

Hybrid

Hybrid Vehicle Emergency Response Manual



HINO195h Cab Over Engine Hybrid



Foreword

This manual provides information and important warnings and precautions to assist emergency responders in the safe handling of the hybrid system of the HINO195h Hybrid.

The HINO195h Hybrid vehicle utilizes a high voltage system (300 Volts) to assist the Diesel engine as a means of propulsion.

Improper handling of the hybrid system may cause serious injury to emergency responders such as injuries from electric shock, severe burns, or even death.

Emergency responders should make sure to follow the instructions in this manual for the safe handling of the HINO195h hybrid.

It is also important to note that the HINO195h hybrid can only be serviced or repaired by trained personnel. Other parties involved in the service, repair or mounting body to this vehicle MUST have had training prior to commencement of work on the HINO195h hybrid.

Important Symbols and Signs

 WARNING	“WARNING” as used in this manual indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury including electric shocks or severe burns.
  DANGER	“DANGER” as used in this manual indicates that high voltage is present inside the component which, if not avoided, could result in death or serious injuries including electric shocks or severe burns.

HINO195h Key Specifications

Diesel Engine:	5.0L; 4 Cylinder; 210HP at 2,500 rpm; 440 lb.-ft. at 1,500 rpm
HV Motor:	36kw, Permanent Magnet Motor
Transmission:	6-speeds Automatic Transmission
HV Battery:	288V Sealed NiMH (Nickel Metal Hydride Battery)
Frame Material:	Steel Frame
Body Material:	Steel panels

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HINO195h Vehicle Identification

The HINO195h hybrid is a cab over engine design medium duty truck. There are two available configurations, a single cab and a crew cab. The HINO195h also has some unique badging that identifies it as a hybrid.



Single Cab



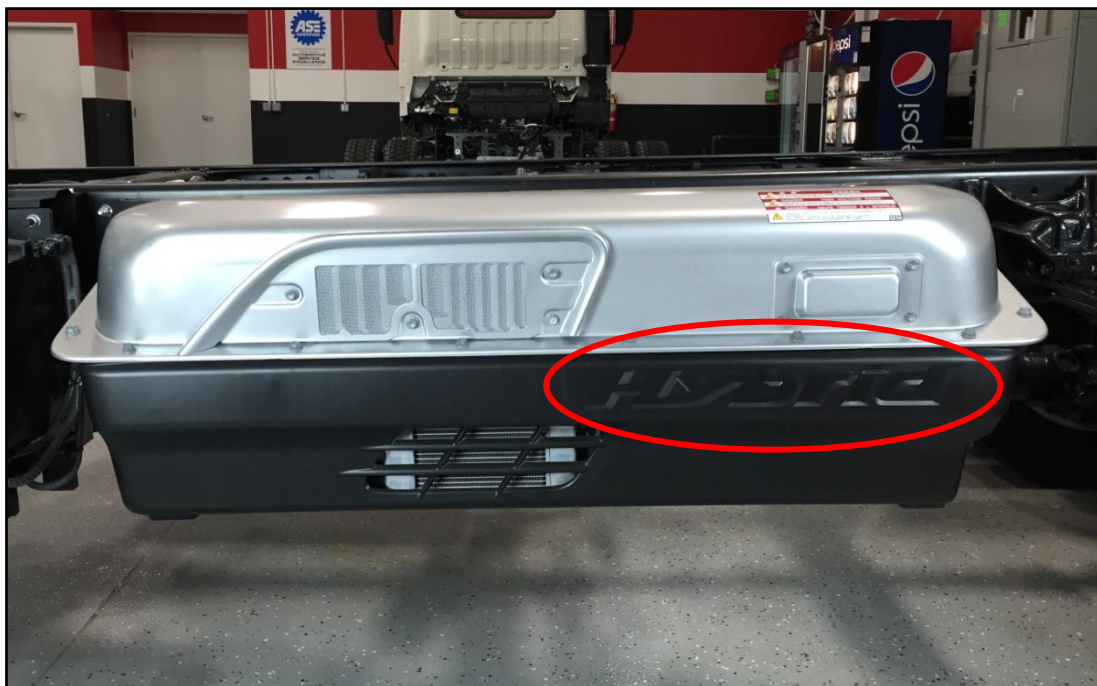
Crew Cab

HINO195h Hybrid Exterior Badging

The HINO195h can be identified as a hybrid by the blue grill, the hybrid logo on the battery pack and by the unique badging that can be found on the driver and passenger doors, and the front of the truck.



Blue Top Bar of Grill



Hybrid Logo on Battery Pack



“h” After 195 on Driver Door Identifying Vehicle as a Hybrid



“h” After 195 on Passenger Door Identifying Vehicle as a Hybrid



Hybrid Badge on Driver's Side Front of Truck

HINO195h Hybrid Interior Badging

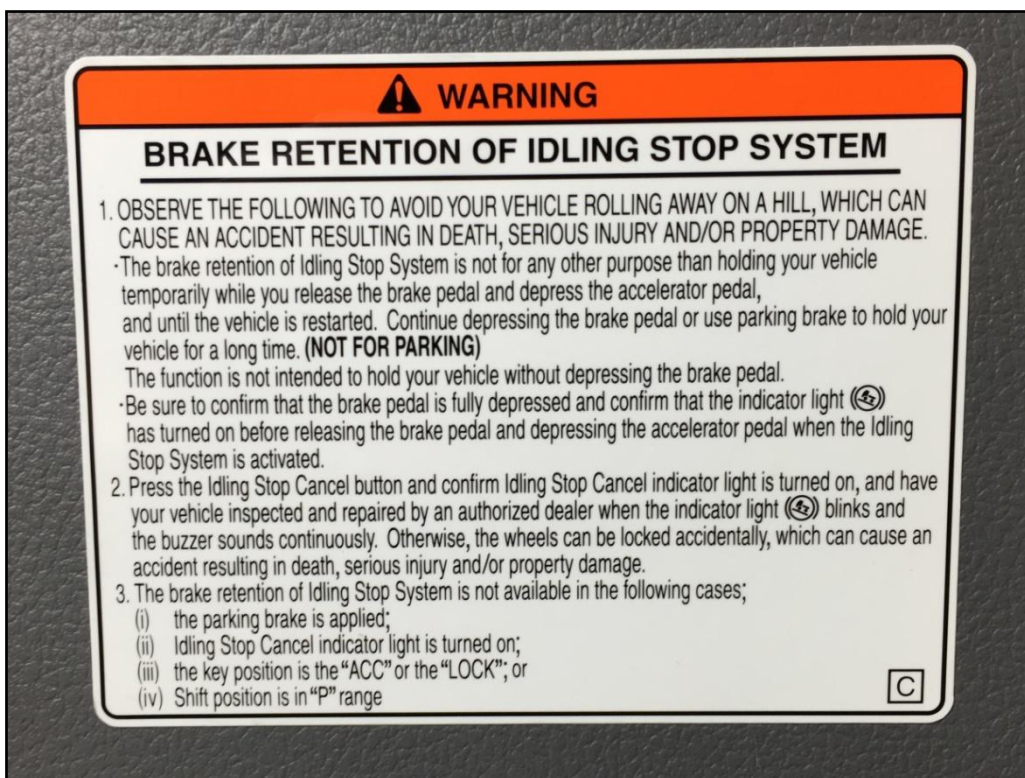
The HINO195h can be identified as a hybrid inside the truck by the hybrid logo on the meter, the idle stop button on the instrument panel, and the idle stop warning label on the driver's door.



