

balance™ hybrid electric vehicle



EMERGENCY RESPONSE GUIDE

2008-2011.5 E-450

Introduction

The emergency response procedures for the Balance Hybrid E450 vehicle are similar to those for traditional gasoline-powered vehicles with the addition of special considerations for the high-voltage electric system components.

The Balance Hybrid E450 vehicle uses a conventional gasoline engine in addition to an electric motor to power the vehicle. The energy used to power the vehicle comes from gasoline (used by the internal combustion engine) and electricity (used by the electric motor).

- Gasoline is stored in a traditional fuel tank.
- Electricity is stored in a high-voltage battery pack.

The combination of a gasoline engine and electric motor provides for reduced emissions and improved fuel economy. The high-voltage system is self contained, never needing to be plugged into an electrical outlet for recharging. The system incorporates a generator that recharges the batteries during cruising and braking.

The information in this guide will allow response to emergencies involving Balance Hybrid E450 vehicles.

The Balance E450 vehicles have been designed with many safety features for your protection. These features help provide safe access to the vehicle under various conditions. However, whenever approaching a high voltage vehicle in a fire, rescue or recovery situation, always follow one industry standard rule:

**ALWAYS ASSUME THE VEHICLE'S
HIGH-VOLTAGE SYSTEM IS POWERED UP !**

Hybrid Vehicle Identification



Balance Hybrid vehicles may be identified by the Azure Dynamics "Balance Hybrid Electric" badges located near the front fenders.



Hybrid Nameplate with "Balance Hybrid Electric" badges located near the front fenders

Hybrid Vehicle Identification

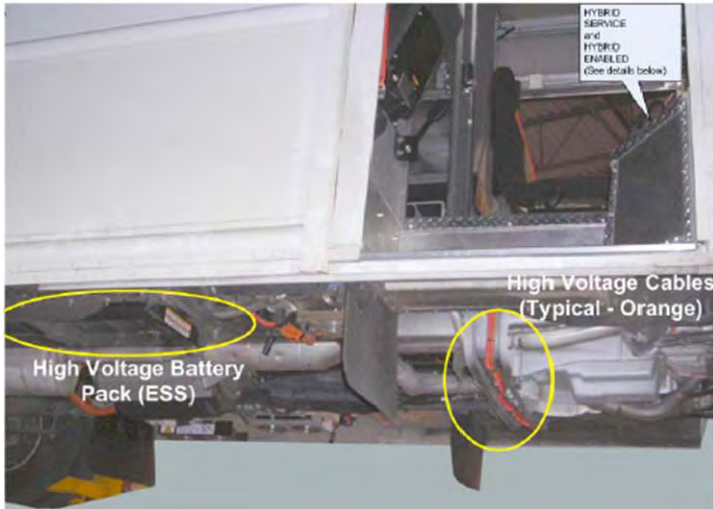
Balance Hybrid vehicles have unique hybrid indicators located to the right of the steering column.



Further verification of the Hybrid Electric Vehicle can be made by:

The orange colored cable and looming that are used for high voltage. They are visible under the vehicle and in the engine compartment.

- The presence of a high voltage battery pack mounted on the frame rail at the middle of the vehicle on the passenger side.



There are NO alphanumeric numbers in the vehicle identification number (VIN) that will classify this vehicle as a hybrid electric vehicle.

High Voltage & Fuel Disconnects

The following list indicates some of the safeguards incorporated in the design of the Hybrid vehicle to shut off the high voltage in the event of an accident.

WARNING



Various components in the hybrid system contain capacitors that can store high voltage charges for several minutes after High Voltage ESS is disconnected.

