



# First Responder's Guide

- Study Guide Carefully
- Carefully Read And Fully Follow All Cautions and Warnings

# First Responder Guide

## WARNINGS and CAUTIONS

**WARNINGS:** Advise you of hazards, the consequences, and what to do to avoid them. Not only to avoid damage to the vehicle or property, but to help avoid situations and occurrences which could result in personal injury or death.

**CAUTIONS:** Advise you of the proper care to be taken to avoid damage to the vehicle or property. Study this guide carefully.

## Introduction

The intent of this guide is to provide information to help you respond to emergency situations involving the eStar™ vehicle in as safe a manner as possible.

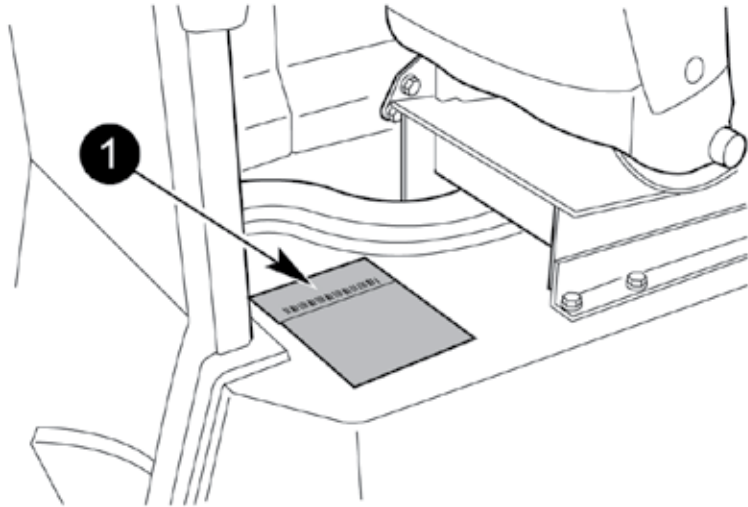
This guide contains a general description of the major components and shows the location of the badging. It also suggests ways of disabling the system and presents cut zone information.

## System Operation

The eStar™ is a fully electric vehicle that has a 300+ volt electrical system coupled with a traditional 12 volt battery system. The 300+ volt system operates the motor/inverter, in-cab heater element and power steering unit. All other remaining systems operate on 12 volts, but still must be approached with caution. As with other conventional vehicles the 12 volt battery is grounded to the metal chassis of the vehicle.

The motor/inverter is cooled with a 50/50 mixture of water and long life antifreeze/coolant (DEX-COOL®). Located under the hood is a radiator with a 12 volt cooling fan to cool the antifreeze/coolant. The radiator cooling fan is thermostatically controlled and may run at anytime.

## eStar™ Identification



The Vehicle Identification Number (VIN) (1) is located on the driver's side seat riser behind the driver seat in the cab.



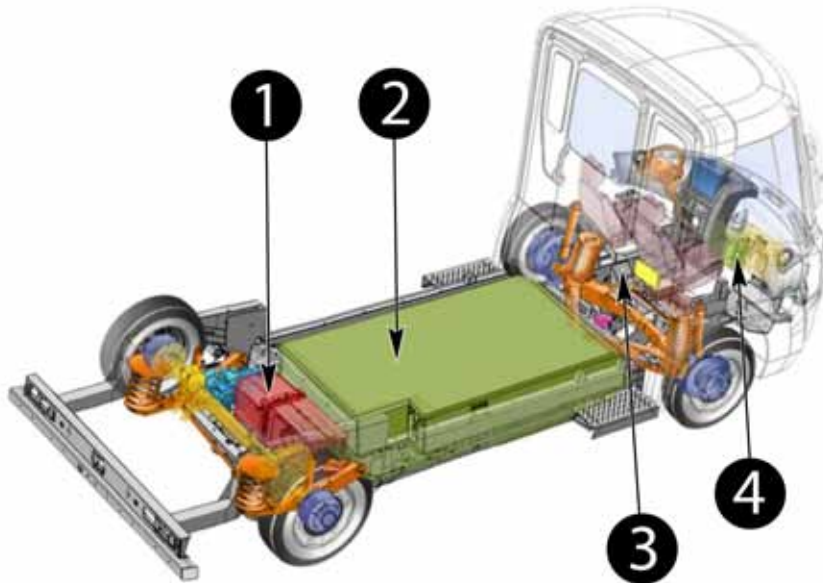
The unique look of the eStar™ vehicle makes it easily identifiable by the tall glass and the center door behind the cab.



The eStar™ badge is located on the center of the cowl below the windshield.

The eStar™ logo is located below the driver and passenger windows to the rear of the glass. All eStar™ vehicles are 12 volt controlled with high voltage supplying power to the motor/inverter, the power steering unit and the cab heater.

