eLion 2017 Owners/Operators Guide

LION BUS | MADE SMART. URBAN JUNGLE SAFE.

921. ch. de la Rivière du Nord
Saint-Jérôme, Québec
J7Y 5G2

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CHAPTER 1 - INTRODUCTION

Why Electric?

The eLion buses are the most advanced Type C school buses of their kind on the market today. They are built to support our customers and the environment.

The eLion bus comes equipped with two different types of batteries.

- 12V batteries to power the low voltage systems
- Lithium-ion NMC LG Chem B10 modules to power all the high voltage components.

By using battery energy instead of diesel fuel to provide power to the vehicle, the eLion buses will reduce environmental impacts around the world. The eLion bus provides clean energy transportation solutions that will improve your carbon footprint.

In order for the LG Chem B10 modules to recharge, the bus must be plugged in.

- An Electric Vehicle Supply Equipment (EVSE) is used to charge the vehicle.

The eLion buses take advantage of regenerative braking (Re-gen).

- "Re-gen" is a term used to describe any time the electric motor applies negative torque to the tires and the resulting energy is recovered by the electric motor instead of wasted as heat.

What to Expect?

In this guide, you can expect to learn:

- The fundamentals of the eLion bus
- Details on Vehicle Operation
- Operating Procedures
- Normal Operating Conditions
- Range Efficient Driver Techniques
- General Warnings and Indicators Prompted by the Vehicle Management Unit
- What you should do in an emergency.
- General Safety Precautions

CHAPTER 2 - VEHICLE CHARACTERISTICS
Overview and Description

Lion Bus ("Lion") was created in 2008 by Marc Bédard and Camile Chartrand to respond to customers' specific needs in one of North America's largest industry.

The Lion school bus includes many innovative features to lower the total cost of ownership.

Lion also improved many other items such as the driver area, which is much more comfortable and easily adaptable to all types of drivers. The driver visibility is also the best of the industry amongst Type C school buses.

The 102'' wide body offers a standard 18'' aisle. This makes the driver's life much easier when he needs to walk to the back of the bus to check on students. This also creates much more comfort for passengers and avoids premature wear of seat back covers.

In 2012, Lion launched an electric school bus development program using its Type C school bus platform. The objective was to integrate an all-electric powertrain to its existing reliable school bus.

In 2014, the ***eLion,*** Lion's all-electric school bus, started its testing process. The ***eLion*** has been tested and certified for all Federal Motor Vehicle Safety SCHOOL BUS Standards. During this period of time, the eLion made over 10,000 test miles on many different school bus routes.

Many tests were conducted by a third party organization to verify and to certify vehicle performance. Several tests were conducted at Transport Canada under specific controls.

The eLion has performed the Rowan University Composite School Bus Cycle. This test was used to prove that the vehicle would meet and exceed the demand of its duty cycle. A second phase of testing has been performed in early 2015 with 6 other eLions. Those units were sent to school bus contractors and school districts in Quebec and in California.

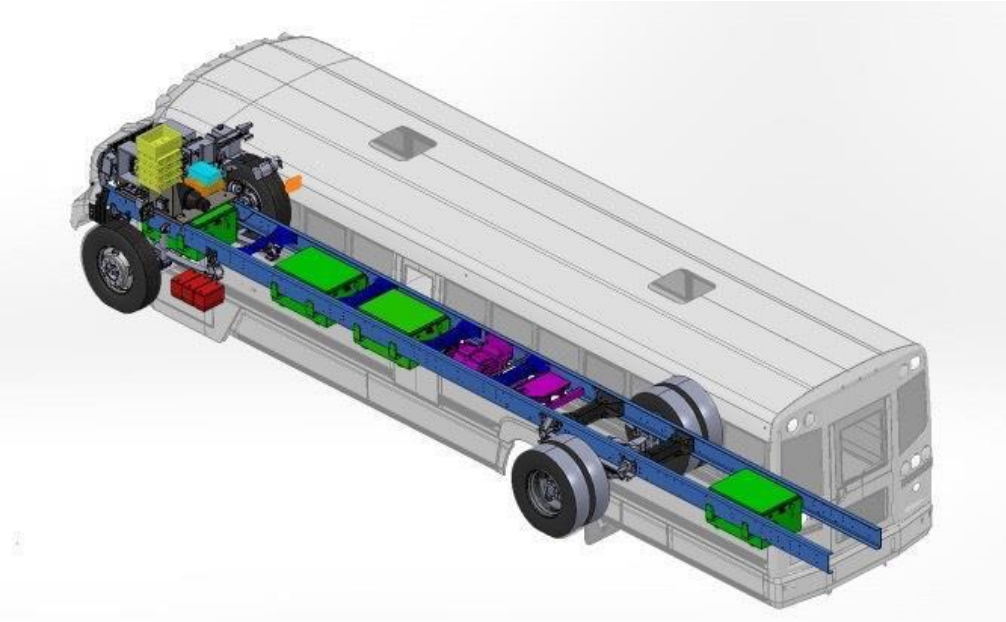
Lion is currently the only all integrated electric original equipment manufacturer of type C school buses in North America. All components used in the eLion manufacturing are original components, tested and certified by Lion's engineering team.