Hybrid Logo on Meter with Ignition Off



Auto Stop Button in Center of Instrument Panel



Auto Stop Warning Label on Driver's Door

Hybrid System Components

The main hybrid components in the HINO195h are the battery pack, motor/generator assembly, and the high voltage cables. The battery pack contains the High Voltage (HV) battery, inverter, and Hybrid Electronic Control Unit (ECU).

 ⚠ DANGER	Danger HIGH VOLTAGE is always present inside the battery pack. To prevent serious injury or death never cut or open the battery pack cover.
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High Voltage Battery Pack Located on Driver's Side Frame Rail

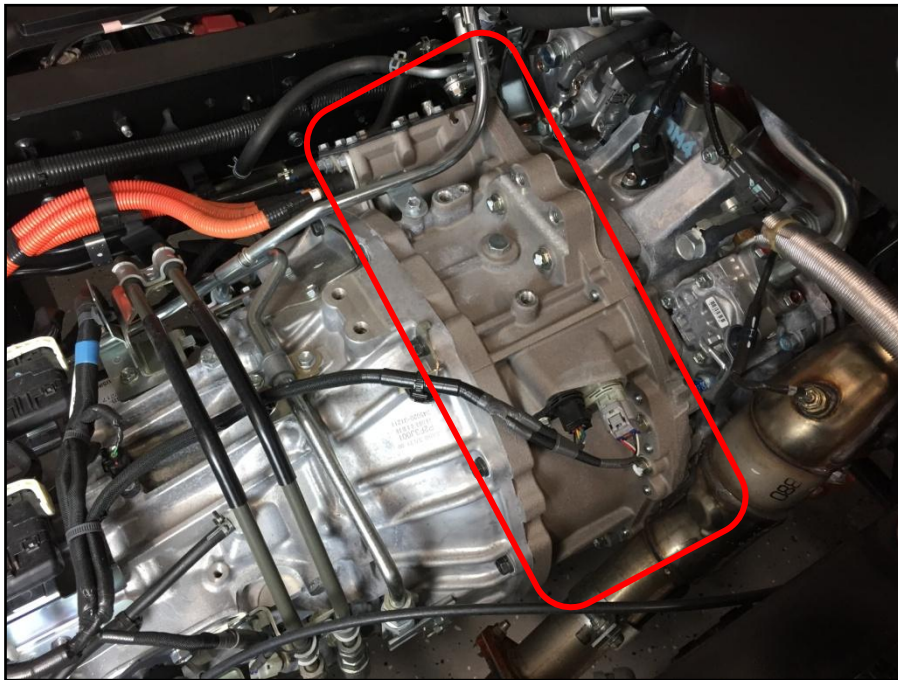
The HV battery is enclosed in a metal case and is rigidly mounted in the battery pack, which is installed on the driver's side of the vehicle. The metal case is isolated from high voltage and concealed by the cover of the battery pack.

The HV battery is composed of 40 NiMH battery modules that each have a nominal voltage of 7.2V. These battery modules are connected in series, and produce a total voltage of approximately 288V. Each module is covered with a non-spillable plastic case.

The electrolyte used in the NiMH battery modules is an aqueous solution of potassium hydroxide which is a strong alkaline. The electrolyte will not normally leak, even if the module is impacted, because the electrolyte is absorbed with the nonwoven fabric plate.

If the battery pack is overcharged, a gas is discharged through the ventilation hose which is installed on the battery pack.

The HV motor/generator is a 3-phase Alternating Current (AC) permanent magnetic electric motor/generator. It's two functions are to power the vehicle and to recharge the HV battery. The motor/generator is located between the engine and the transmission.



High Voltage Motor/Generator

High Voltage Cables

The orange colored cables carry high voltage Direct Current (DC) between the HV battery and the inverter, and carry 3-phase AC between the Inverter and the HV motor/generator.

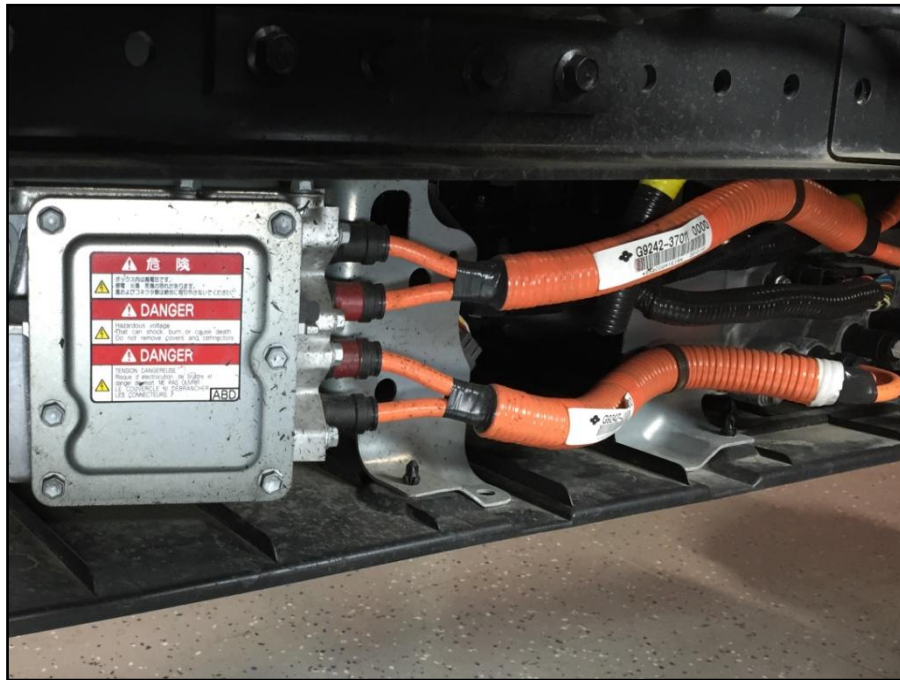
The cables that carry the high voltage DC can be identified by the orange convoluted tubing, and can be seen from underneath the truck, just below the driver's side frame rail.

The cables that carry the high voltage AC can be identified by the orange convoluted tubing and are located behind the battery pack are routed along the inside of the drivers side frame rail and are connected to the motor/generator assembly.



