GS 450h

Hybrid 2006 Model

Emergency Response Guide

(Revised September 2006)

FOREWORD

In May 2006, Lexus will release the Lexus GS450h petrol-electric hybrid vehicle in Australia. Except where noted in this guide, basic vehicle systems and features for the GS450h are the same as those on the conventional, non-hybrid, Lexus GS430/300. This GS450h Emergency Response Guide has been published to educate and assist emergency responders in the safe handling of the GS450h hybrid technology.

High voltage electricity powers the electric motor, generator, A/C compressor, and inverter/converter. All other automotive electrical devices such as the headlights, power steering, horn, radio, and gauges are powered from a separate 12-Volt battery. Numerous safeguards have been designed into the GS450h 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 GS450h utilises the following electrical systems:

- Maximum 650-Volts AC
- Nominal 288-Volts DC
- Maximum 37-Volts AC / DC
- Nominal 12-Volts DC

GS450h Features:

- First *Hybrid Synergy Drive* to utilise rear wheel drive exclusively.
- A boost converter in the inverter assembly that boosts to 650-Volts the available voltage to the electric motor.
- The high voltage hybrid vehicle battery pack is rated at 288-Volts.
- A high voltage electric motor driven air conditioning compressor rated at 288-Volts.
- High voltage High Intensity Discharge (HID) headlights.
- A high voltage Electric Power Steering (EPS) assist motor rated at 37-Volts.
- The body electrical system rated at 12-Volts negative chassis ground.
- Supplemental Restraint System (SRS) - dual stage frontal airbags, front knee airbags, front seat and optional rear seat side airbags, side curtain airbags, and front seat belt pretensioners.

High voltage electrical safety is an important factor in the emergency handling of the GS450h *Hybrid Synergy Drive* system. It is important to recognise and understand the disabling procedures and warnings throughout the guide.

Additional topics in the guide include:

- Lexus GS450h 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 GS450h hybrid vehicle.

2006 GS450h

TABLE OF CONTENTS

ABOUT THE GS450h

The GS450h sedan is the first hybrid model for Lexus in Australia. *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 GS450h 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 GS450h operates in various driving modes.

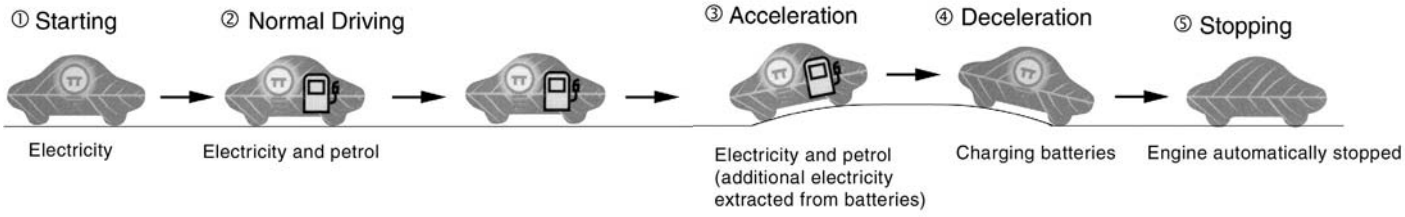
❶ During light acceleration at low speeds, the vehicle is powered by the electric motor. The petrol engine is shut off.

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.

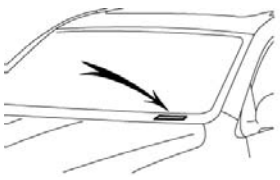
❸ During full acceleration, such as climbing a hill, both the petrol engine and the electric motor power the vehicle.

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

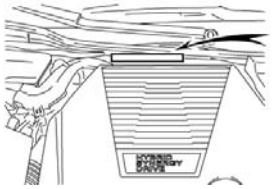
❺ While the vehicle is stopped, the petrol engine and electric motor are off, however the vehicle remains on and operational.



GS450h IDENTIFICATION



Left Hand Side Windshield



Engine Compartment Cowl

Base of Driver Side B Pillar

VIN Plate Locations

In appearance, the 2006 GS450h is nearly identical to the conventional, non-hybrid Lexus GS430/300. The GS450h is a 4-door sedan. Exterior, interior, and engine compartment illustrations are provided to assist in identification.

The alphanumeric 17 character Vehicle Identification Number (VIN) is provided in the front windshield cowl, driver door pillar, and engine compartment.

Example VIN: JTHBC96S105000149

A GS450h is identified by the first 6 alphanumeric characters **JTHBC96S**.

Exterior Front View

Exterior

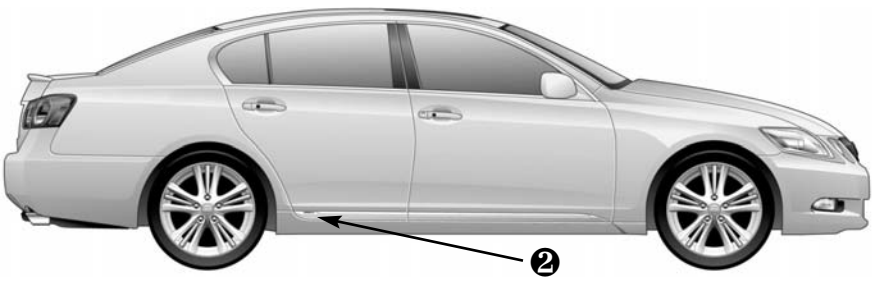
❶ LEXUS GS 450h logos on the rear luggage compartment lid.

❷ HYBRID logos on the rear door moulding.

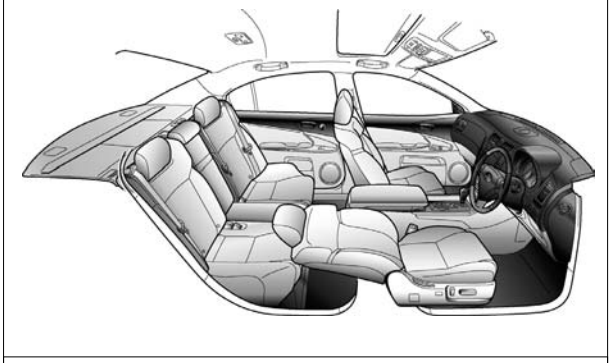
❸ Petrol fuel filler door located on the passenger side rear quarter panel.

Exterior Rear View

Exterior Rear and Passenger Side View



Exterior Driver Side View



Interior View

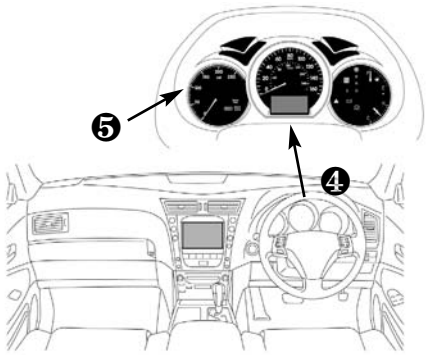
Interior

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 GS430/300.

❺ In place of a tachometer, a power meter showing kW output is used.

NOTE:

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

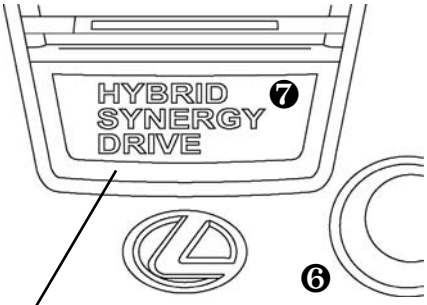


Instrument Cluster View

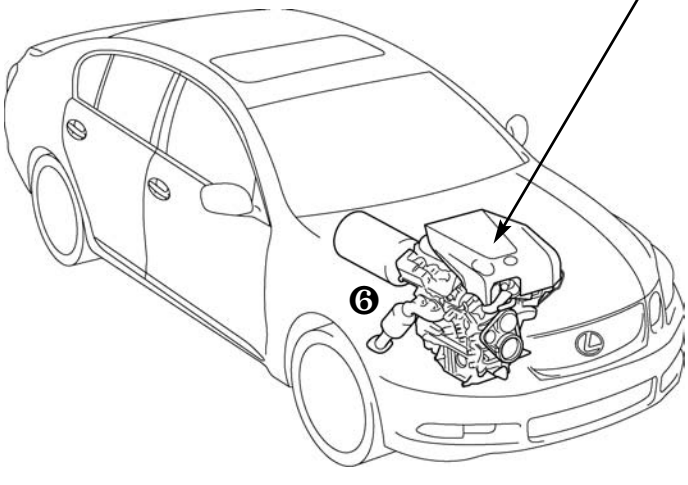
Engine Compartment

❻ 3.5- litre aluminum alloy petrol engine.