## High Voltage Component Locations



1. Motor/Inverter
2. High Voltage Battery Cassette
3. Power Steering Unit
4. Cab Heater

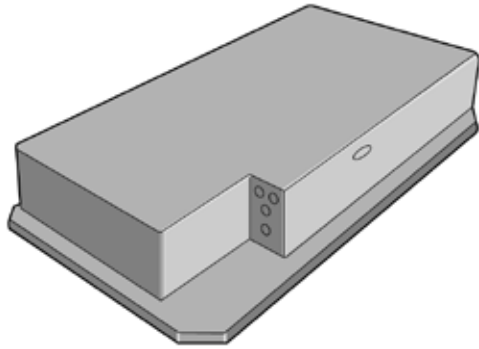
## High Voltage Components

### 1. Motor/Inverter



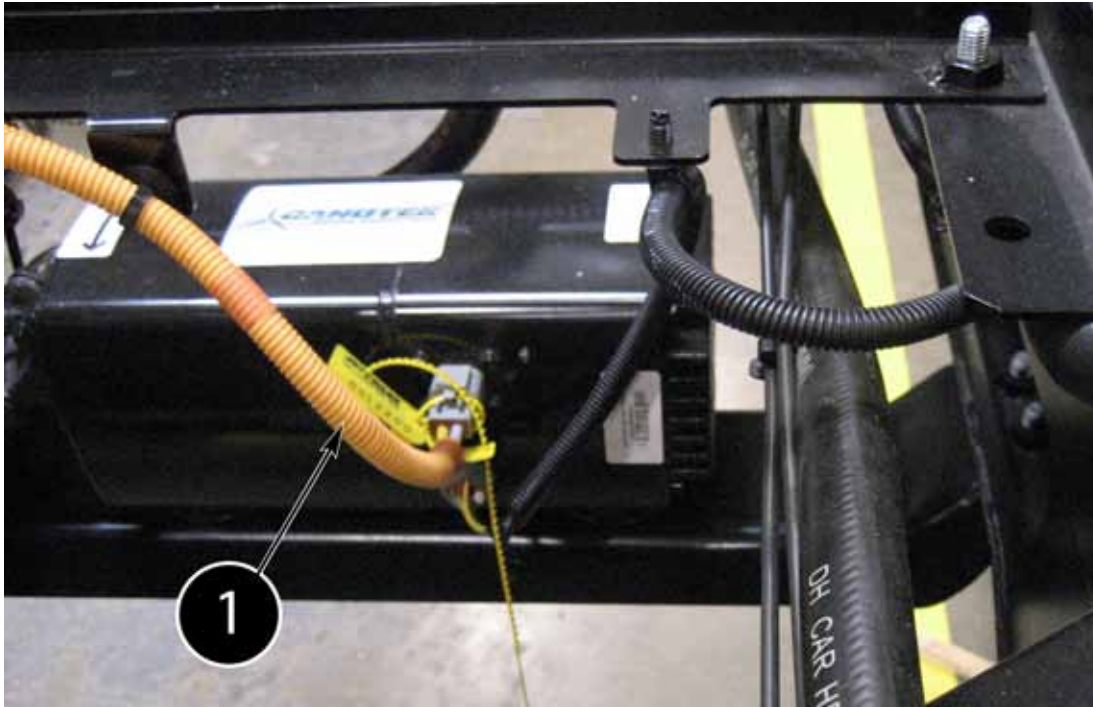
The motor and inverter are located to the rear of the high voltage battery cassette between the frame rails and in front of the rear axle. The high voltage leads enter the inverter on the passenger side.

### 2. High Voltage Battery Cassette



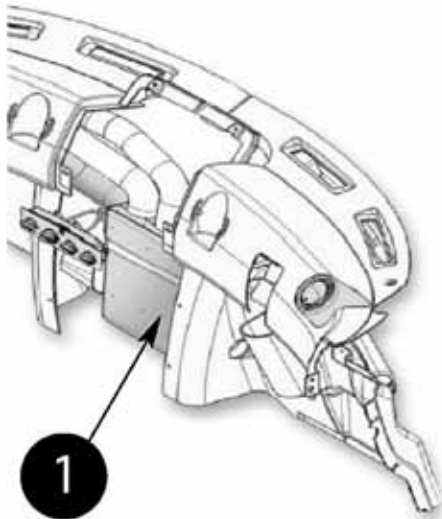
The high voltage battery cassette is enclosed in a sealed case located between the frame rails. The high voltage leads enter through the passenger side rear of the case.