WARNING

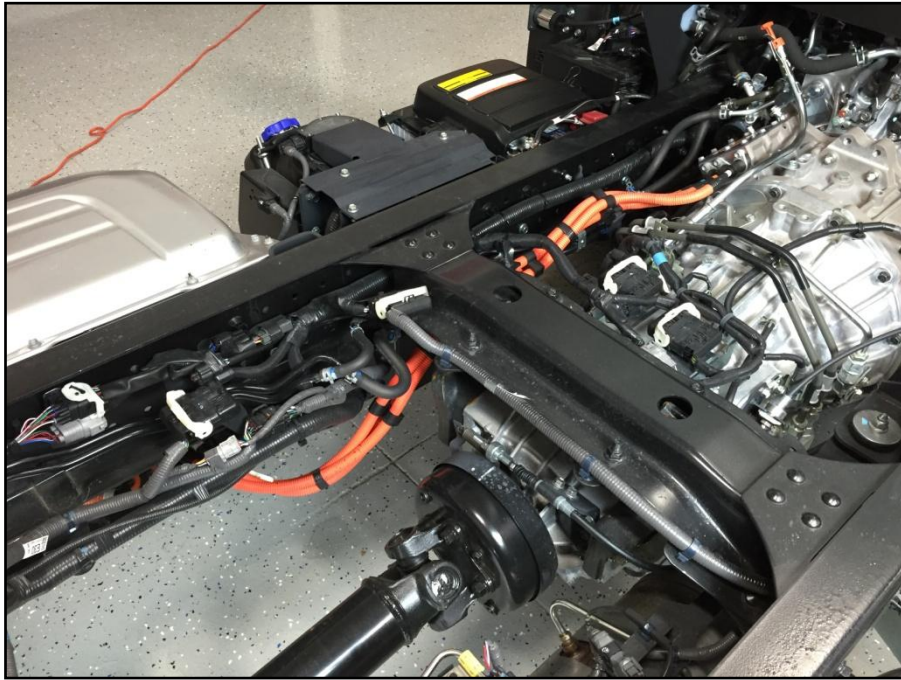
The high voltage system may remain powered up for up to 7 minutes after the vehicle is shut off. To prevent serious injury or death from severe burns or electric shock, NEVER touch, cut or open any orange color high voltage cable or high voltage components.



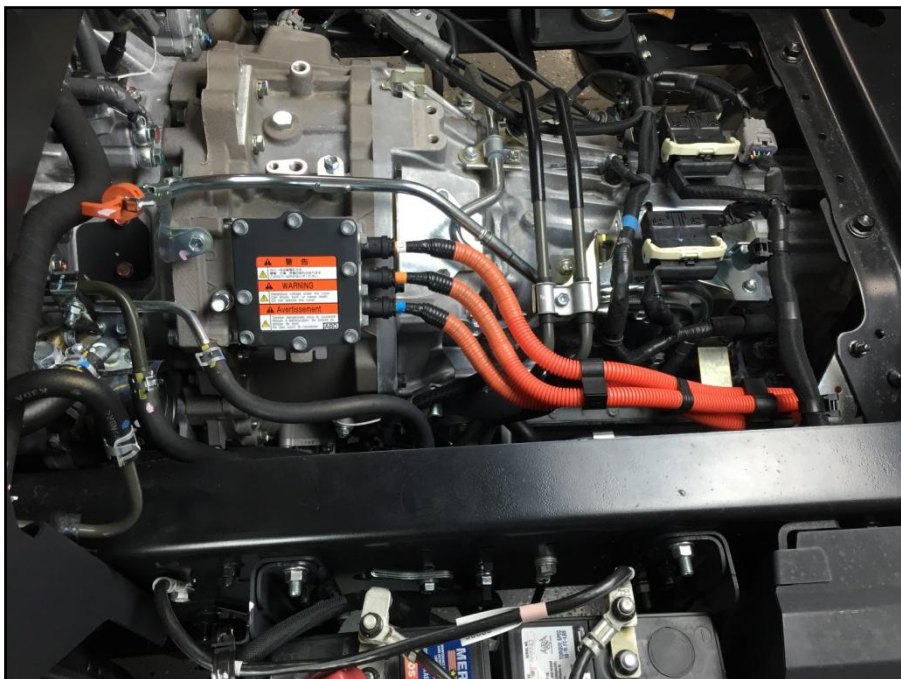
Orange Cables That Carry High Voltage Direct Current (DC)



Orange Cables That Carry High Voltage Alternating Current (AC)



Orange Cables That Carry High Voltage Alternating Current (AC)



High Voltage Cables Connected to Motor/Generator

Powertrain

The HINO195h is equipped with a 4 cylinder diesel engine, the HINO JO5E, which produces 210 HP and 440 lb.-ft. torque. The JO5E engine has been engineered for maximum performance and fuel economy.



HINO JO5E Engine

The HINO195h is equipped with the Aisin A465 transmission. The A465 is a 6 speed automatic transmission and is standard on every HINO cab over engine truck. Aisin is a leader in the industry with over 40 years experience manufacturing durable, quality transmissions.



Aisin A465 Transmission

Hybrid System Operation

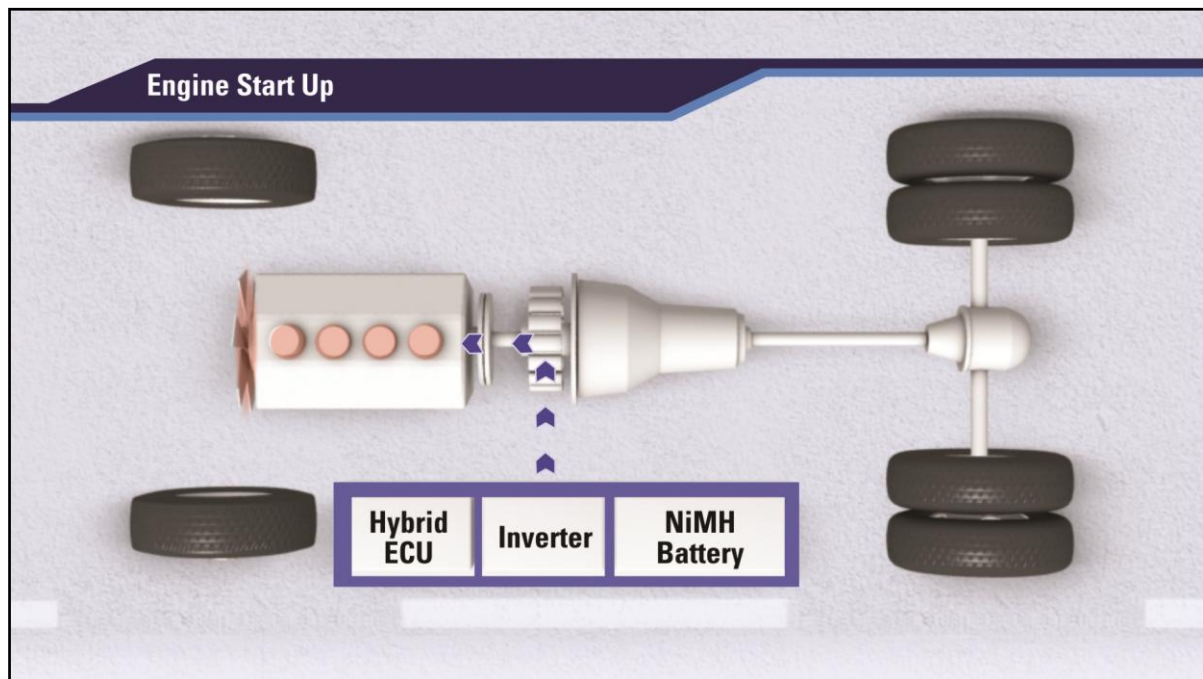
The HINO195h hybrid can be powered by the diesel engine or by a combination of the diesel engine and the electric motor/generator. Also under certain conditions, when the vehicle is stopped and in gear such as at a stop light, the engine will be shut off for additional fuel savings in idle stop mode.