❼ Logos on the plastic engine cover.



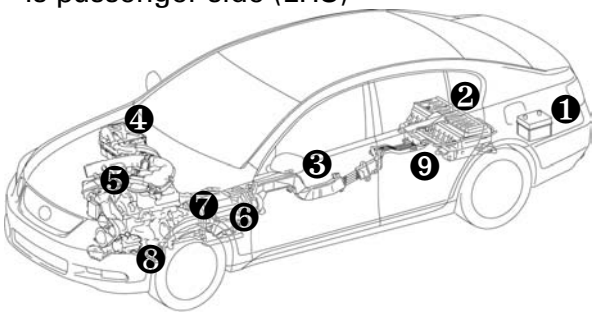
Logo on Cover



Engine Compartment View

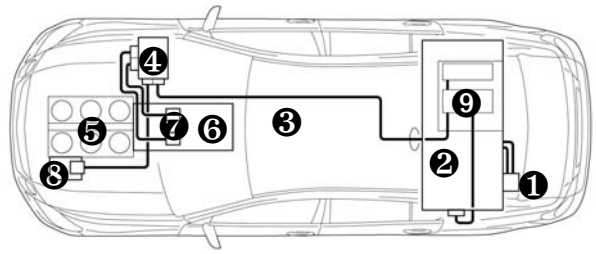
HYBRID SYNERGY DRIVE COMPONENT LOCATIONS AND DESCRIPTIONS

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



Hybrid Synergy Drive Components

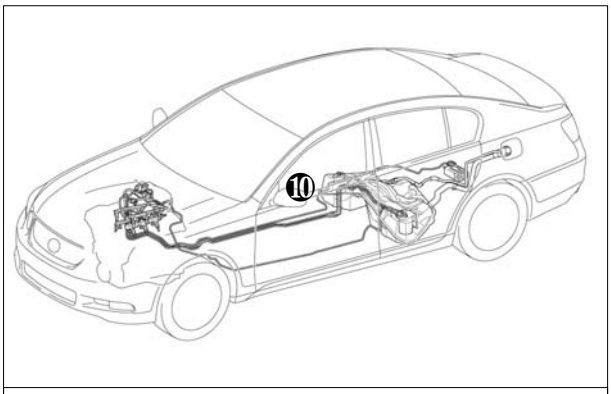
*Actual position of Inverter ❹ is passenger side (LHS)



Components (Top View) and High Voltage Power Cables

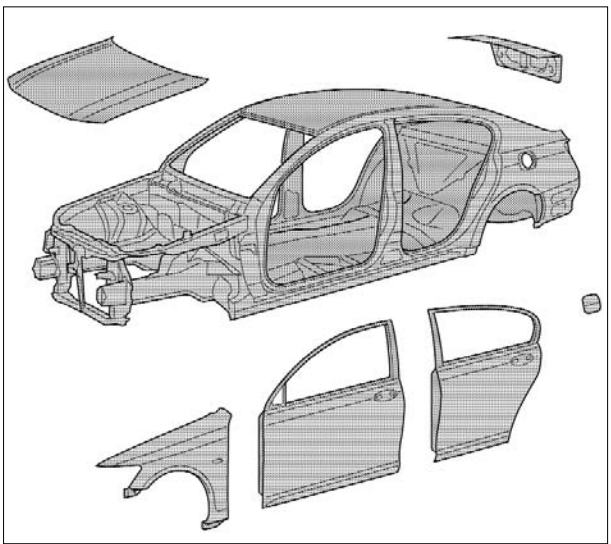
COMPONENT	LOCATION	DESCRIPTION
12-Volt ❶ Auxiliary Battery	Luggage Compartment	A lead-acid battery that supplies power to the low voltage devices.
Hybrid ❷ Vehicle (HV) Battery Pack	Luggage Compartment Area, Mounted to Cross Member and behind Rear Seat	288-Volt Nickel Metal Hydride (NiMH) battery pack consisting of 40 low voltage (7.2-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, inverter/converter, and A/C compressor. These cables also carry 3-phase Alternating Current (AC) between the inverter/converter, electrical motor, and generator.
Inverter/ Converter ❹*	Engine Compartment	Boosts and inverts the high voltage electricity from the HV battery pack to 3-phase AC electricity that drives the electric motor. The inverter/converter also converts AC electricity from the electric generator and electric motor (regenerative braking) to DC that recharges the HV battery pack.
Petrol 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 rear wheels through the propeller shaft.

HYBRID SYNERGY DRIVE COMPONENT LOCATIONS AND DESCRIPTIONS



Fuel Tank and Fuel Lines

COMPONENT	LOCATION	DESCRIPTION
A/C ❽ Compressor	Engine Compartment	3-phase high voltage AC electrically driven motor compressor.
DC-DC ❾ Converter	Luggage Compartment under HV Battery Pack	Converts 288-Volts from the HV battery pack to 12-Volts for low voltage vehicle power.
Fuel Tank ⑩ and Fuel Lines	Undercarriage, Driver Side and Centre	The fuel tank provides petrol via fuel lines to the engine. The fuel lines are routed along the driver side and centre tunnel under the floor pan.

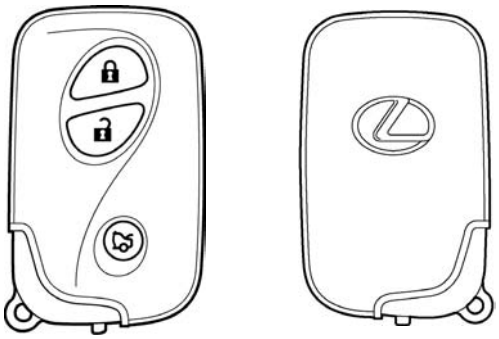


Steel Unibody

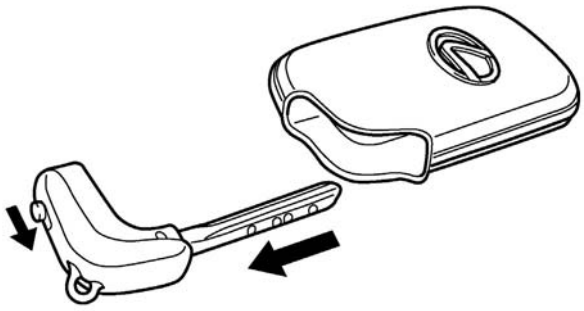
Key Specifications

Petrol Engine:	(218 kW), 3.5- litre Aluminum Alloy Engine
Electric Motor:	(147 kw), Permanent Magnet Motor
Transmission:	Automatic Only
HV Battery:	288-Volt Sealed NiMH Battery
Curb Weight:	1,875 kg
Fuel Tank:	65 litres
Frame Material:	Steel Unibody
Body Material:	Steel Panels

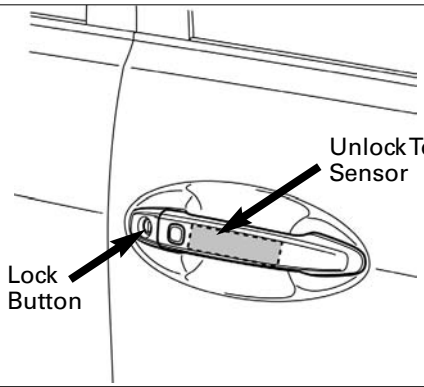
SMART ENTRY SYSTEM AND PUSH-BUTTON START



Smart Key



Hidden Metal Cut Key For Door Lock



Hidden Metal Cut Key For Door Lock

The GS450h smart entry system consists of a smart key transceiver that communicates bi-directionally enabling the vehicle to recognise the smart key in close proximity to the vehicle. Once recognised, the smart key will allow the user to lock and unlock the doors without pushing smart key buttons, and start the vehicle without inserting it into an ignition switch.