Ignition Key in OFF Position	Any time the ignition lock cylinder is in the OFF position, the high-voltage system is disabled.
Inertia Switch – High-Voltage Shut-Off	The high-voltage shut-off switch is located behind the passenger side kick panel. In the event of a collision or a substantial physical jolt, the switch is designed to open automatically, disabling the high-voltage system.
High-Voltage Fuse	In the event of a high-current short circuit, the high-voltage fuse will open, disabling the high-voltage system
High-Voltage Inter-lock Circuit	Whenever a high-voltage access point is disconnected, the high-voltage inter-lock circuit opens and disables the high-voltage system.
High-Voltage Service Disconnect Switch	Whenever the high-voltage service disconnect (located in the front of high-voltage battery) is removed, the high-voltage system is disabled. This step requires the use of tools
Thermal Sensors	If the vehicle's ignition key is left on, and the high voltage battery temperature exceeds 75°C (167°F), the thermal sensors will disconnect the high voltage battery. If key is off, the high voltage will already be off.
Fuel Pump Shut-Off	The fuel pump shut-off switch is normally closed to allow vehicle operation. In the event of a collision or a substantial physical jolt, the switch is designed to open automatically, shutting off electrical power to the fuel pump.

Electric Vehicle Identification

WARNING



Follow existing training & directions from personnel in charge at the scene (e.g. the Incident Commander)
For maximum safety, do not approach or attempt to handle a damaged hybrid electric vehicle unless you have been properly trained.
At a minimum, the Recommended Equipment and Safety Precautions sections below should be followed.

Recommended Equipment

- Class ABC fire extinguisher
- High voltage gloves, face shield, insulated boots, protective raincoat or apron
- A non-conductive object that is about 1.5 metres (5 feet) long that can be used to safely push someone away from the vehicle in the event that they come in contact with high voltage.

Safety Precautions

- Always approach a hybrid vehicle as if there is high voltage present.
- Remove all jewelry, watches, necklaces, earrings etc. since metal objects conduct electricity.
- If the vehicle is on fire, use Class ABC powder type extinguisher to contain and smother the flames, or if water is being used, use large amounts (i.e. from a fire hydrant).
- Make sure you are wearing insulated high voltage gloves and other protective clothing.
- Do not touch any broken or damaged orange cables.
- Always treat severed or damaged cables as if they contain high voltage.
- If the vehicle is submerged in water – do not touch any high voltage components or cables while extricating the occupant.

Disconnecting High Voltage

WARNING



If the high voltage battery was damaged physically or electrically during an accident, there is a possibility that high voltage may still be present on the orange cables even after the 12 Volt batteries have been disconnected. Always follow high voltage training.

Engine Operation

Until the vehicle is shut down, the engine may start or accessory drive belt may operate without engine running. Secure the vehicle and disconnect the batteries to prevent engine start or accessory belt operation.

12V Battery

The 12 volt battery is located in the engine compartment on the passenger side. In the event of an accident, turn off the ignition and remove the ignition key. Then remove all of the negative cables from the 12 volt battery. This will disable the high voltage and low voltage systems (Single Battery option).

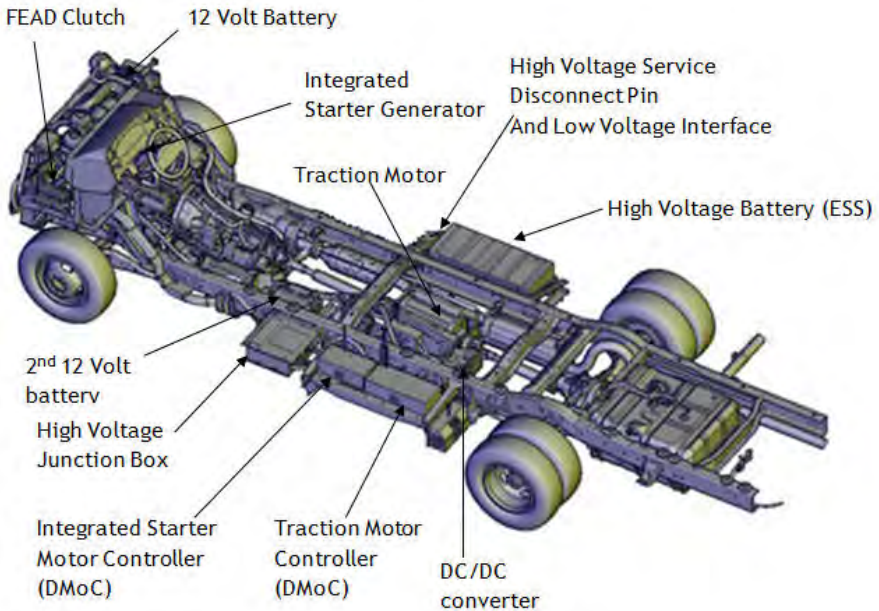
Azure also offers an option for a second 12 volt battery to accommodate increased 12 volt demands by some applications. This auxiliary battery will be mounted in-board of the frame rails. The second 12 volt battery is connected in parallel with the Ford original equipment battery and must also be disconnected to completely disable the 12 volt electrical system.