### 3. Power Steering Unit



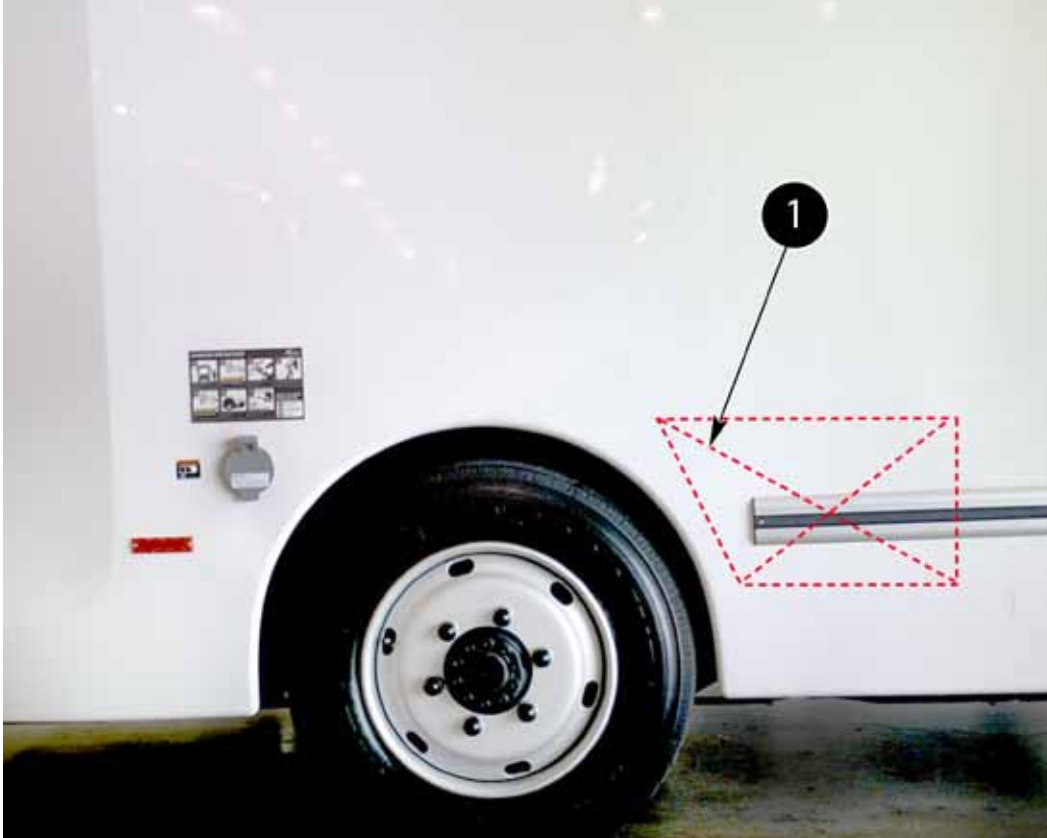
The power steering unit (1) is located under the cab and between the frame rails on the cross member.

### 4. Cab Heater



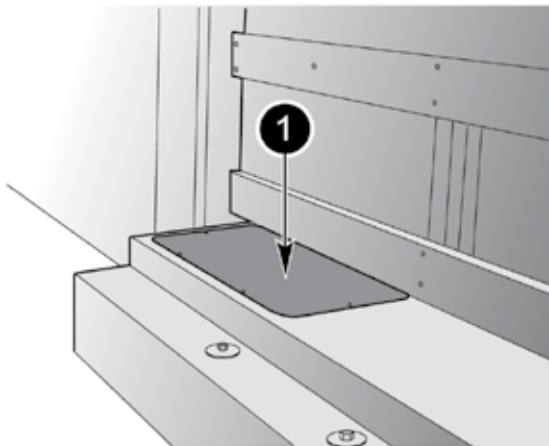
The cab heater (1) is located in the interior of the cab and is behind the center of the dash panel. The high voltage leads are routed behind the washer fluid reservoir and enter the heater from the center of the bulkhead under the hood.

## Low Voltage Components

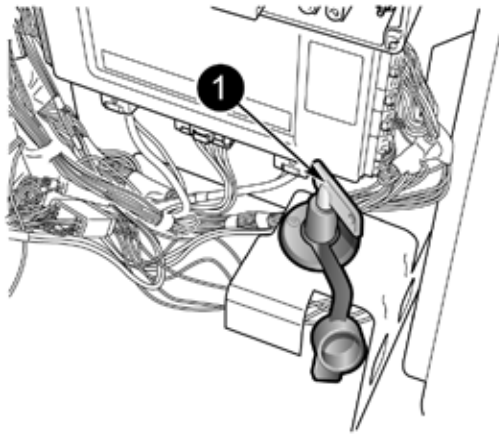


### 12 Volt Battery

The 12 volt battery (1) is located forward and slightly above the right rear (passenger side) wheel well and is accessed through a removable cover on the top of the right rear wheel housing.



The cover (1) is fastened and sealed requiring tools to remove.



## High Voltage Switches

The high voltage service key, high voltage safety cut off button and the inertia switch. These switches are wired in series, and all do the same function of disabling the high voltage system.