Smart key features:

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

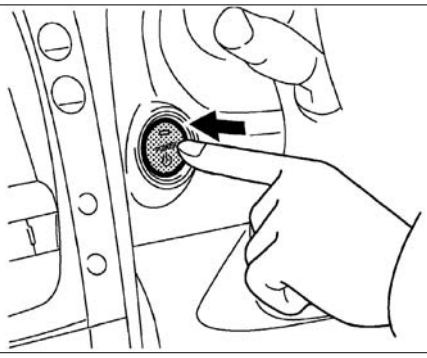
Door (Lock/Unlock)

Three methods are available to lock/unlock the doors.

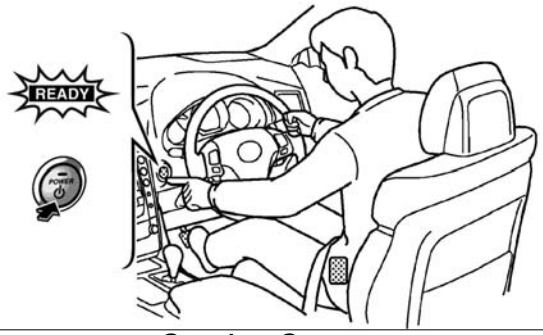
1. Pushing wireless smart key lock/unlock buttons.
2. Touching the sensor on the backside of any exterior door handle, with the smart key in close proximity to the vehicle, unlock the doors. Pushing the lock button on any exterior door handle locks the doors.
3. Inserting the hidden metal cut key in the drivers door lock and turning clockwise once unlocks the driver door, twice unlocks all doors. To lock all doors turn the key counter-clockwise once. Only the driver door contains an exterior door lock for the metal cut key.

SMART ENTRY SYSTEM AND PUSH-BUTTON START

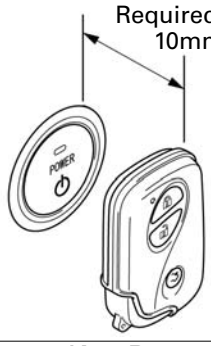
Power Button with Integral Status Indicator Light



Ignition Modes (Brake Pedal Released)



Starting Sequence (Brake Pedal Depressed)



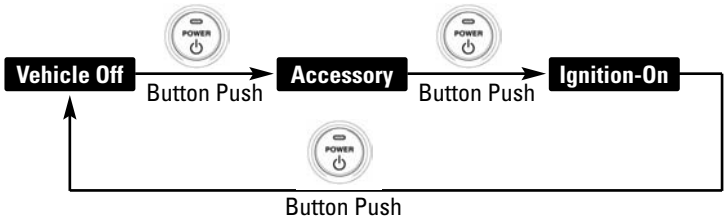
Smart Key Recognition (When Smart Key Battery is Discharged)

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.

- 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.

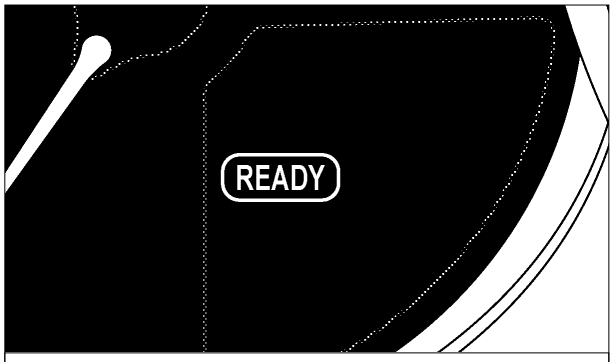
Ignition Mode Sequence (Brake pedal released):



- 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 discharged, it cannot communicate with the vehicle. In order for the vehicle to recognise the smart key, the driver must hold the smart key next to the power button while pushing the power button.
- 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



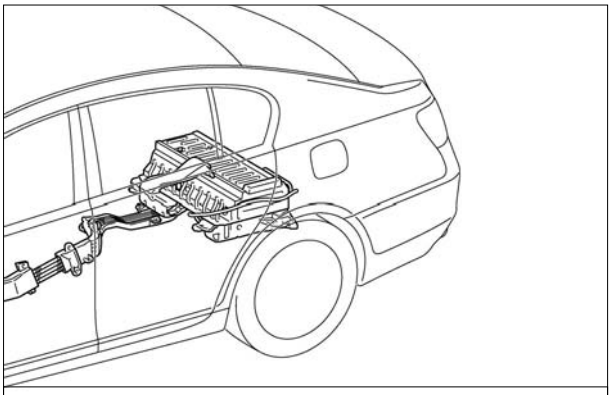
Instrument cluster **READY** Indicator

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 lit, it informs the driver that the vehicle is on and operational even though the petrol engine may be off and the engine compartment is silent.

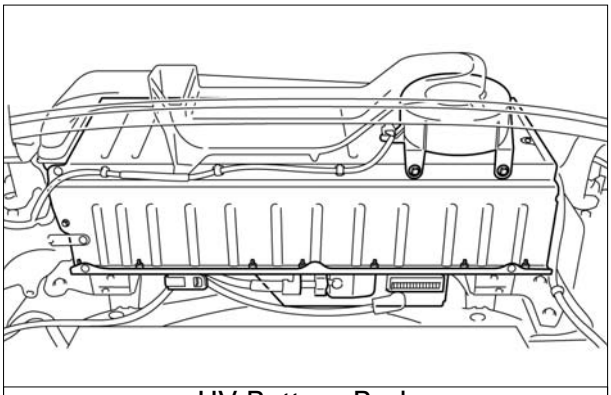
Vehicle Operation

- With the GS450h, the petrol engine may stop and start at any time while the **READY** indicator is on.
- Never assume that the vehicle is shut off just because the engine is off. Always look for the **READY** indicator status. The vehicle is shut off when the **READY** indicator is off.
- The vehicle may be powered by:
    1. The electric motor only.
    2. The petrol engine only.
    3. A combination of both the electric motor and the petrol engine.
- The vehicle computer determines the mode in which the vehicle operates to improve fuel economy and reduce emissions. The driver cannot manually select the mode.

HYBRID VEHICLE (HV) BATTERY PACK



288-Volt HV Battery Pack



HV Battery Pack
Mounted in Luggage Compartment

The GS450h contains a high voltage, Hybrid Vehicle (HV) battery pack that contains sealed Nickel Metal Hydride (NiMH) battery modules.

HV Battery Pack

- The HV battery pack is enclosed in a metal case and is securely mounted in the 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 40 low voltage (7.2-Volt) NiMH battery modules connected in series to produce approximately 288-Volts. Each NiMH battery module is non-spillable and sealed in a plastic case.
- The electrolyte used in the NiMH battery module is an alkaline mixture of potassium and sodium hydroxide. The electrolyte is absorbed into the battery cell plates and forms a gel that will not normally leak, even in a collision.
- In the unlikely event that the battery pack is overcharged, the modules vent gases directly outside the vehicle through a vent hose.