To disable the dual battery 12V system, first remove the negative battery terminal from the Ford original equipment battery located under the hood. Then remove the negative terminal of the second 12V battery located in-board of the frame rails.

Note that if the positive terminal of either of the 12 volt batteries is disconnected while the 2nd battery is still connected, the positive terminal must be electrically isolated from the chassis ground until the 2nd battery is disconnected. Failure to do so could result in vehicle damage.

High Voltage Components

High Voltage Components—Strip Chassis or Step Van –2011 *



In the unlikely event that the battery pack is overcharged, or if it is exposed to extreme heat, the battery may vent corrosive gases (hydrofluoric acid and hydrogen fluoride) outside of the battery pack through a vent on the bottom of the battery pack. The battery pack is designed to be completely waterproof.

The high voltage battery pack is a liquid cooled single unit that is housed in a vented steel case. The 2008 to 2010 Balance Hybrid may have two different types of batteries installed.

A nickel-metal hydride (NiMH) high voltage battery pack consists of 24 sealed battery modules. Each module contains 10 nickel-metal hydride (NiMH) 1.2 Volt DC battery cells. The total battery pack voltage is approximately 288 Volts DC, however can be as high as 400 Volts DC depending on its state of charge.

The active material for the negative electrode in NiMH batteries is a metal hydride. In the unlikely event that the battery pack is overcharged, or if it is exposed to extreme heat, the modules can vent flammable and corrosive gases (hydrogen and potassium hydroxide) outside of the battery pack through a vent hose and a check valve at the rear of the battery pack.

High Voltage Components

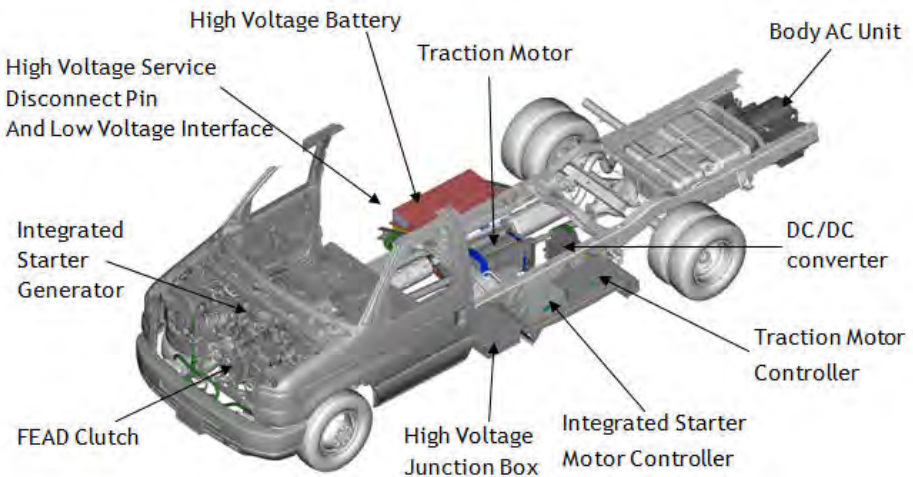
The battery pack is designed to be completely waterproof.

The liquid electrolyte (potassium hydroxide) in the battery pack is normally absorbed by the battery cell plates and will not leak under most conditions.

However, if the battery pack is crushed, it is possible for a small amount of electrolyte to leak.

The second type of battery is a lithium-ion battery which has 96 cells and the total battery pack voltage is approximately 345 volts DC, but can be as high as 394 volts DC.