WARNING

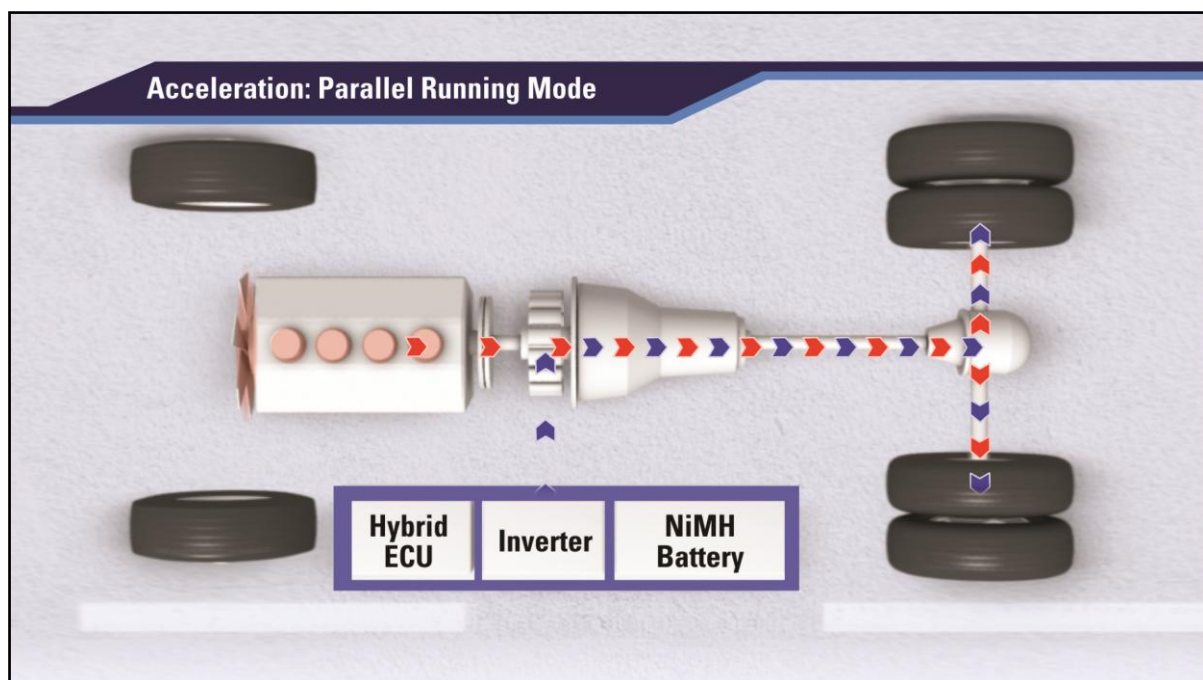
You may find the vehicle in an engine off state (idle stop mode) that may be temporary. Once the driver's foot is removed from the brake pedal, the truck could restart and be able to move unexpectedly. To prevent this put the vehicle gear shift lever in park. Then turn the ignition switch to the lock position and remove the key.

When the HINO195h engine is initially started, it uses a conventional starter mounted to the engine. When the HINO195h is in idle stop mode and the driver takes their foot off of the brake pedal, the motor/generator will start the engine.



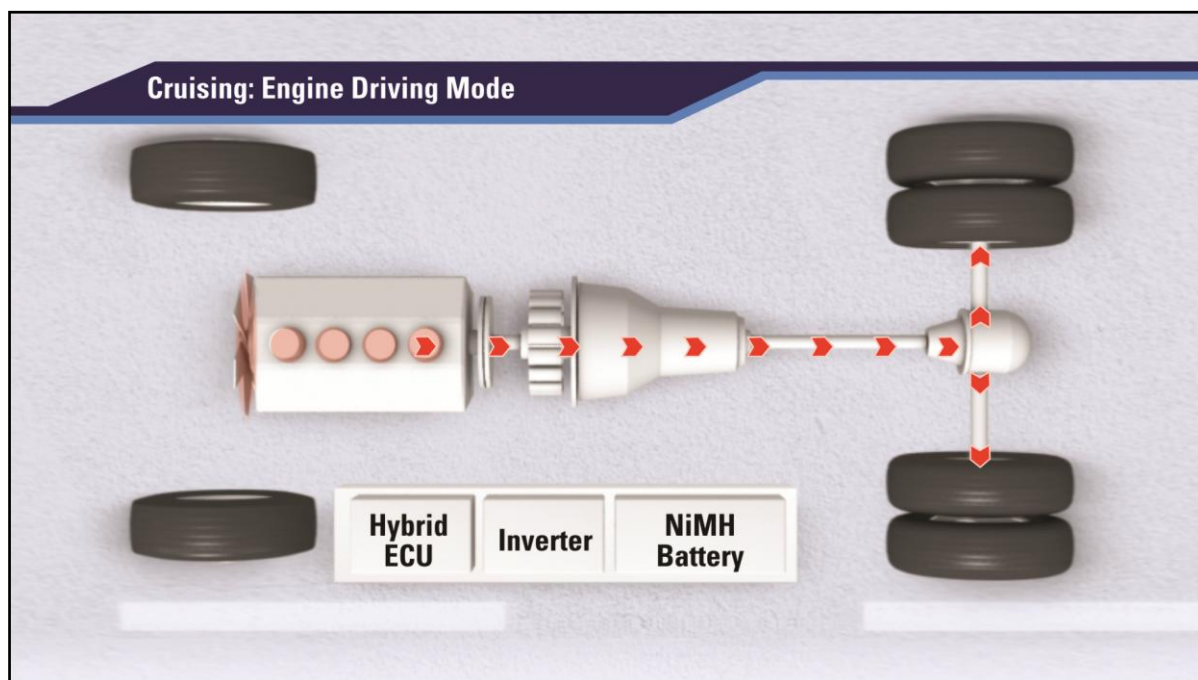
Engine Start Up after Idle Stop

When starting from a stop and accelerating the motor/generator assists the diesel engine to power the truck.