HV BATTERY PACK	
Battery pack voltage	288-Volts
Number of NiMH battery modules in the pack	40
NiMH battery module voltage	7.2-Volts
NiMH battery module dimensions	118x20x276mm
NiMH module weight	1.0kg
NiMH battery pack dimensions	333x952x484mm
Battery pack weight	69kg

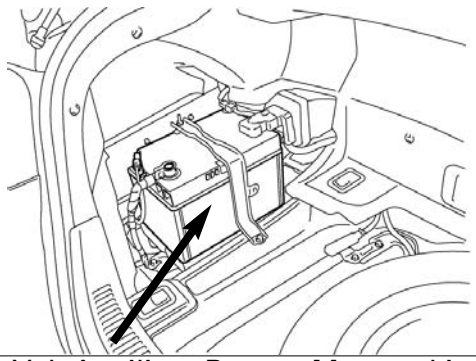
Components Powered by the HV Battery Pack

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

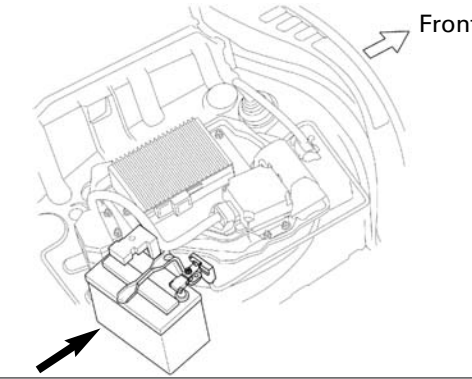
HV Battery Pack Recycling

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

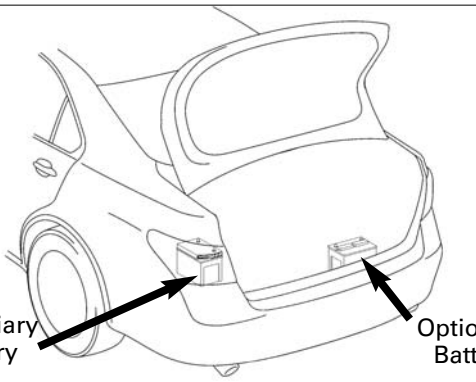
LOW VOLTAGE BATTERIES



12-Volt Auxiliary Battery Mounted in Luggage Compartment



Optional 12-Volt Battery for Active Stabiliser Suspension System



Low Voltage Batteries in Luggage Compartment

The Auxiliary Battery

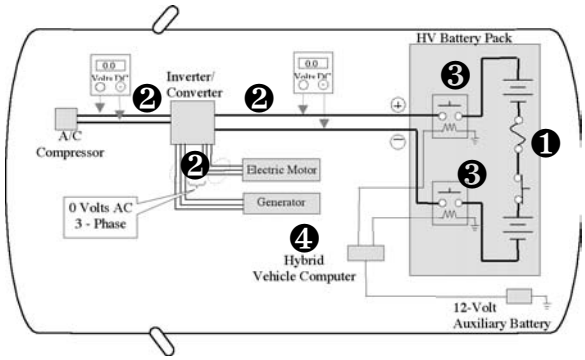
- The GS450h contains a lead-acid 12-Volt battery. The 12-Volt auxiliary battery powers the vehicle's electrical system similar to a conventional vehicle. As with conventional vehicles, the auxiliary battery is grounded to the metal chassis of the vehicle.
- The auxiliary battery is located in luggage compartment. It is concealed by a fabric cover on the passenger side in the rear quarter panel well.

Optional Active Stabiliser Suspension System Battery

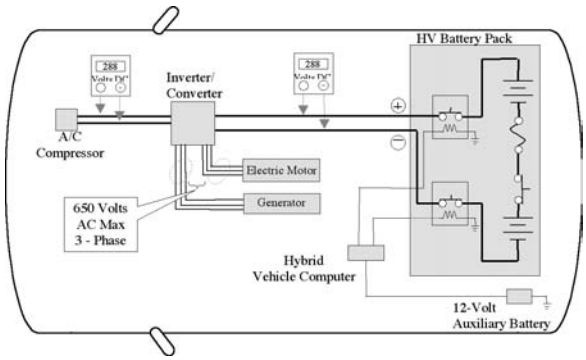
- The GS450h may be optionally equipped with an active stabiliser suspension system powered by a separate 12-Volt lead-acid battery. Similar to the auxiliary battery, the 12-Volt active stabiliser suspension system battery is grounded to the metal chassis of the vehicle.
- When equipped with the optional active stabiliser suspension system, the GS450h is equipped with run-flat tyres, and no spare tyre. The active stabiliser suspension system battery is located in the luggage compartment, and concealed under deck fabric and tool tray in the spare tyre well.

NOTE:

The 12-Volt battery for the optional active stabiliser suspension system does not power the vehicle's low voltage system. Responders need to identify and distinguish the auxiliary battery from the active stabiliser suspension system battery. When in doubt, during power disconnect, disable both 12-Volt batteries in the luggage compartment.



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



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

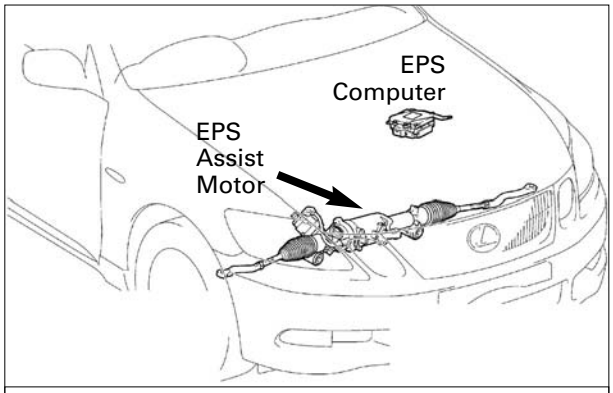
The HV battery pack powers the high-voltage electrical system with DC electricity. Positive and negative orange coloured high voltage power cables are routed from the battery pack, under the vehicle floor pan, routed along the passenger side propeller shaft and transmission tunnel to the inverter/converter. The inverter/converter contains a circuit that boosts the HV battery voltage from 288 to 650-Volts DC. The inverter creates 3-phase AC to power the motor and generator located in the transmission. Power cables are routed from the inverter to each high-voltage motor (electrical motor, electric generator, and A/C compressor). The following systems keep occupants in the vehicle and emergency responders safe from high voltage electricity:

High Voltage Safety System

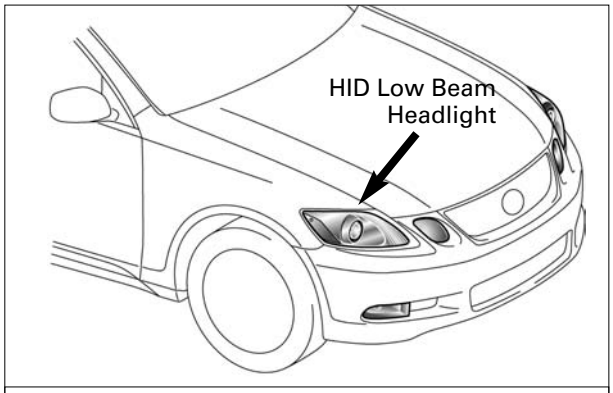
- A high voltage fuse ❶ provides short circuit protection in the HV battery pack.
- Positive and negative high voltage power cables ❷ connected to the HV battery pack are controlled by 12-Volt normally open relays ❸. When the vehicle is shut off, the relays stop electricity flow from leaving the HV battery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



37-Volt EPS



Projector Type HID Low Beam Headlights

Electronic Power Steering System

The GS450h is equipped with a 37-Volt AC assist motor for the Electric Power Steering (EPS) system. The EPS computer generates 37-Volts from the 12-Volt system. The 37-Volt wires are isolated from the metal chassis and are routed a short distance from the EPS computer to the EPS assist motor in the engine compartment.

NOTE:
37-Volt AC has a higher arc potential than the normal 12-Volt DC.

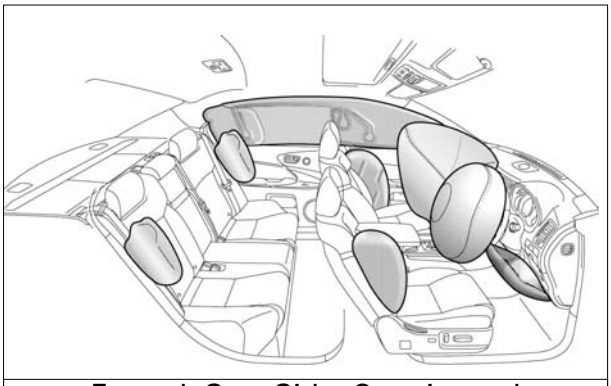
High Intensity Discharge Headlights

Similar to conventional, non-hybrid, Lexus vehicles, the GS450h is equipped with low beam projector type High Intensity Discharge (HID) headlights. The light control unit, located inside the headlight assembly, contains a high voltage generator circuit that momentarily boosts 12-Volts to 22-kV that is applied to the bulb when the headlights are turned on. Once illuminated, the voltage drops to approximately 45-Volts.