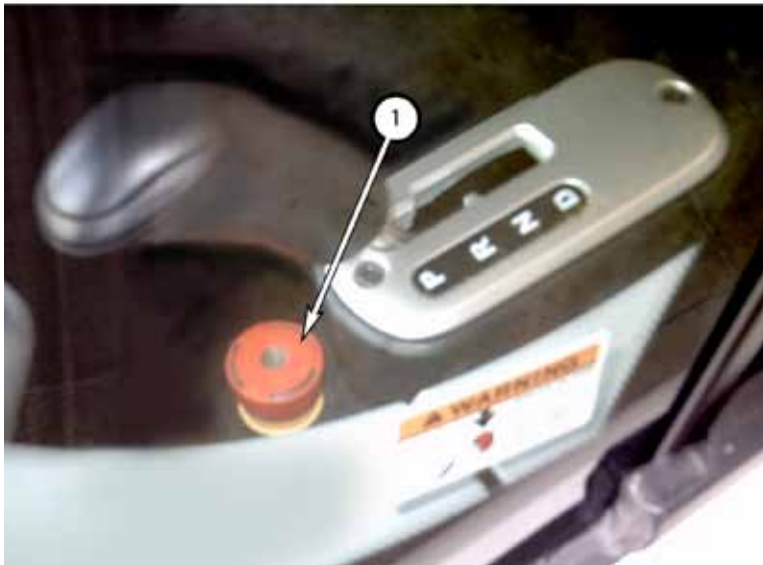
### High Voltage Service Key

The high voltage service key (1) is located behind the passenger seat, under a plastic cover. Tools are required to remove this cover. This key can be turned in a counter-clockwise direction and removed. High voltage will be active for approximately 10 minutes after the key is removed.

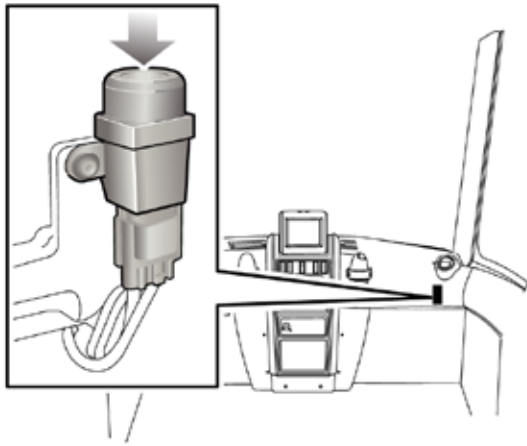


### High Voltage Safety Cut Off Button

The high voltage safety cut off button (1) is located on the left side of the driver's seat near the window in front of the gear selector. Pushing down on the switch disconnects the drivetrain and high voltage battery.



The switch is visible from outside the driver's side window. The driver's side window must be broken out to access high voltage safety cut off button (1).



## Inertia Switch

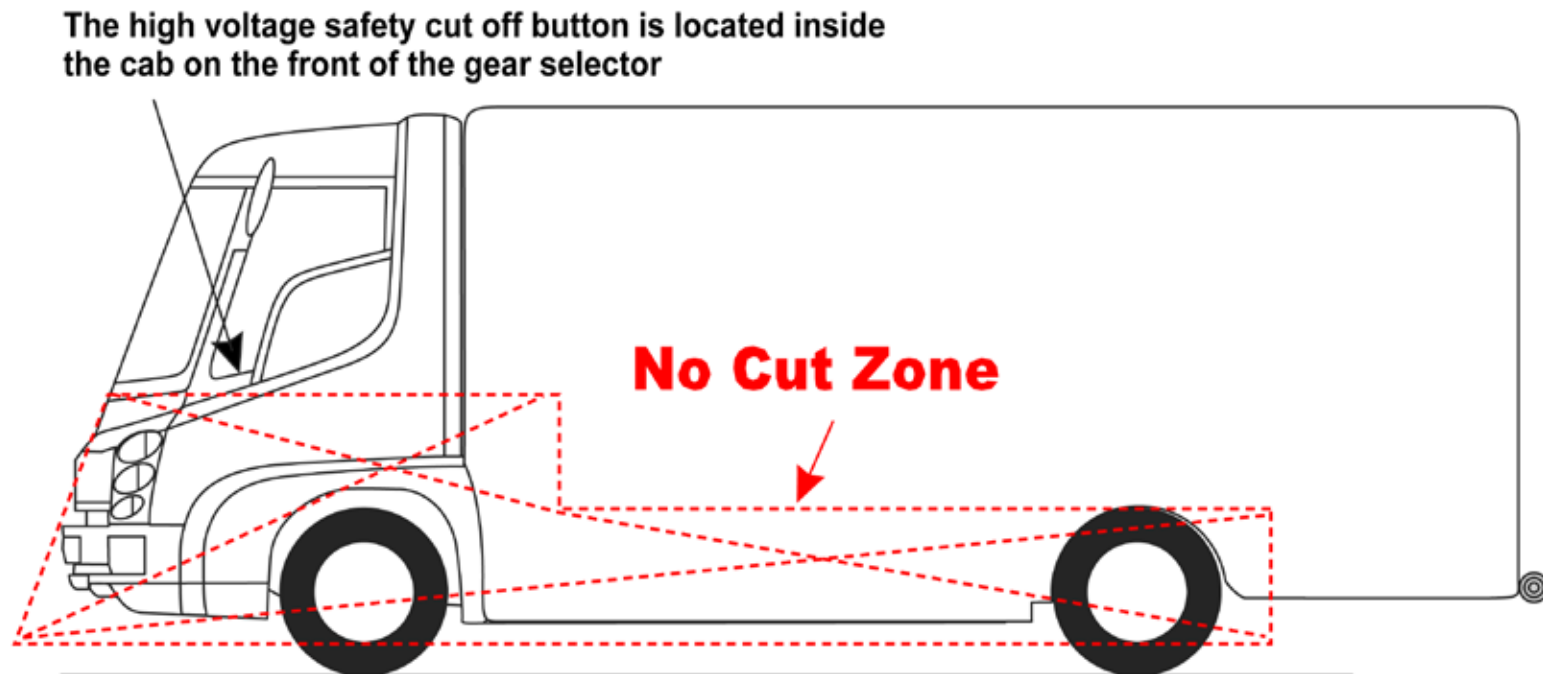
The inertia switch is located on the passenger side of the dash behind the dash panel and below the top to the left of the passenger side air duct. If the vehicle receives a heavy impact, the inertia switch will trip to isolate the high voltage battery cassette. Press down and release on the top of the switch to reset.