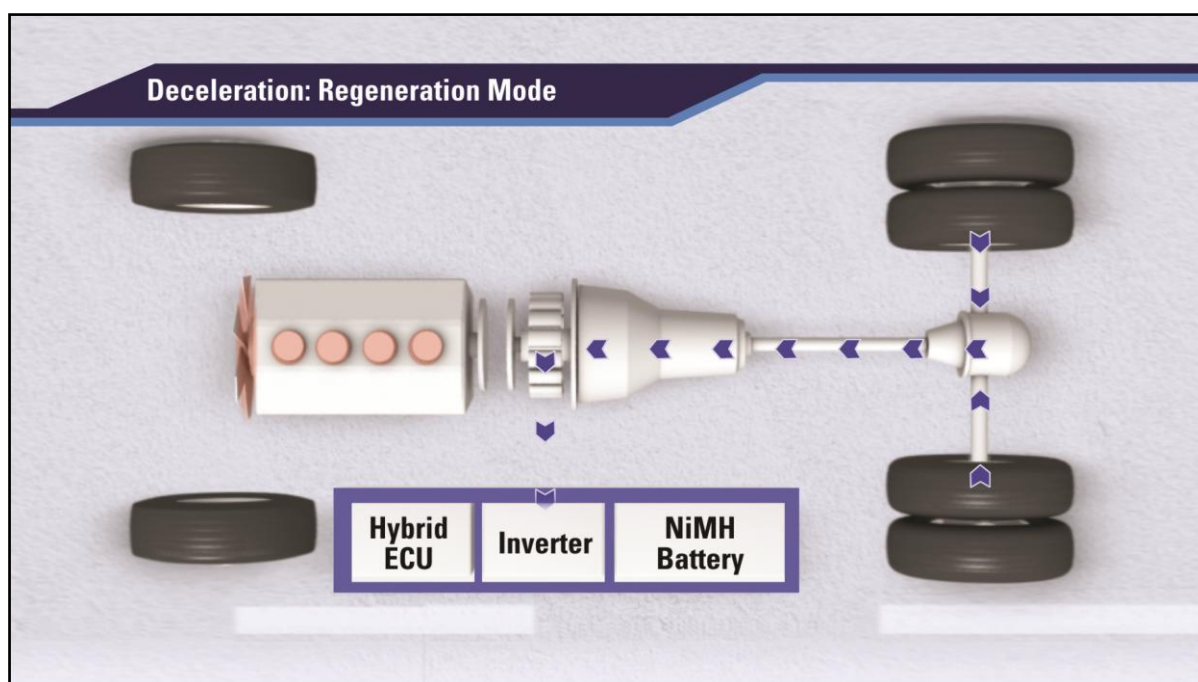
Starting and Accelerating Mode

When cruising the vehicle is powered by the diesel engine.



Cruising Mode

When the Hino195h is decelerating or braking, it can enter into regeneration mode which will generate power and use that power to recharge the hybrid battery. It is not necessary to recharge the hybrid battery externally, because it is charged by the motor/generator during regeneration.



Regeneration Mode When Decelerating and Braking

High Voltage Labels

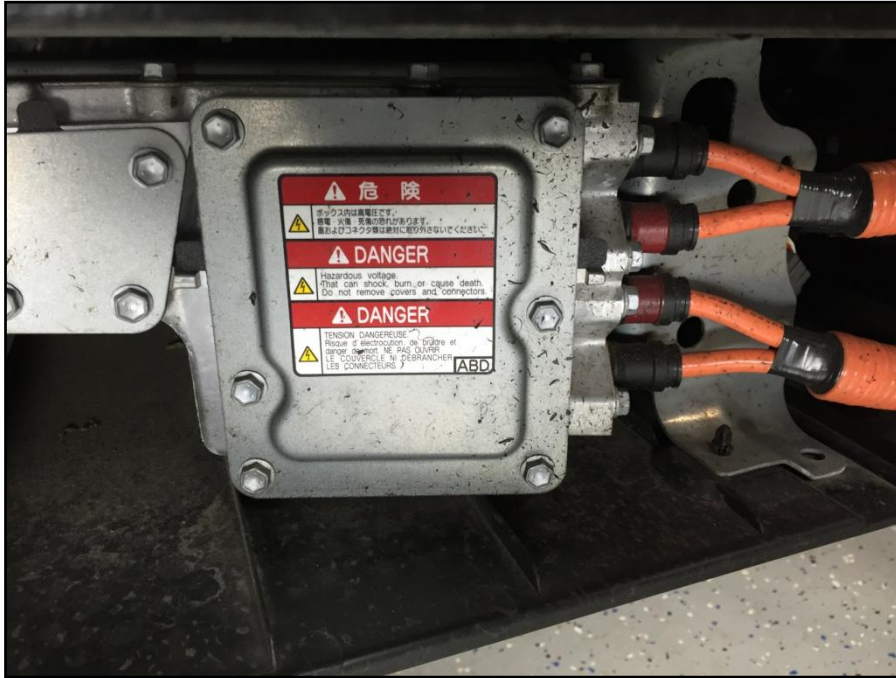
The HINO195h hybrid features labels that help to quickly identify potential high voltage hazards. The labels will either contain the color red or orange. Red labels indicate that HIGH VOLTAGE is always present inside the component with the warning label. NEVER cut or open a component that has a red warning label. The battery pack has 3 red HIGH VOLTAGE warning labels on it.



Red High Voltage Warning Label on Top of Battery Pack



Red High Voltage Warning Label on Top of Battery Pack



Red High Voltage Warning Label on Back of Battery Pack

Orange labels indicate that HIGH VOLTAGE may be present inside the component with the warning label. NEVER cut into or open a component that has an orange warning label.



Orange High Voltage Warning Label on Motor/Generator Assembly

Disabling 12 Volt Power

The positive and negative high-voltage cables connected to the HV battery are controlled by the 12 volt relays which are ordinarily opened. When the ignition switch is turned off, the relays stop the electricity flow from the HV battery. The HINO195h is equipped with two 12 volt batteries which are wired in parallel to provide 12 volts.

To disable the 12 volt power a HINO195h perform the following steps: Step 1, turn the ignition switch to the LOCK position and remove the key.