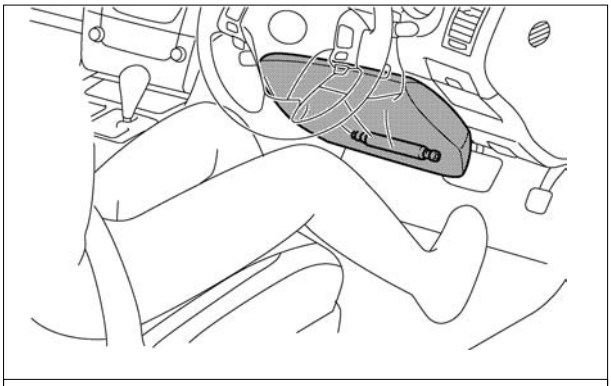
⚠ **WARNING:**

High voltage is applied to the HID bulb socket when the low beam headlights are turned on. To avoid serious injury or death by electric shock do not touch the bulb socket when the headlights are turned on.

SRS AIRBAGS & SEAT BELT PRETENSIONERS



Frontal, Seat Side, Curtain, and Knee Airbag



Driver Side Knee Airbags

Standard Equipment

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

Optional Equipment

- Rear seat side impact airbags ⓫ mounted in the rear seats are optional equipment.
- A pre-crash safety system containing 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 seatbelts. When conditions stabilise the electric motor will reverse itself. When the airbags deploy, the pyrotechnic pretensioners function normally.

NOTES:

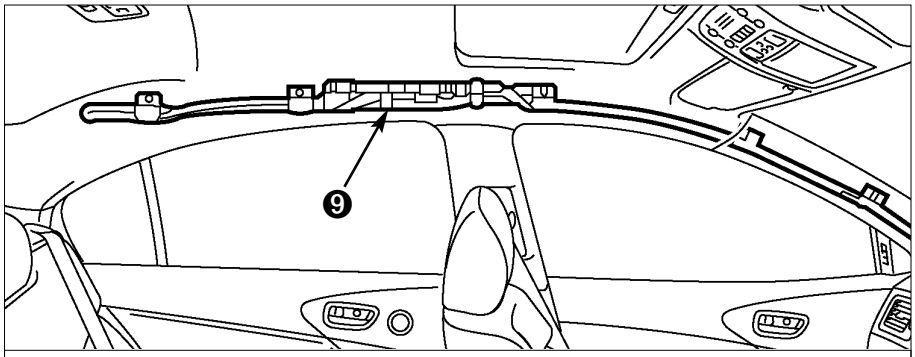
The front seat side impact airbags and the side curtain airbags may deploy independently of each other.

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

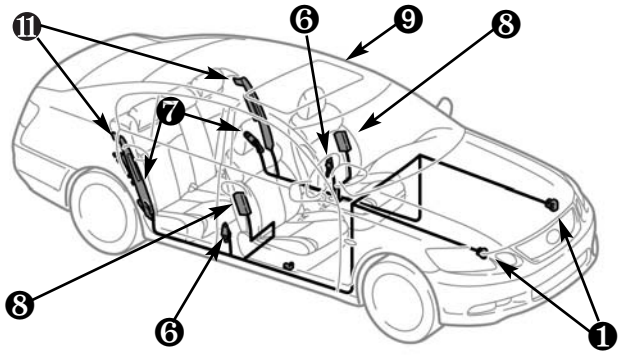
⚠ **WARNING:**

The SRS may remain powered for up to 90 seconds after the vehicle is shut off or disabled. To prevent serious injury or death from unintentional SRS deployment, avoid breaching the SRS components

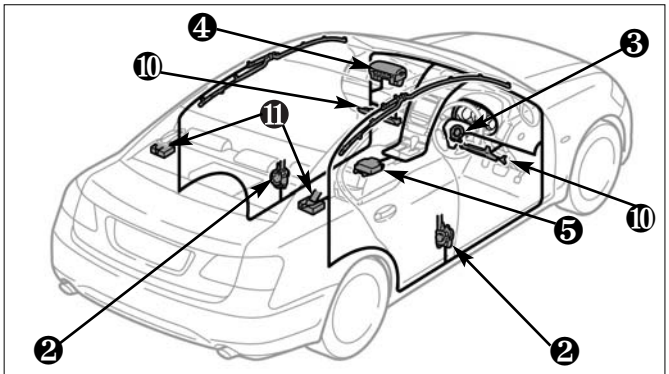
SRS AIRBAGS & SEAT BELT PRETENSIONERS



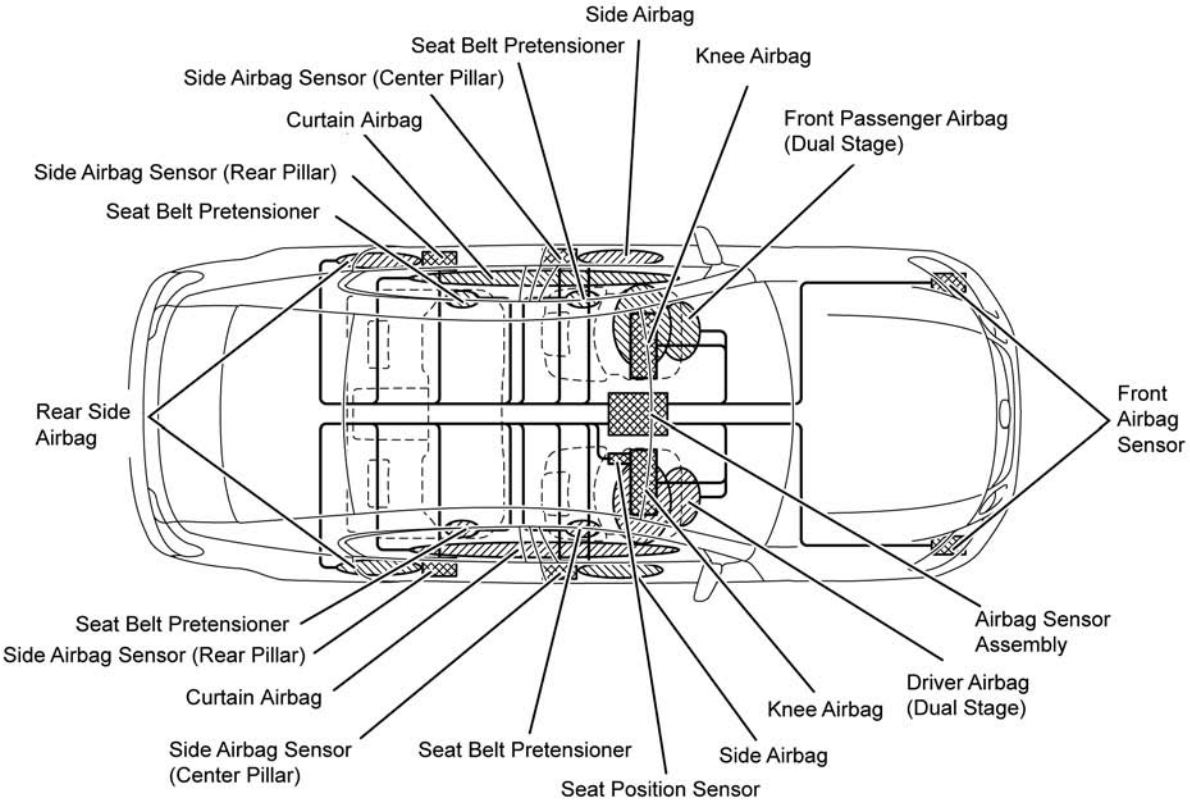
Side Curtain Airbag Inflator in Roof Rail



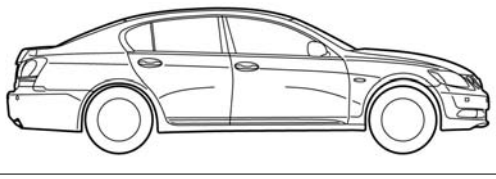
Electronic Impact Sensors, Front and Optional Rear Seat Side Airbags



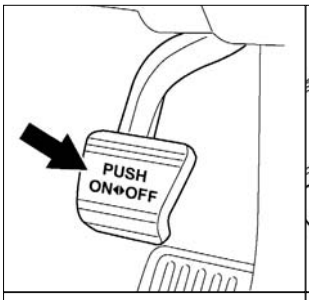
Standard Frontal Airbags, Seat Belt Pretensioners, Knee Airbags, and Side Curtain Airbags.