High Voltage Components—Cutaway Chassis or Shuttle Bus—2011*



* Prior model year High Voltage component configurations on pages 10 & 11.

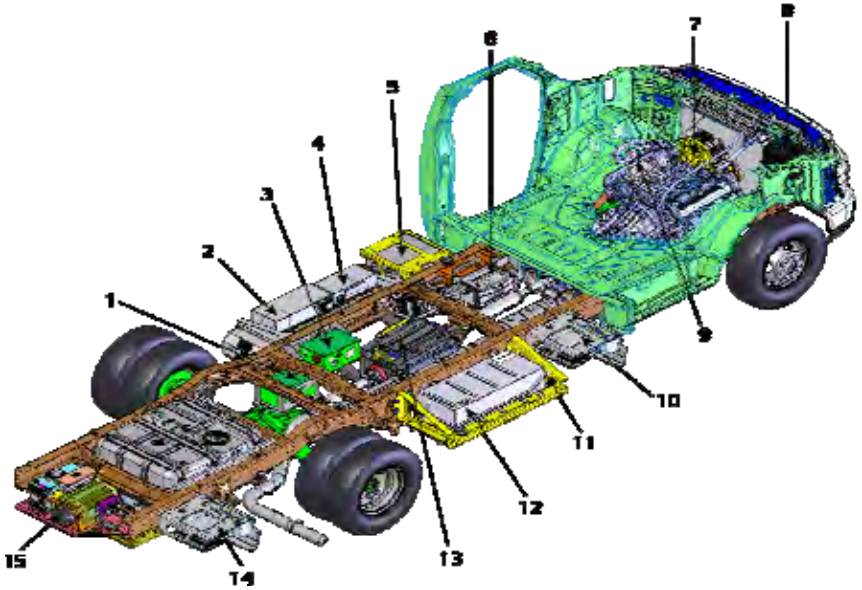
WARNING



The electrical system in this vehicle is capable of producing lethal voltage levels. High Voltage Cabling is identified by orange cable or orange loom.

High Voltage Components

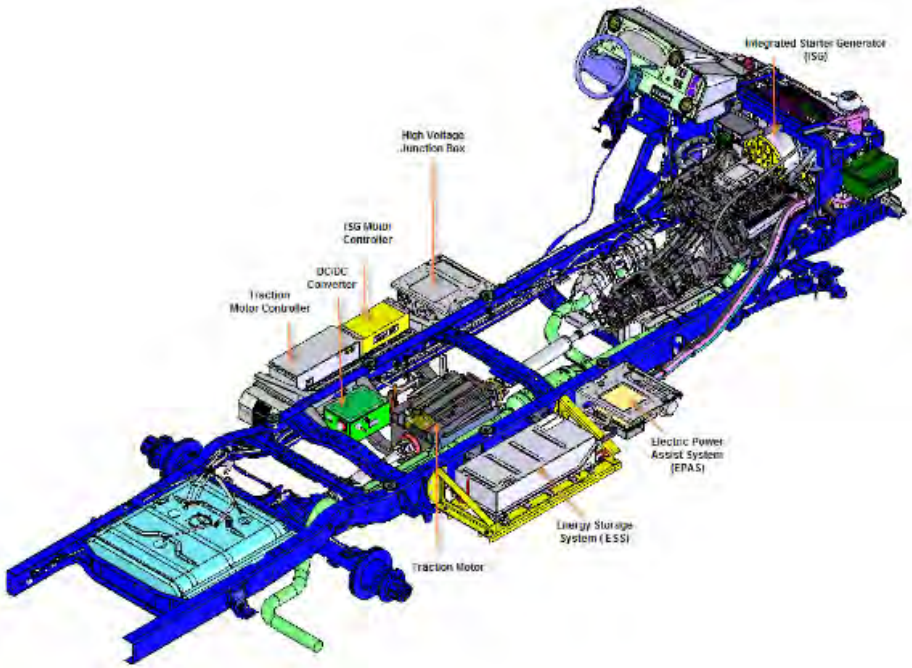
High Voltage Components—Shuttle Bus – 2008-2010.5