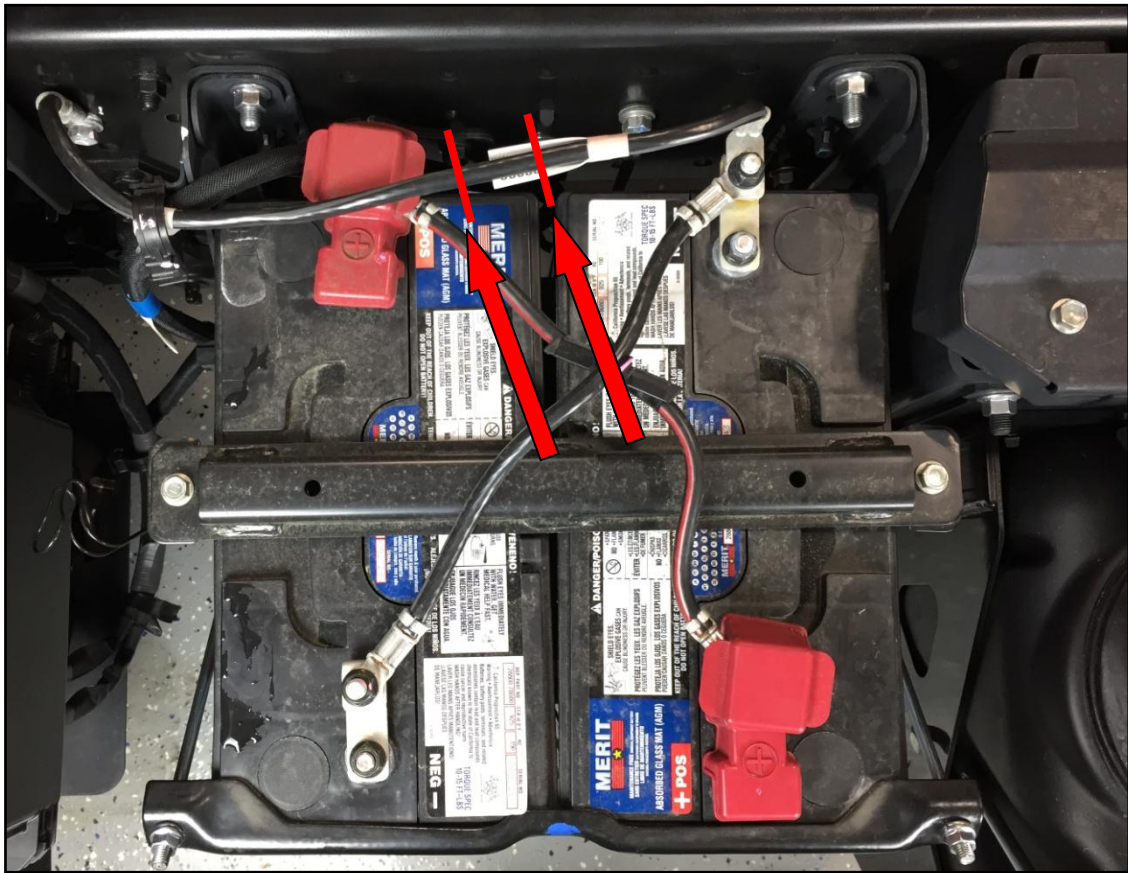
Ignition Switch Turned to LOCK Position with the Key Removed

Step 2, remove the battery cover by releasing the 2 spring clips.



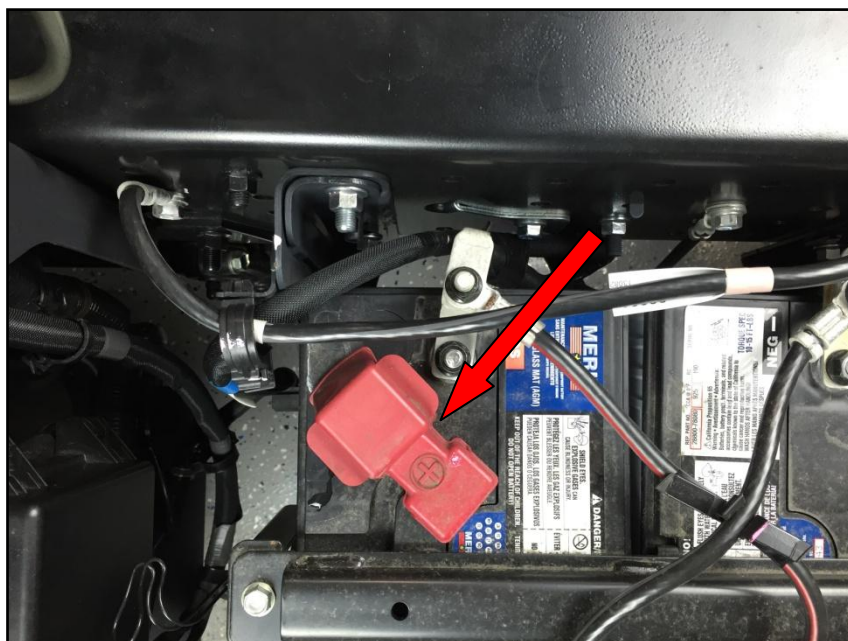
12 Volt Batteries Cover and Spring Clips

Step 3, cut a section out of the negative battery cable by making 2 cuts. This will prevent the negative battery cable from being inadvertently reconnected.



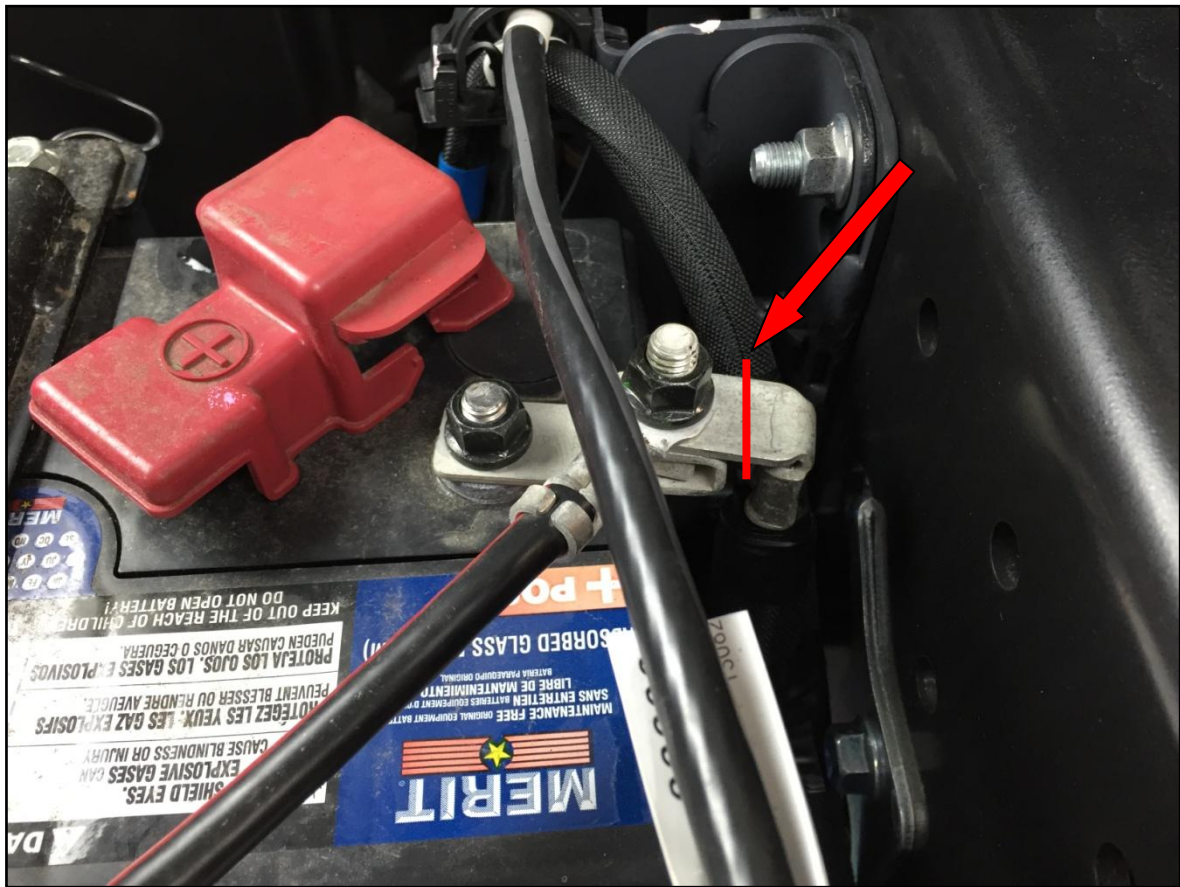
Cut Section Out of the Negative Battery Cable