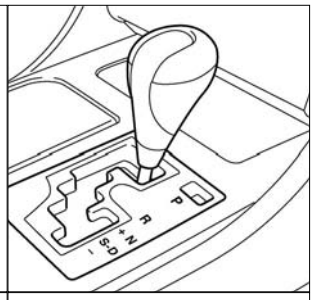
System Diagram



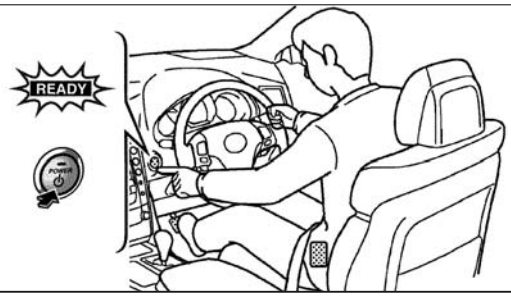
Chock Wheels



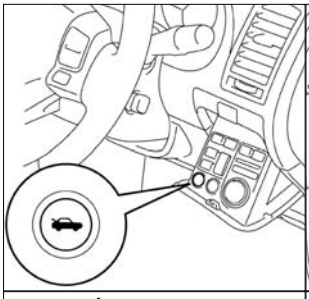
Set Parking Brake



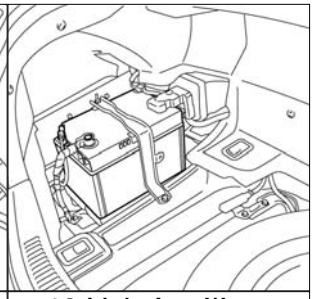
Shift Lever in Park



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



Luggage Compartment Opener Button



12-Volt Auxiliary Battery in Luggage Compartment

On arrival, emergency responders should follow their standard operating procedures for vehicle incidents. Emergencies involving the GS450h may be handled like other automobiles except as noted in these guidelines for Extrication, Fire, Overhaul, Recovery, Spills, First Aid, and Submersion.

⚠ WARNING:

- *Never assume the GS450h 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.

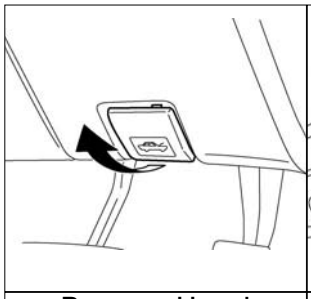
  Move the shift lever to the Park position.

- ## Disable Vehicle

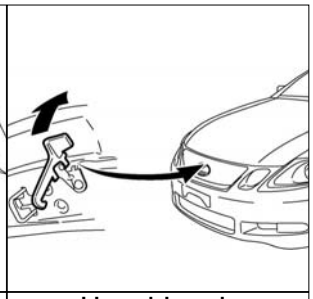
  Performing any one of the following three procedures will shut the vehicle off and disable the HV battery pack, SRS, and petrol fuel pump.

  Procedure #1

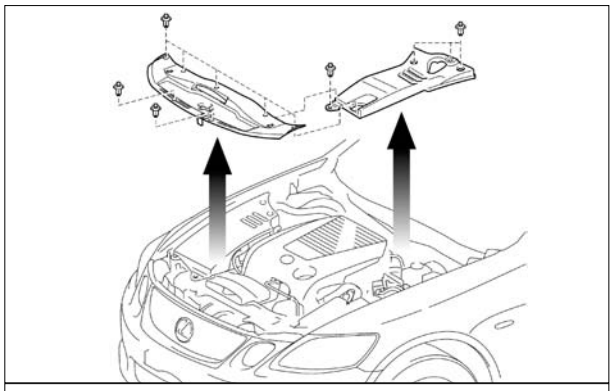
  1. Confirm the status of **READY** indicator in the instrument cluster.
  2. If the **READY** indicator is illuminated, the vehicle is on and operational. Shut off the vehicle by pushing the power button once.
  3. The vehicle is already shut off if the instrument cluster lights and the **READY** indicator are not illuminated. Do **not** push the power button because the vehicle may start.
  4. Keep the smart key 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.



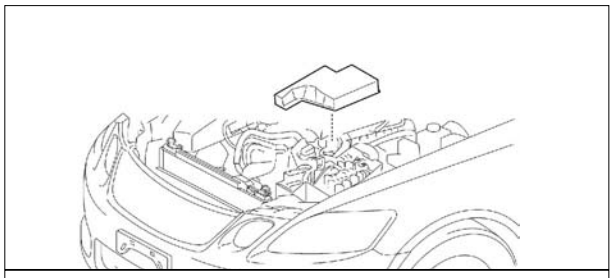
Remote Hood Release



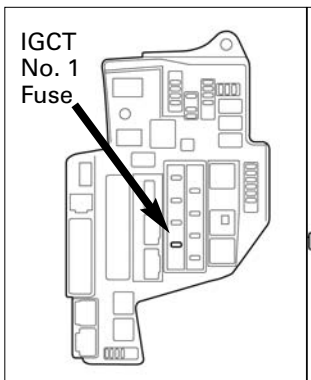
Hood Latch Release



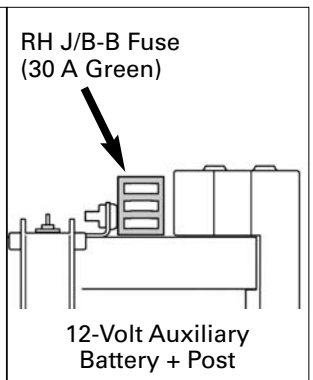
Remove Engine Compartment Covers



Remove Fuse Box Cover



IGCT No. 1 Fuse Location in Engine Compartment Fuse Box



RH J/B-B Fuse in Luggage Compartment near the Auxiliary Battery Positive Post

Extrication *(Continued)*

NOTE:

Before disconnecting the 12-Volt auxiliary battery, if necessary, reposition the power seats and 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 illustration in the Roadside Assistance section page 24). Once the 12-Volt auxiliary battery is disconnected power controls will not operate.

Procedure #2 (Alternate if power button is inaccessible)

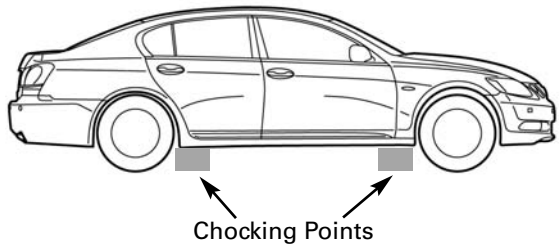
1. Disconnect the 12-Volt auxiliary battery in the luggage compartment.
2. Remove the engine compartment covers.
3. Remove the driver side fuse box cover.
4. Remove the IGCT No. 1 fuse (20A yellow coloured) in the engine compartment junction block as illustrated. If the correct fuse cannot be recognised, pull all of the fuses in the fuse block.

Procedure #3 (Alternate if power button and engine compartment are inaccessible)

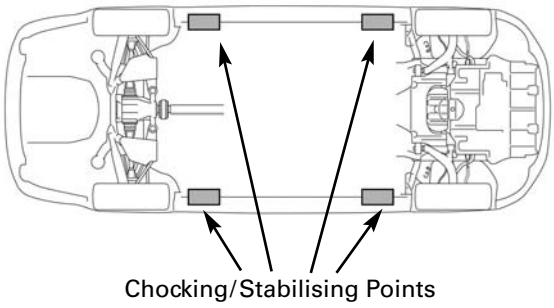
1. Remove the RH J/B-B fuse (30A green coloured) in the luggage compartment near the auxiliary battery positive post as illustrated. If the correct fuse cannot be recognised, pull all three fuses.
2. Disconnect the 12-Volt auxiliary battery in the luggage compartment.