The Lion chassis has been used by Lion since its inception. The eLion uses that same chassis and the mechanical components common to the two buses, electric and diesel, are exactly the same.

The eLion bus body and the Lion diesel body are the same, except for components proprietary to the eLion. In total, approximately 1,000 Lion vehicles are presently being operated in North America.

Technical Specifications

Below is a schematic of the standard 75 miles range eLion. Drive train components are showed in purple (TM4 Electric motor and TM4 CO200 inverter). All drive train components and battery packs are located between the frame rails in order to offer a maximum protection to those components in case of side impacts. All components are easily accessible and easy to service as they can be removed from below. For example, a battery pack could be removed and replaced within 30 minutes.



Vehicle Propulsion System

The eLion is equipped with one standard DC TM4 Sumo MD electric motor. See below a quick overview of the most important specifications of TM4's electric motor.
The ***eLion*** has no transmission. It is a direct drive with a short drive shaft between the electric motor and the rear axle.

Lion offers a wide range of differential ratios to customize the eLion based on the end user's needs. The selection of the ratios will permit an optimal performance of the eLion depending if it is mostly used on city routes, mountain routes, highways or should this bus be operated in mixed route uses. Lion provides assistance to select the optimal ratio.

SPECIFICATIONS

750 Vdc, 30 seconds, 65°C

SUMO MD

MOTOR	INVERTER	PEAK POWER (kW)	CONTINUOUS POWER (kW)	OPERATING SPEED (RPM)	CONTINUOUS TORQUE (Nm)	PEAK TORQUE (Nm)
LSM200C-2300	CO200MV	200[1]	100	2250	1000	2300
LSM200C-HV2100	CO200HV	200	180	3100	1000	2100

sumo

CONTROLLER FEATURES

- Medium (<450 Vdc) or high (<750 Vdc) voltage inverter
- Reflex™ gate driver technology
- EMI filter
- Best in class power density
- 3-phase or multi-phase inverters
- High efficiency

MOTOR FEATURES

- Proven permament magnet technology for optimal efficiency
- Outer rotor topology for maximum torque density
- Low electro-magnetic noise
- Low-cogging torque for better NVH
- Four-quadrant operation

SOFTWARE FEATURES

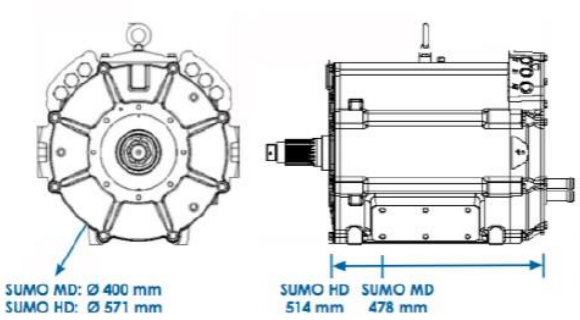
- Compatible with TM4's advanced diagnostic software suite
- CAN 2.0b communication interface
- Torque or speed control

TM4 Sumo MD Electric Motor Systems

Items in the red boxes come standard on the eLion bus.