## Vehicle Cut Sheet

If cutters or spreaders are needed to allow occupants to be rescued, make sure to stay within the recommended cut zones.

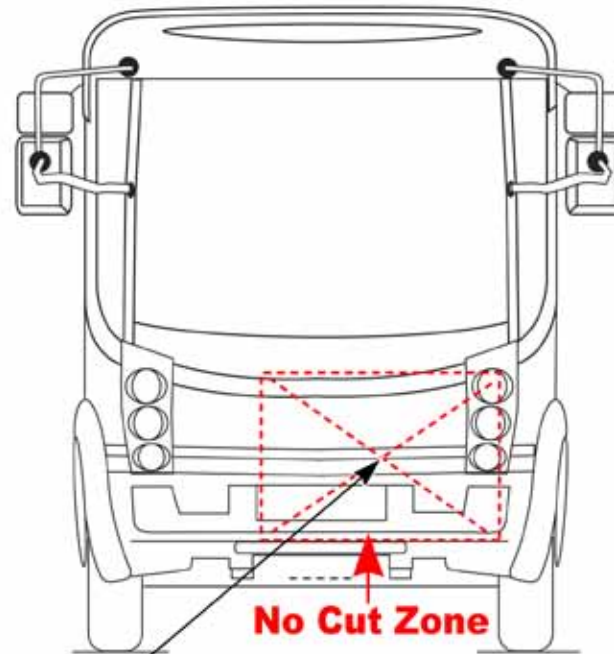
### WARNING

- No cut zone indicates area of high voltage lines.
- High voltage lines are identified by orange conduit.
- To prevent personal injury or death, never cut the high voltage source orange leads.



## WARNING

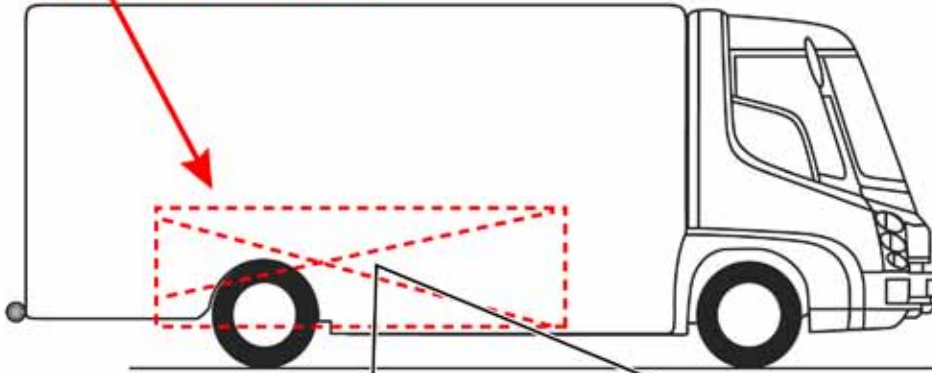
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### No Cut Zone