⚠ WARNING:

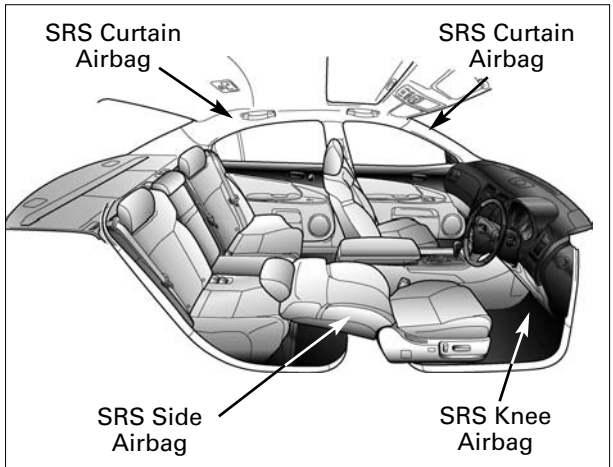
- *The high voltage system may remain powered for up to 10 minutes after the vehicle is shut off or disabled. To prevent serious injury or death from severe burns or electric shock, avoid touching, cutting, or opening any orange high voltage power cable or high voltage component.*
- *The SRS may remain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



Underbody View



Front Seat Side, Side Curtain, and Knee Airbag Identifiers.

Extrication *(Continued)*

- Stabilise Vehicle

  Check/stabilise at (4) points directly under the front and rear pillars.

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

- Access Patients

  Glass Removal

  Use normal glass removal procedures as required.

  SRS Awareness

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

  Door Removal/Displacement

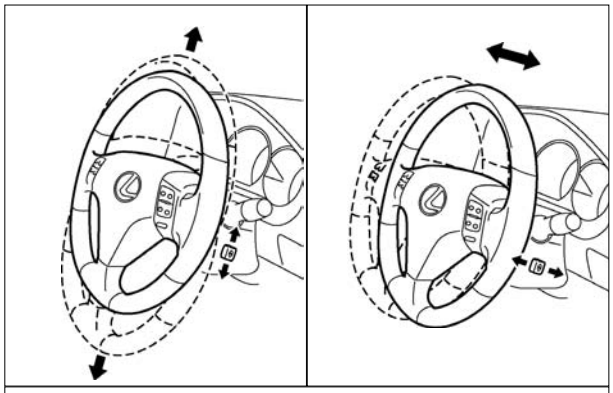
  Doors can be removed by conventional rescue tools such as hand, electric, and hydraulic tools. In certain situations, it may be easier to pry back the vehicle body to expose and unbolt the hinges.

  Roof Removal

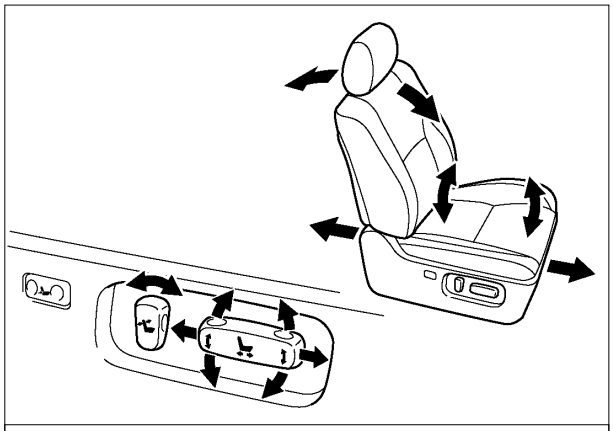
  The GS450h contains side curtain airbags. If undeployed, it is not recommended to remove or to displace the roof. The side curtain airbags may be identified as illustrated.

  Dash Displacement

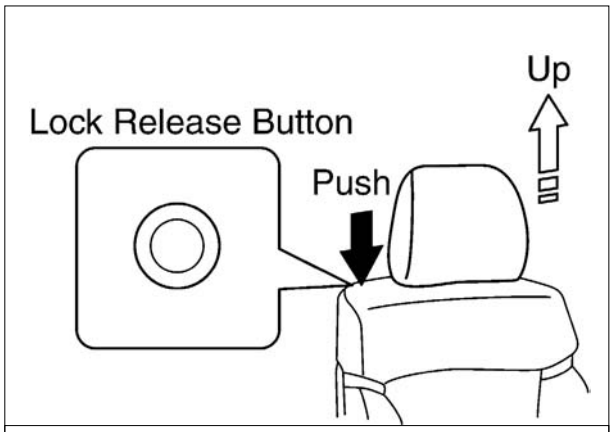
  The GS450h contains side curtain airbags. Do not remove or displace the roof during a dash displacement to avoid cutting into undeployed airbags or inflators. As an alternative, dash displacement may be performed by using a Modified Dash Roll.



Power Tilt and Telescoping Controls



Power Front Seat Controls



Driver Headrest Hidden Release Button

Extrication *(Continued)*

Rescue Lift Air Bags

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

Repositioning Steering Wheel and Seat

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

NOTE:

The GS450h driver seat is equipped with a power seat slide linked headrest. Repositioning the seat and/or headrest removal must be done prior to 12-Volt auxiliary battery disconnect. Unlike the passenger seat, the driver seat has a hidden release button located under the seat fabric as illustrated.

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 a GS450h until the fire has been knocked down and overhaul operations have commenced.

- 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 GS450h 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 GS450h 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 GS450h 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.

- Disable Vehicle

  Performing any one of the following three 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. Keep the smart key 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.

  Procedure #2 (Alternate if power button is inaccessible)

  1. Disconnect the 12-Volt auxiliary battery in the luggage compartment.
  2. Remove the engine compartment covers.
  3. Remove the driver side fuse box cover.
  4. Remove the IGCT No. 1 fuse (20A yellow coloured) in the engine compartment junction block as illustrated on page 16. If the correct fuse cannot be recognised, pull all of the fuses in the fuse block.

  Procedure #3 (Alternate if power button and engine compartment are inaccessible)

  1. Remove the RH J/B-B fuse (30A green coloured) in the luggage compartment near the auxiliary battery positive post as illustrated on page 16. If the correct fuse cannot be recognised, pull all three fuses.
  2. Disconnect the 12-Volt auxiliary battery in the luggage compartment.

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.

⚠ 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.*

Spills

The GS450h 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 the plastic battery module would be a rare occurrence.

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

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 26.

- 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 water.

EMERGENCY RESPONSE

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.

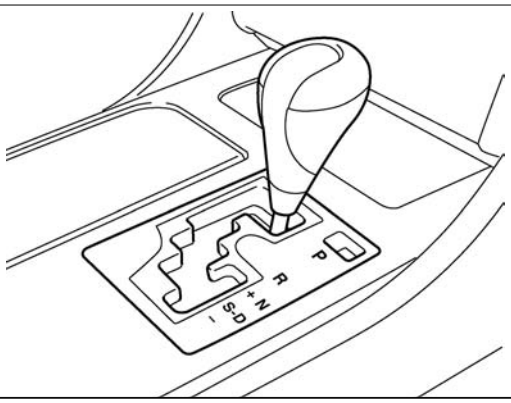
> ⚠ **WARNING:**
> *The NIMH battery electrolyte is a caustic alkaline (pH 13.5) that is damaging to human tissues. To avoid injury by coming in contact with the electrolyte, wear proper personal protective equipment.*

- 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.
- 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.

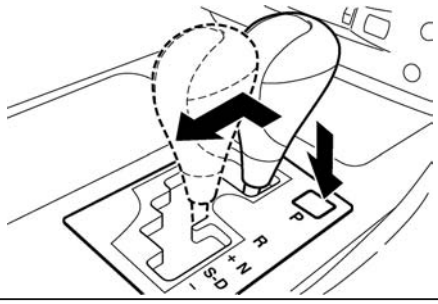
Submersion

When fully or partially submersed a GS450h can be safely handled by following these recommendations:

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



Gated Shift Lever



Push in Shift Lock Release

Lexus GS450h roadside assistance may be handled like conventional Lexus vehicles except as noted in the following pages.