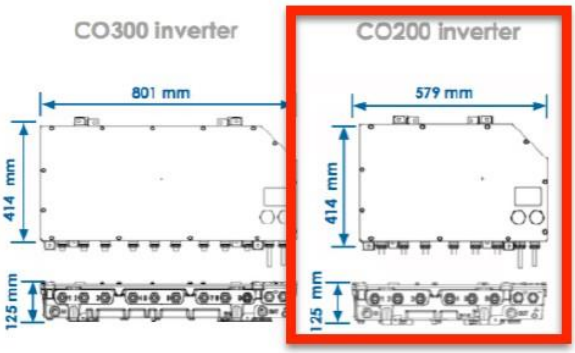
WEIGHT AND DIMENSIONS

PRODUCT	WEIGHT	LENGHT
SUMO MD	216 kg	478 mm
SUMO HD	336 kg	514 mm
CO200	22 kg	579 mm
CO300	35 kg	801 mm



STANDARDS

Automotive components	AEC-Q100 AEC-Q101 ACE-Q200
Electromagnetic compatibility EMC	Main automotive international standards
System protection	IP6K5 (IP69K optional)
Toxic materials and flammability	ROHS, ELV, UL94-VO



Innovation in motion

TM4's vast expertise and cutting-edge technologies have both been integral contributors to the design of one of the world's most advanced electric drivetrains. More than 100 breakthrough patents combine to deliver unmatched efficiency, power density and quality in a unit that is compact, and affordable. TM4 is recognized as an expert in thermal management, coil winding, outer rotor topology, and motor & inverter control algorithms, all contributing to producing the highest possible energy conversion efficiencies.

The LSM200 motor technology uses permanent magnets to offer high efficiency. Its topology is based on an outer rotor technology that maximizes the use of the magnets and reduces the amount of rare earth materials. This high torque/low speed system is designed to interface with standard rear differentials without the need for an intermediate gearbox. The CO200HV controller utilizes the latest technology of automotive grade insulated-gate bipolar transistors (IGBT) to deliver the industry's highest specific power and current densities.

KEY BENEFITS

INDUSTRY-LEADING EFFICIENCY
Brushless permanent-magnet technology ensures exceptional performance over a wide range of speeds.

BEST-IN-CLASS POWER DENSITY
Delivers more power with its unmatched power-to-weight ratio, takes up less valuable space, and requires fewer raw materials to produce.

ADHERENCE TO AUTOMOTIVE STANDARDS
99% of our electronic components are automotive-certified, assuring compliance with current industry best practices throughout the entire development cycle.

RELIABLE SYSTEM PERFORMANCE
Built to endure demanding real-world road conditions and backed by a first-rate warranty.

EXCEPTIONAL EASE OF INTEGRATION
Allows for a plug and play integration and a significantly reduced time-to-market.

PATENT PENDING INNOVATION
The Reflex™ gate driver technology increases efficiency and operating voltage range while limiting overshoot and commutation losses.

Vehicle Performance

The eLion was submitted to very specific testing that would represent real life conditions. Amongst other testing, the bus performed a full test week at Transport Canada's testing facility (PMG Technologies).

Lion confirms that a fully loaded eLion (30,000 lbs) has the ability to:

- Sustain a minimum speed of 40 mph on a 2.5% grade
- Sustain a minimum speed of 10 mph on a 20% grade
- Accelerate to 10 mph in a maximum of 4 seconds
- Accelerate to 20 mph in a maximum of 10 seconds
- Accelerate to 30 mph in a maximum of 20 seconds
- Accelerate to 40 mph in a maximum of 35 seconds

Vehicle Range

Lion confirms that the eLion equipped with four batteries has a range of 75 miles on routes comprised of 50% city and 50% highway miles.

A 100-mile range option is available by adding a fifth battery pack on the vehicle. Pricing of this option is available in the pricing section.

Lion gathers on-board data and statistics of every delivered eLion bus to provide end-users real-time and up-to-date energy consumption average and many other useful information.

The eLion has a standard 75-mile range on a single battery charge. A standard eLion is equipped with four 26 kWh battery packs totaling 104 kWh.

The eLion has an average energy consumption of 1.4 kWh / mile.

The average energy consumption mentioned above includes several months per year of winter conditions.

Lion confirms that the eLion is capable of operating at minus 20F to 95F with a very limited loss of range (less than 10%).