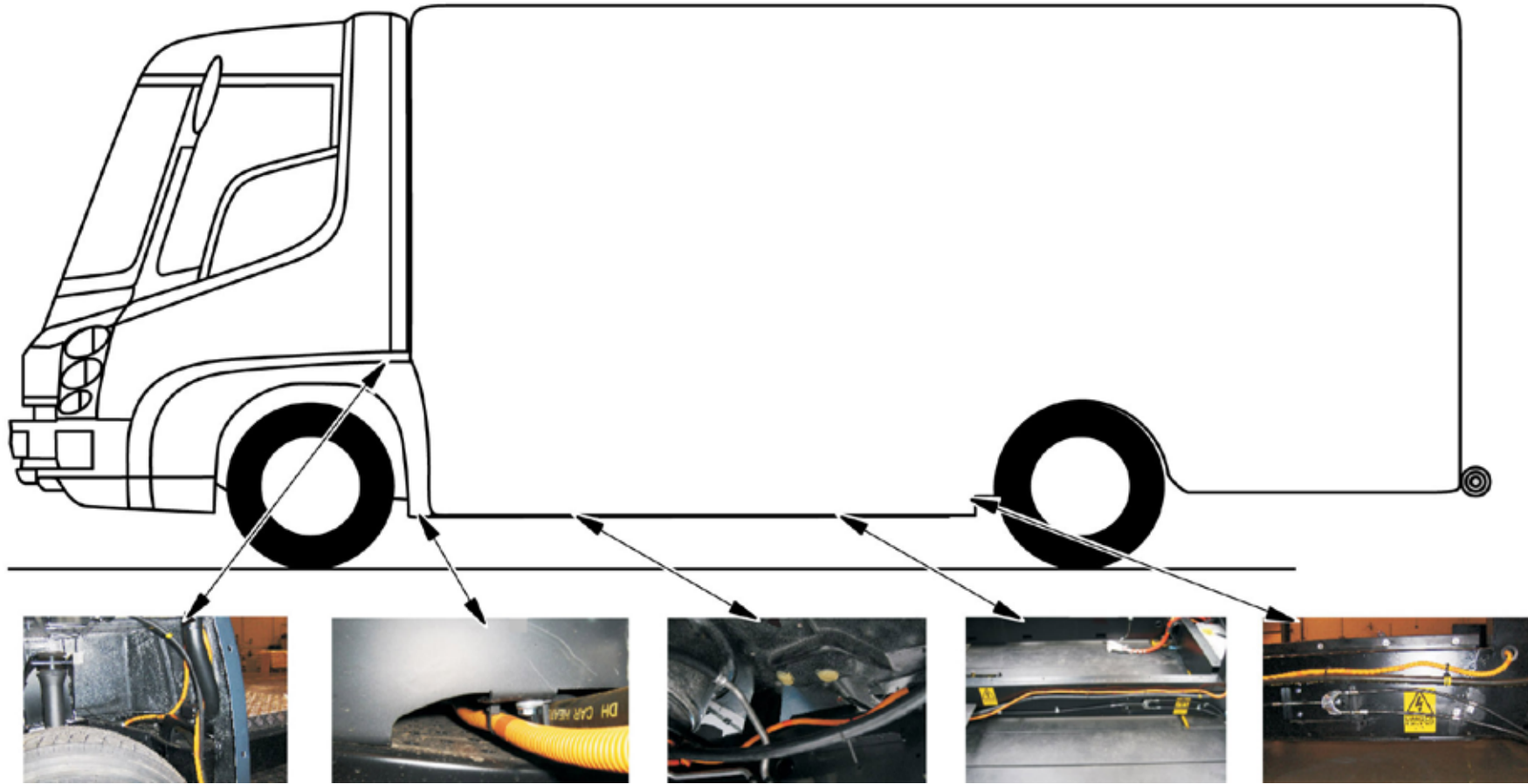
Top View



Rear View



## High Voltage Cables

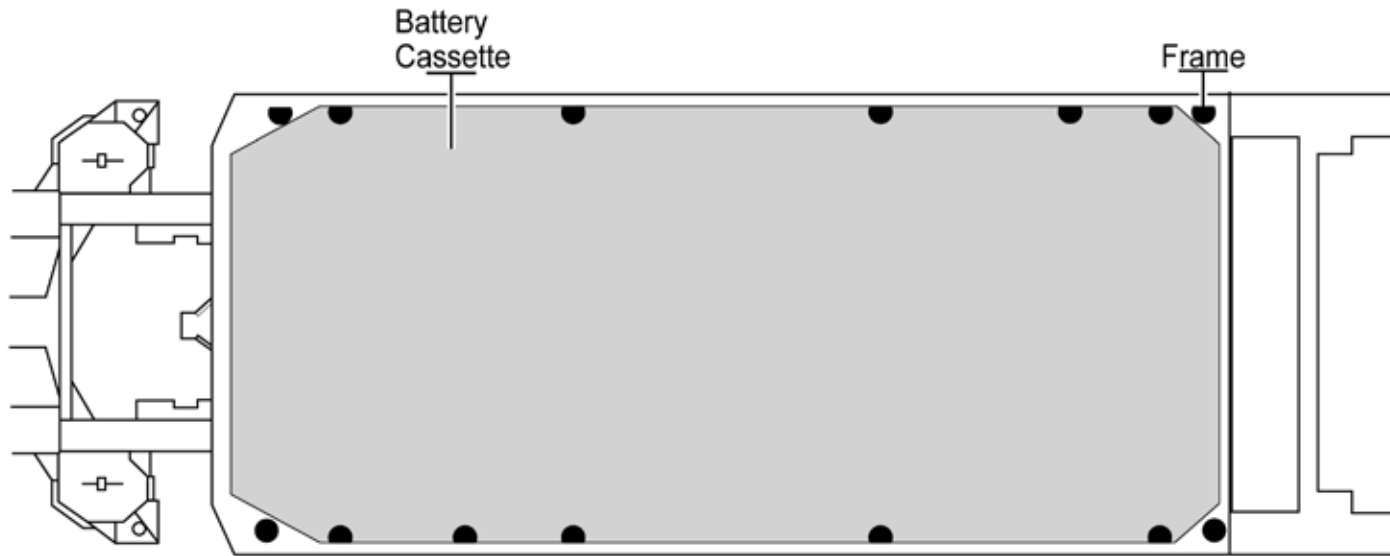


## Emergency Procedures

### Emergency Procedure **Do's** and **Don'ts**

#### **Do's**

- Always assume that a eStar™ is “live” when you approach.
- Always perform the “High Voltage Shutdown” and allow the eStar™ 10 minutes after the vehicle is shut off or disabled before touching any high voltage cable or component.
- Always look for orange wiring. This indicates high voltage could be present.
- Prior to cutting the vehicle to gain access ensure that the area you are cutting is not in the “No Cut Zone”.
- In event of battery fire use self-contained breathing apparatus. Use dry chemical (ABC), carbon dioxide (CO<sub>2</sub>), or class D fire extinguishers.



### Don'ts

- Never cut any of the orange high voltage cables.
- Never cut into or open the inverter, battery cassette or any other high voltage component.
- Do not cut in the shaded area of the underside view above. This area contains the high voltage battery cassette.

### Recommended Protective Equipment:

- Safety glasses or face shield
- Rubber boots
- High voltage gloves
- Respiratory protection
- Protective raincoat or apron
- Class ABC, (CO<sub>2</sub>), or D fire extinguisher
- A non-conductive pole at least six feet long
- Absorbent pads
- Dry sand

## **Emergency Procedure for Spills**

Absorb spilled material with an inert absorbent (dry sand or earth). Scoop contaminated absorbent into an acceptable waste container. Collect all contaminated absorbent and dispose of according to local, state and federal laws and regulations. Scrub the area with detergent and water, collect all contaminated water for proper disposal.

## **High Voltage Shutdown**

After disabling the eStar™, power is maintained up to 10 minutes in the high voltage electrical system. There are two options:

### **Option 1 – If the driver is not alert**

The high voltage safety cut off button is located on the front of the gear selector panel. It can be pushed to disable and isolate the high voltage system in an emergency. When pushing down on the button, the following will occur.