1. 2nd, DC/DC Converter (optional for all variants)
2. Traction Motor Controller
3. DC/DC Converter
4. Integrated Starter Generator Motor Controller
5. High Voltage Junction Box
6. 2nd, 12 Volt Battery (optional for all variants)
7. Integrated Starter Generator (ISG)
8. 12 Volt Battery
9. Vehicle Control Unit (VCU)
10. Electric Power Assist System Motor & Motor Controller (Non-Shuttle Bus Location)
11. High Voltage Service Disconnect Pin & Low Voltage Interface
12. Energy Storage System (ESS): High Voltage Battery Pack
13. Traction Motor
14. Electric Power Assist System Motor & Motor Controller (Shuttle Bus Location)
15. Electric Air Conditioning Unit (Shuttle Bus Only)

High Voltage Components

High Voltage Components—Strip Chassis or Step Van – 2008-2010.5



High Voltage Components

WARNING



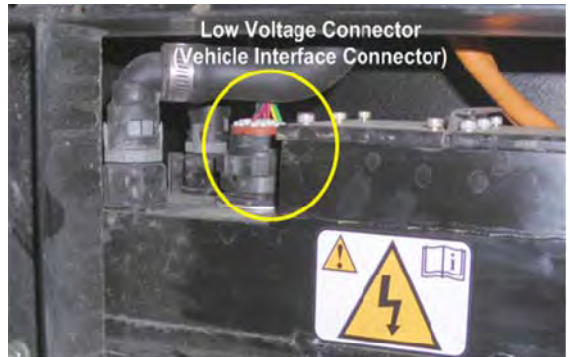
If the high voltage battery was damaged physically or electrically during an accident, there is a possibility that high voltage may still be present on the orange cables even after the 12 volt battery is disconnected. Always follow high voltage training.

Securing A Damaged Vehicle

Disable the vehicle and its high voltage electrical system by performing as many of these steps as possible:

- Put the shift lever into Park.
- **Remove the ignition key. Removing the ignition key or turning it to the OFF position will disconnect the high voltage system unless the high voltage battery is damaged.**
- Block the wheels if necessary.
- Disconnect the negative cable (black) from the 12 Volt battery. It is located in the engine compartment on the passenger side. This will also disconnect the high voltage battery. The negative cable must be disconnected from the 2nd 12 volt battery, located inside the frame rails. (if installed)
- Disconnect the low voltage connector (also referred to as the Vehicle Interface Connector) from front of the battery pack. Turn counter -clockwise ($\frac{1}{4}$ turn) and pull it out.

This view is from underneath the front edge of the high voltage battery pack.



High Voltage Battery



For the 2011 Balance the harness may be cut at the label located at the front of the High Voltage Battery.

Damaged Battery

The batteries contain chemicals which can cause burns and other serious injuries. If contact with battery electrolyte occurs, follow the suggestions below, to minimize the chance of injury:

- Flush eyes immediately with cold running water for at least 15 minutes if contact occurs.
- Rinse skin immediately with water for at least 15 minutes.
- Remove and dispose clothing if soiled.
- Seek medical attention immediately.

Personal protective equipment (PPE) such as a splash shield or safety goggles, gloves (latex, rubber or Nitrile), an apron or overcoat and rubber boots are required when handling damaged batteries.

Fold-down helmet shields are not acceptable for acid or alkaline spills.

The liquid electrolyte in the battery pack is normally absorbed by the battery cell plates and will not leak under most conditions. However, if the battery pack is crushed, it is possible for a small amount (drops/mist) of electrolyte to leak.

Potential Hazards / Public Safety

Towing

Follow the towing procedure for a conventional gasoline-powered vehicle.

WARNING



Never chain or strap vehicle to or across any high voltage components or orange cables.

Battery Pack Disposal

The high voltage battery pack is recyclable. Dispose the battery according to the applicable federal, provincial, state, and local regulations.

WARNING



Do not disassemble or incinerate the high voltage battery pack. Improper disposal methods can lead to injury.