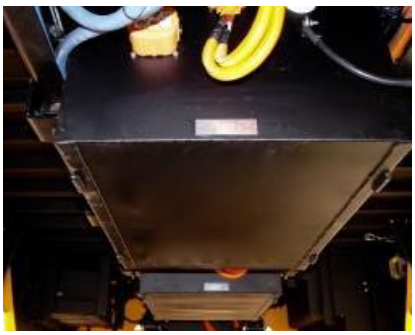
Additional Range

Lion offers a fifth battery pack mounted between the frame rails and between the two axles. The additional 26 kWh battery pack brings the available range to 100 miles. Every battery pack weights approximately 700 lbs.

All electronic equipment meets or exceeds FCC Class B requirements.

Final vehicle weight, without passengers:

4 Batteries / 75 miles range: 19,500 lbs.
5 Batteries / 100 miles range: 20,200 lbs.



Example: eLion Battery Pack

Regenerative Braking System

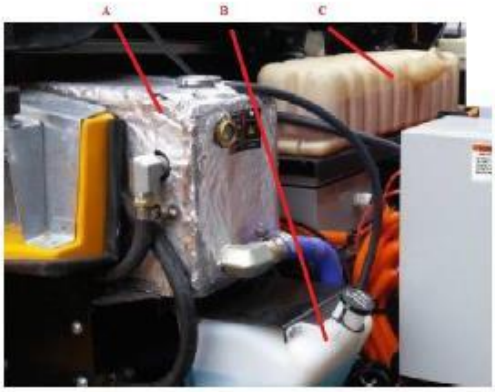
Lion offers a standard two level regenerative braking systems that complies to all US FMVSS.

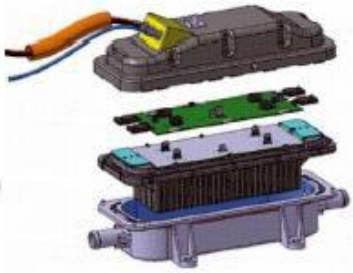
The regenerative braking system (REGEN) is activated as soon as the driver removes his foot from the throttle pedal. The REGEN mode has been tuned to be powerful enough to charge the batteries and gain approximately 15% of range. The first level is smooth but very effective. The second level is activated when the driver uses the brake pedal. In this case, the REGEN is much more powerful and gives the battery a maximum charge. For both level of REGEN, the brake lights are activated for safety purposes.

Lion's regenerative system is disabled when an ABS brake fault code is active to offer maximum safety. The driver can manually disable the REGEN mode if road conditions are icy or slippery.

Heating and Climate Control Systems

Lion has developed a heating system for heating the interior cabin of the vehicle. The eLion can be programmed so the preheat mode can be used while in charging mode. This way, coolant lines are heated, defrosters are enabled so that the driver has a defrosted windshield bus when accessing it in the morning.





a) Heating Coolant Tank
b) Windshield Washer Tank
c) Main cooling tank (charger/motor/radiator)

Battery Temperature Control

The eLion battery packs are climate controlled when the bus is in a charging mode. Each battery pack is equipped with a standard electric heater and blowers that keep the modules from going below 50F. If the module temperature goes below 50F and if the bus is plugged for recharge, the high voltage battery heating system automatically starts to keep modules at required temperature. In the meantime, the on-board charger continues to charge the batteries to provide enough energy so the bus remains at 100% of State of Charge (SOC). This way, all year long, the bus is always fully charged in the morning and doesn't lose any range capacity because of battery temperature, even in winter time.

The battery electric heating system is only enabled when the bus is in charge mode. In drive mode, the high voltage battery heating system is disabled but the drive and battery systems create enough heat into the battery packs during normal operation.

Vehicle Battery Systems

The standard eLion is equipped with 4 battery packs of 26 kWh each for a total of 104 kWh. The battery packs are assembled at Lion's facility. Lion uses LG Chem B10 modules to power its electric school bus. You will find below the required information :

Recommended battery system and estimated range
- *4 battery packs*
- *Chemistry: Lithium-ion NMC*
- *Range 75 miles*

Battery Type	Lithium ion NMC/LMO
Voltage	288 - 400 Vdc
Nominal Voltage	360 Vdc
Rated Capacity	36 Ah
Rated Energy	26 kWh
Max Constant Current	93 A Charge/Discharge
Battery Pack Weight	300 kg