1. The high voltage system starts to decay and the high voltage system will be fully shut down after 10 minutes.
2. The 12 volt system stays active until the driver is removed from the seat.

### **Option 2 – If the driver is alert**

With the eStar™ stopped, the driver must move the gear selector lever to the park (P) position on the gear selector panel to engage the transmission lock, then fully apply the parking brake. Only with the transmission selector in the Park (P) position and the parking brake fully applied is it safe to exit from the driver seat and the vehicle cab. After exiting the cab the following occurs:

1. The high voltage components will de-energize automatically after approximately 5 seconds of leaving the driver's seat.
2. All non-essential electrical systems will shut down, including the headlights, windshield wipers, cab heater and mirrors.
3. After 5 minutes the I-Pack (Instrument Panel) will turn off and the 12 volt electrical system will power down. The high voltage cable will decay for 10 minutes before shutting down.

## 12 Volt Shutdown

Disconnecting or cutting the negative cable to the battery may be necessary in some emergency situations. See Low Voltage Components for 12 Volt battery location.



### **WARNING**

The high voltage system remains powered for 10 minutes after the eStar™ is shut down or disabled. To prevent serious injury or death from severe burns or electrical shock, avoid touching any orange covered high-voltage cable/component for a minimum of 10 minutes.

If you will be working around or removing any high voltage cables or components, you **MUST** use high voltage gloves and ensure that the high voltage system has been disabled and follow high voltage safety procedures.

1. Using a screwdriver, unscrew the cover screws and remove the cover.
2. Locate the 12 volt battery and disconnect or cut the negative cable.

## Built in Safety Features

All high voltage cables are covered with orange conduit or orange tape for the length of the wire.

An inertia switch is located in the cab to isolate high voltage in the event of a heavy impact.

An isolation check in the high voltage system disconnects the battery cassette in the event of a short to ground.