Step 4, remove the inner positive terminal cover by pulling up on the cover.



Positive Terminal Cover Removed

Step 5, cut the positive battery cable.



Cut the Positive Battery Cable

Removing the Hybrid Service Plug

The service plug is intended to break the circuit of the HV battery. The power supply from the HV battery can be stopped by removing the service plug. A large capacity fuse has been installed in the service plug to protect from a short circuit in the HV battery circuit.

If you must remove the service plug use Class 0 insulated gloves. After the service plug is removed reinstall the service plug cover or cover with black electrical tape.



⚠ DANGER

Danger HIGH VOLTAGE is always present inside the battery pack even with the service plug removed. To prevent serious injury or death never cut or open the battery pack cover.

To remove the service plug perform the following steps:

Step1, remove the 4 bolts of the service plug cover on the side of the battery pack using either a 10mm wrench or a 10mm socket and ratchet.

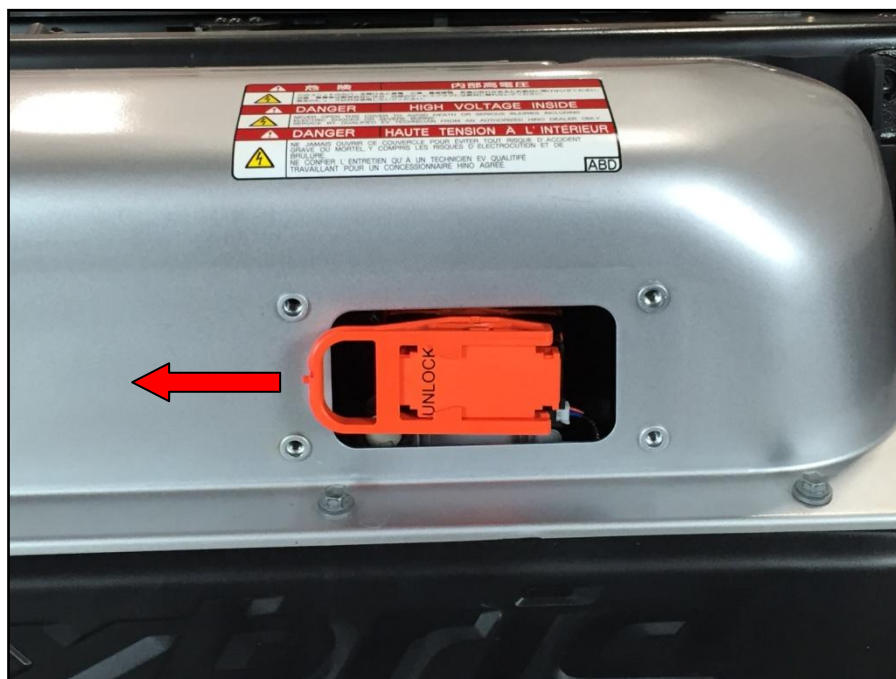


Service Plug Cover



Service Plug Handle

Step 2, pull the handle towards the front of the vehicle.



Pull Service Plug Handle Forward

Step 3, rotate handle towards outside of vehicle.



Rotate Service Plug Handle Outward and Rearward

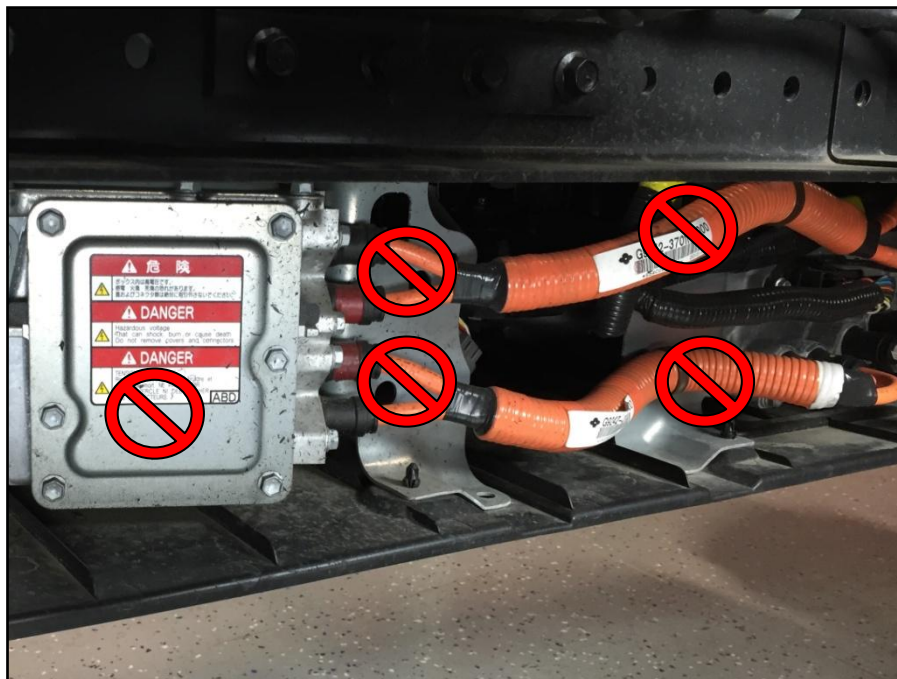
Step 4, pull service plug out.