Battery efficiency (miles per kWh)
0.71 mi/kWh

Time (in minutes) to charge batteries from 20% state of charge to 100% state of charge on a level 2 charger.
4h20 (with level 2 charger 80 A @ 240 V, thus 19.2 kW)

Time (in minutes) to charge batteries from 20% state of charge to 80% state of charge on a level 2 charger.
3h15 (with level 2 charger 80 A @ 240 V, thus 19.2 kW)

Battery capacity (amps per hour per cell)
36 Ah/cell

Battery storage capacity (kWh)
104 kWh

Total usable battery energy storage capacity (kWh)
93 kWh

Battery Cycle Life is more than 4,000 full cycles if used on a normal school bus route. The battery life is dependent on its use profile.

The battery packs warm themselves when too cold, however it is recommended to leave the vehicle plugged in overnight and over the weekend to maintain the battery warm for temperature colder than 50F. When being parked for longer periods, a 20% SOC is recommended.

Battery Management Systems

The BMSs are on-board and there is one BMS in each battery pack. They communicate via CAN bus with the vehicle integration module (VIM) which acts as their master BMS. The VIM also communicates with all the powertrain devices to ensure their safe and optimal use, thus being the central controller of the vehicle.

Real Time Data

Lion includes a standard Parker touch screen on which the driver can see real-time state of charge, remaining range, energy consumption gauges and many other important information.

This screen also provides real time data on every specific electronic component. Technicians and drivers have access to real time fault codes and specific information on the vehicle.

On-board Telematics

Lion uses an on-board telematics system that provides real-time data to Lion, technician and end- users through a web interface. The system used has been customized to

Lion's electric bus and provides information such as:

- State of charge, remaining range, GPS location, average energy consumption, total energy used, fault codes and diagnostic information, etc.

The telematics system can also be used for statistic downloads and software updates.

On-Board Charging Systems

The eLion is equipped with a standard 19.2 kWh on-board AC charger: BCI-20. The BCI-20 conforms to the most recent SAE J1772 standards or equivalent.

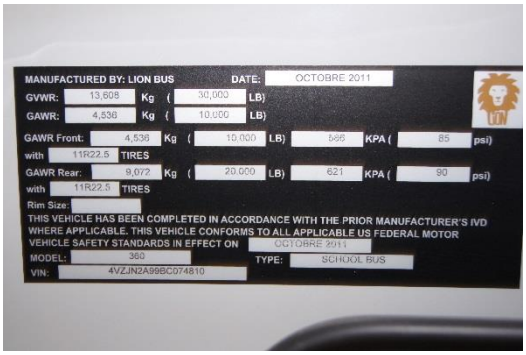
All charging system components used on the eLion have or meet:

- UL certifications.
- SAE Standards and comply with relevant IEEE standards.
- Are capable of operating from -20F to122F with less than 10% degradation in specified performance.

Vehicle Identification label

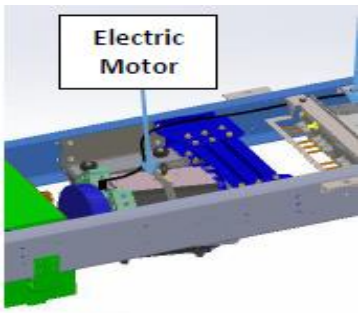
The plate is installed above the driver's mirror left hand side and will include the following information

- Manufacturing date of the vehicle
- Gross vehicle weighted rating (GVWR)
- Gross axle weighted rating (GAWR)
- Size of the wheels and tires used
- Vehicle identification number (VIN)



Electric Motor Serial Number

The serial number of the electric motor is located underneath the bus toward the rear, the label is located on top of the TM4 motor



CHAPTER 3 - OPERATING THE VEHICLE

MAX SPEED

1. This bus has a 60mph max speed, an upgraded calibration is available upon request.
2. Over 60mph, check engine light and Stop engine light will advise the driver to slow down.
3. Remove foot from throttle to allow REGEN and to lower bus speed
4. After 3-5 seconds over max speed, the bus will enter a protection mode, and will cut High Voltage.

CRASH SENSOR

1. The bus is equipped with a crash sensor that willshut off High Voltage in case of accident
2. Located on the front inside LH frame
3. The bus will automatically derate if crash sensor is enabled.

Pre-Trip Inspection

In addition to the normal pre-trip inspection, Driver should check the State of Charge (SOC) indicator on the display.