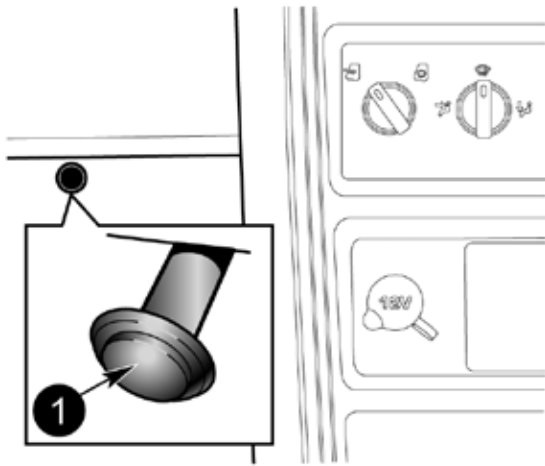
High voltage cables coming from the battery cassette are controlled by normally open contacts.

The battery cassette contains high voltage fuses to provide circuit protection internal to the cassette.

## Towing Procedure

### WARNING

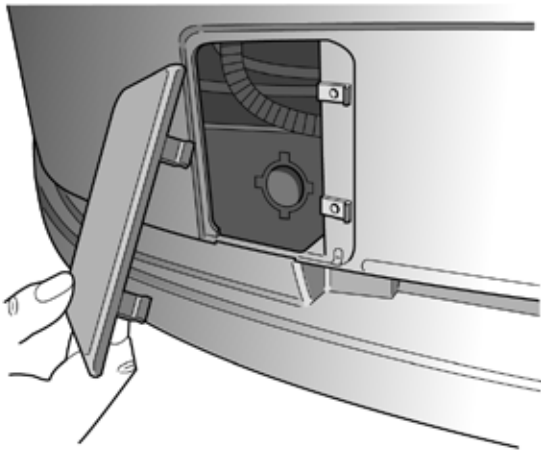
Note: Serious internal motor and transmission damage can result from improper eStar™ towing. A 21' roll back type wrecker is recommended for towing the eStar™.



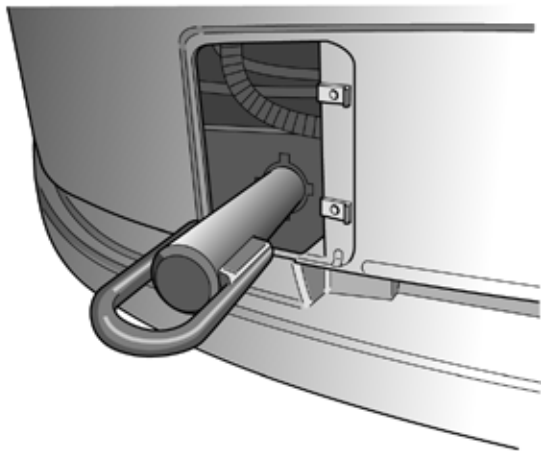
Procedure to winch from obstructions:

1. Open the hood using the release knob (1) located to the right of the steering column.
2. Pull the top of the hood forward and lower carefully until its supported by the hinges.
3. Unscrew the tow hook (1) located under the hood on the driver's side to the rear of the brake fluid reservoir as shown.





4. Remove the cover on the passenger side of the bumper.



5. Screw the tow hook in until it bottoms out in the threaded hole.

## Parking Pawl Location



If the vehicle's 12 volt system is not active and the shift lever is in the park (P) position, the parking pawl is engaged. Moving the shift lever to neutral (N) will NOT allow the vehicle to roll freely. The transmission will need to be manually placed into neutral using the following procedure.

The parking pawl actuator is located on the driver side of the drivetrain. To prevent personal injury or death make sure that the vehicle's wheels are blocked so it will not roll when the parking pawl is disengaged.

## Parking Pawl Engagement



### Actuator in the park position

First check the position of the parking pawl. If it is in the position shown do not recover or tow the vehicle until you have carried out the parking pawl disconnecting procedure.



### Actuator in the neutral position

If the parking pawl is in the position shown, then the vehicle is OK to recover to tow.

## Parking Pawl Disconnecting Procedure

### Parking Pawl Electrical Connector

Locate and disconnect the parking pawl motor electrical connector. Doing this will not allow the motor to be inadvertently actuated and extended when the parking pawl is disconnected from the lock lever.



### CAUTION

Actuating the parking pawl when not installed will fully extend the motor past the end of the housing and may require parking pawl motor assembly replacement.

### Parking Pawl Disconnection

If the vehicle has been left in park, you will have to carry out the following procedure before towing the vehicle.



1. Disconnect the actuator from the linkage by removing the “R” clip from the pin.
2. Remove the pin from the clevis.



3. Push the parking pawl lock lever fully towards the gearbox housing.

The vehicle can now be moved freely or towed.

## Conclusion

We are serious about making your job as safe as possible. We are confident that the information in this guide will prove useful as you prepare to assist those involved in an emergency situation.