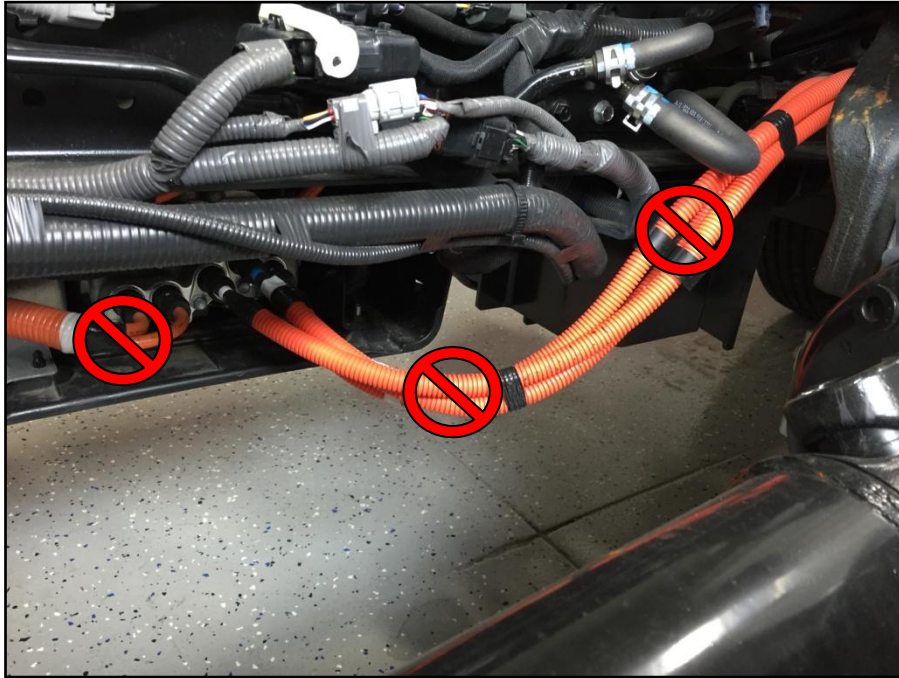
Pull Service Plug Out

DO NOT CUT ZONES

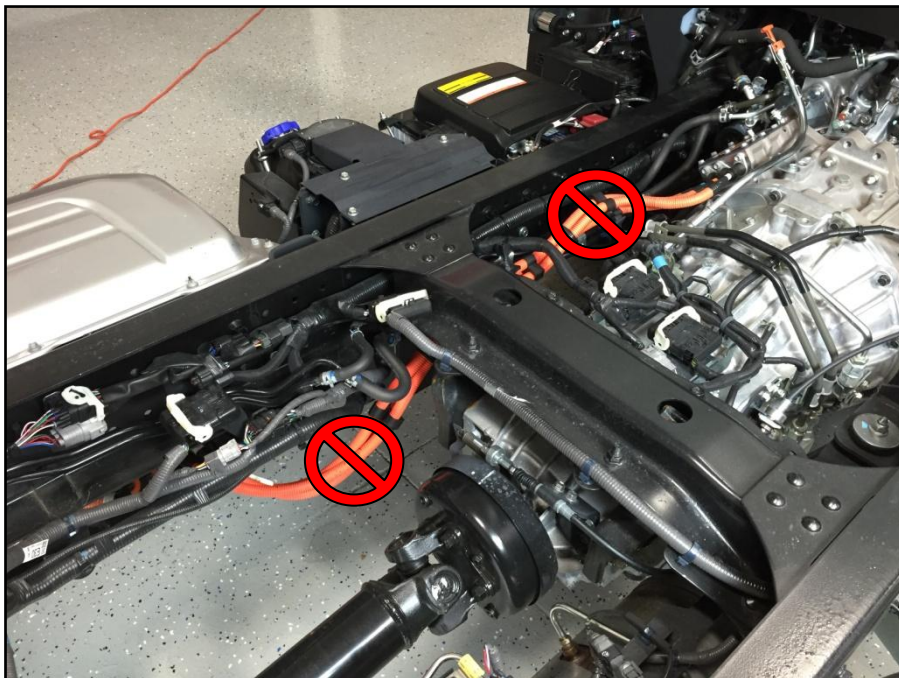
DO NOT CUT any orange cables and DO NOT CUT into the battery pack, battery pack cover, or battery pack components. DO NOT use the jaws of life in these areas.



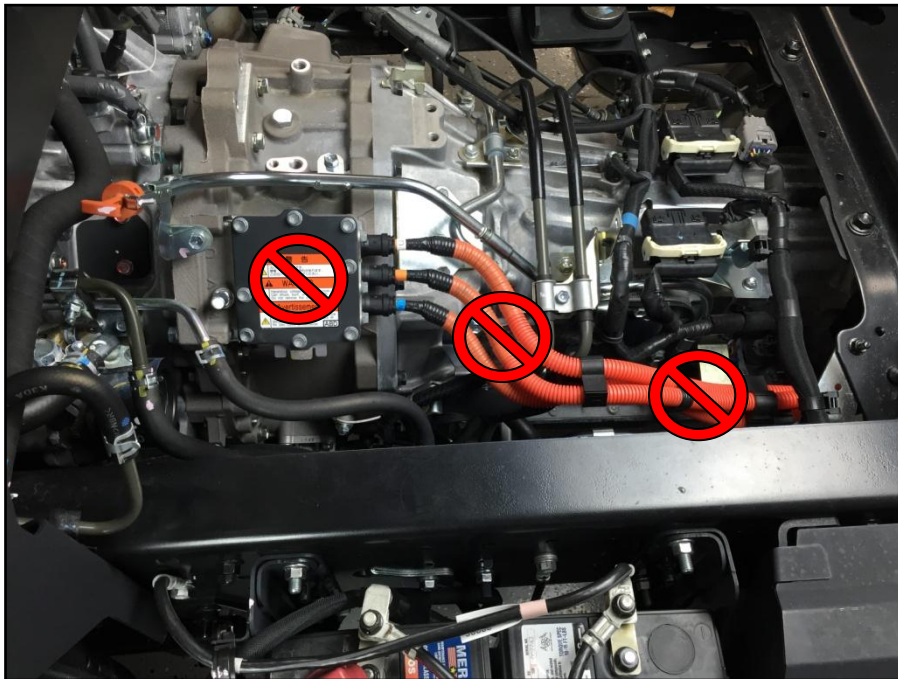
DO NOT CUT Into Orange Cables or Battery Box Components



DO NOT CUT Orange Cables



DO NOT CUT Orange Cables



DO NOT CUT Orange Cables or Motor/Generator Cover

 WARNING	Improper handling of the high voltage system may cause death or serious injury including electric shocks or severe burns. The HINO195h is equipped with a high voltage hybrid system of about 300V.
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 WARNING	The aqueous solution of potassium hydroxide, which is a strong alkaline of pH14, is used as the electrolyte for the HV battery. The electrolyte will not leak profusely, even if the HV battery is damaged, because the liquid is absorbed by a nonwoven fabric.
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Response for Emergency Situations

If vehicle catches fire approach and extinguish the fire using proper vehicle fire fighting practices.

If the HV battery catches fire, determine which of the following 2 methods is appropriate for suit the situation.

(1) Offensive Fire Attack

Flooding the HV battery with copious amounts of water at a safe distance will effectively control the HV battery 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.

(2) Defensive Fire Attack

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

NOTE:

(When allowed to burn out, NiMH battery modules burn rapidly and are quickly be reduced to ashes except for the metal alloy cell plates.)

The jaws of life can be used on the cab of the HINO195h. The HINO195h is NOT equipped with any airbags or pyrotechnic seatbelt pretensioners. All cab body panels are made of steel.