Entrance Door

Exterior Locking System

To open with pneumatic door latch:

1. Lift the lid
2. Insert the key and turn

To open with manual release**:**

1. Lift the lid
2. Insert the key and turn
3. Rotate the handle down
4. Turn the handle
5. Pull the door outward

To close with pneumatic door latch

1. Perform "Child check mate " routine, if equipped
2. Open the door with the switch
3. Exit the vehicle
4. Insert the key and turn
5. Close the door. Remove key

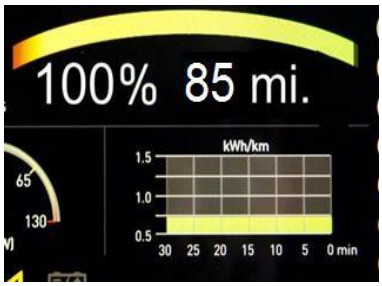
Entrance Door Interior Release

Light indicating that the door is locked

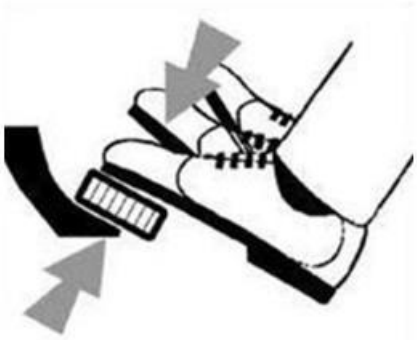
1. Turn the handle and push against the door to open.

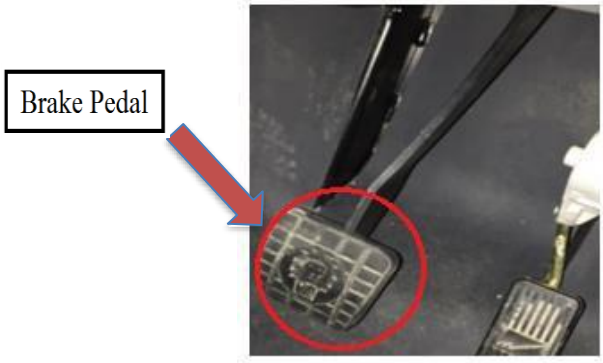
Startup Shutdown Procedure

1. Turn the key to the ON position and wait until you see the S.O.C. (%) on the driver screen

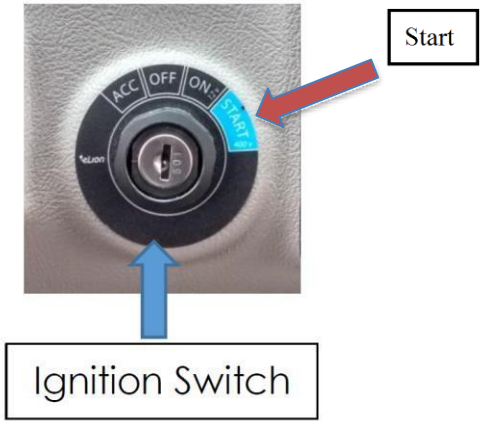


2. Apply Brake pedal

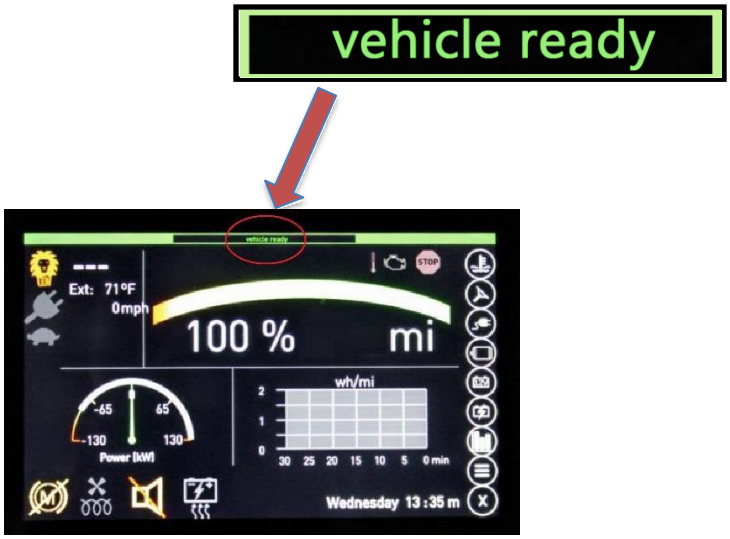




3. Turn Key to START for 2 seconds



4. A green line will appear in the upper screen (Vehicle Ready)



Fault Codes on Driver Screen

1. When available, please capture a picture of fault code on driver screen
2. Send picture of fault code to FPGF and or Dispatch/Center Supervisor
3. Push the  to bring back drive screen with S.O.C.
4. Press the icon:  to get more information on the system fault code