Lexus Roadside Assistance is available during the basic warranty period by contacting:

Lexus Drivecare: 1800 253 987

Shift Lever

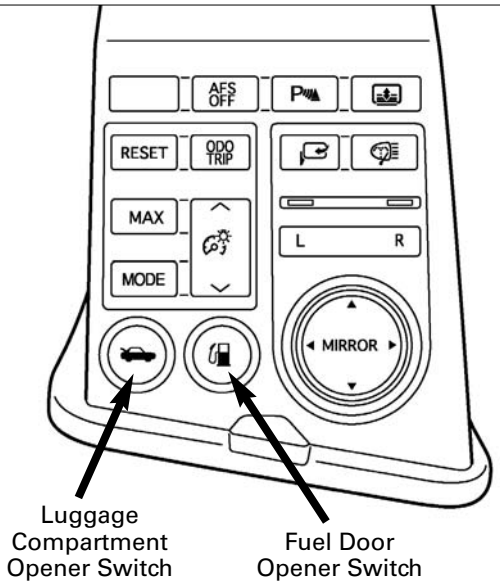
Similar to most Lexus vehicles, the GS450h uses a gated shift lever as shown in the illustration. However, the GS450h shift lever includes an **S** position for 6 levels of engine braking.

Towing

The GS450h is a rear drive vehicle and it must be towed with the rear wheels off the ground. Failure to do so may cause serious damage to the Hybrid System Drive components.

- A flat bed trailer is the preferred method of towing.
- When towing the vehicle with the front wheels on the ground, be sure to release the steering lock by turning the ignition-on.
- The vehicle may be shifted out of **P**ark into **N**eutral 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 **P**ark, 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.

ROADSIDE ASSISTANCE



Fuel Door and Luggage Compartment Opener Switches

Electric Luggage Compartment Opener

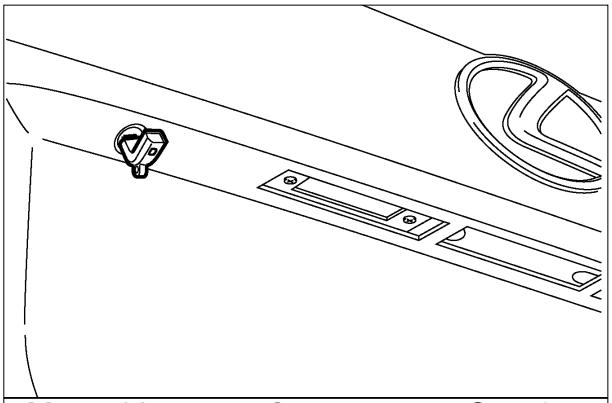
The GS450h is equipped with an electric luggage compartment opener. In the event of 12-Volt power loss, the luggage compartment can be opened with the metal cut key hidden in the smart key.

Electric Fuel Door Opener

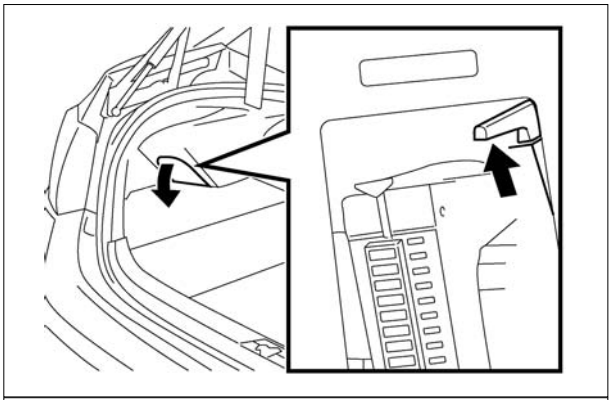
The GS450h is equipped with an electric fuel door opener. In the event of 12-Volt power loss, the fuel door can only be opened using the manual release located inside the luggage compartment.

Spare Tyre

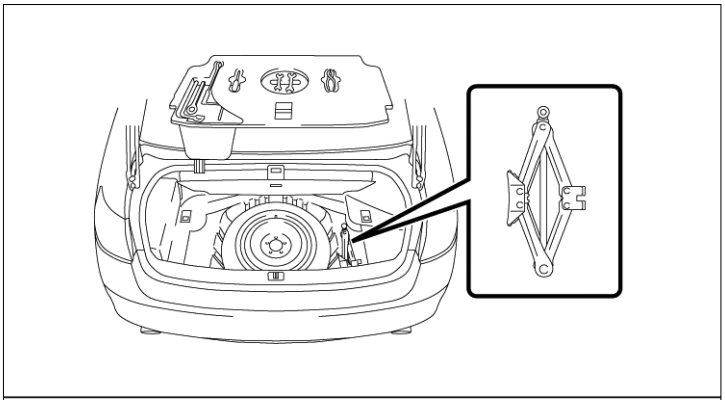
The jack, tools, and spare tyre are provided in the luggage compartment as illustrated.



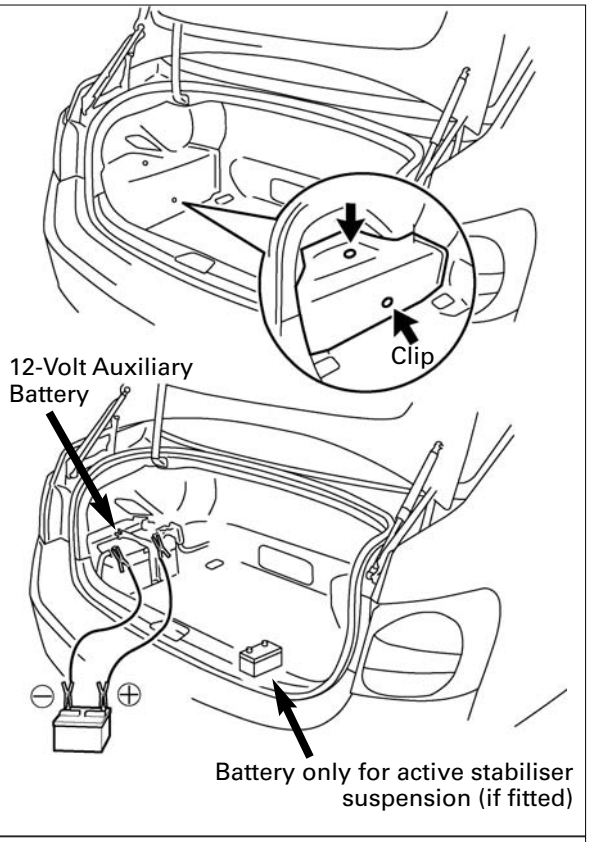
Manual Luggage Compartment Opening with the Metal Cut Key



Manual Fuel Door Release



Tools and Spare Tyre in the Luggage Compartment



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 smart key to open the luggage compartment.

- Open the luggage compartment, and remove the 12-Volt auxiliary battery cover on the left hand side.
- Connect the positive jumper cable to the positive battery post.
- Connect the negative jumper cable to the negative battery post.
- Place the smart key inside the vehicle, depress the brake pedal, and push the start button.

NOTES:

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 discharged, hold the smart key next to the power button (within 10 mm) during the start sequence.

- The high-voltage HV battery pack cannot be jump-started.
- Never use a 'Quick Charger' or 'Booster Pack' to jump-start the vehicle.
- If the auxiliary battery needs to be replaced, replace it only with 12-Volt battery specially designed for use in the GS450h.

Immobiliser and Anti-Theft Alarm

The GS450h is equipped with an immobiliser system and an anti-theft alarm as standard equipment.

- The vehicle can be started only with a registered smart key.
- To disarm the anti-theft alarm, unlock the door by using the smart key button, hidden metal cut key, or using the door handle touch sensor. Engaging the ignition-on mode 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-MP6R5R02 (GEN II)
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/Revised date	Issue date Oct 31st, 2003
Issue number	p0054

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.

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. Transport 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.
There should be a *"Non-spillable"* marking for international shipment. *(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)

(1) DOT (Department of Transportation)
- UN Number 2800
- Classes 8
- Special Provision 49 CFR 173.159(d)

(2) IATA (International Air Transport Association)
- UN Number 2800
- Classes 8
- Special Provision A67

15. Others

Not specified.

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