5. The vehicle is ready to use when an « **N** » appears in the upper left corner

6. Release parking brake and select gear

Parking brake engaged position

Parking brake released position

If the bus does not start!

1. When turning the key to the ON position
   - is there any 12V?
   - Is the screen/display turning on?
     - o If not, check the safety kill switches

(1) 12V Safety switch located in the 12V battery compartment
(2) 12V Safety switch located in the driver's cockpit near the lower left hand corner

- If the safety switches are in the ON position check the 12V accessory batteries and recharge as needed

12V Accessory Batteries

12V Battery Compartment Decal

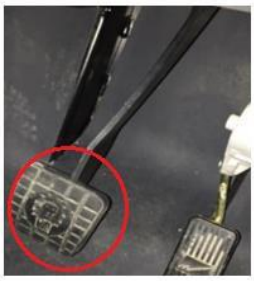
2. Is the bus plugged in the charging station? If so, the bus won't start: Protection Mode!

J1772 Standard Charge Receptacle Location

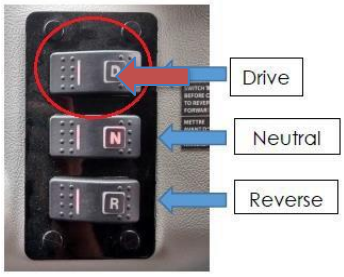
To select the Drive Mode

1. The « **N** » must appear in the upper left corner

2. Apply brake pedal and select the « **D** » mode on the gear sector

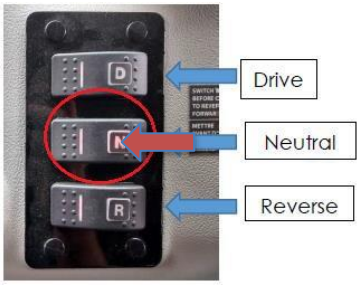


Brake Pedal



Gear Selector Switches

3. When switching from **Drive** to **Reverse** please make sure the bus is stopped and always press/select the Neutral Mode between **R & D** prior to selecting drive or reverse

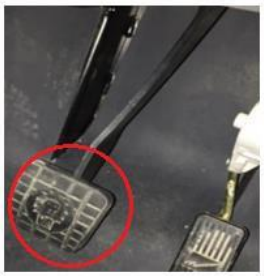


Note: When changing gear from Drive to Reverse or from Reverse to Drive always press the Neutral button between each gear selection

Note: The eLion will enter a protection mode (Turtle) below 5% of S.O.C, the bus will continue to drive, but at lower speed and lower acceleration but with full torque, always manage your route to ensure you have adequate energy/SOC to complete your run

Unable to use Gear Selector?

1. If the N appears in the upper left corner
    - Make sure you press the brake pedal

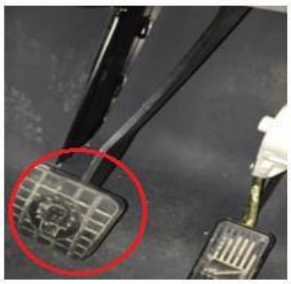


2. If « **!!!** » appears, reset the 12Vsystem

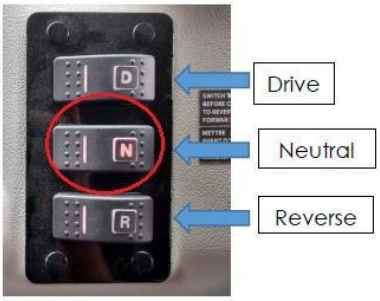
To reset the 12V system cycle the safety/kill switch in the driver's cockpit area [2] or in the exterior battery compartment [1] to the OFF positions for 15 seconds then turn it back to the ON position and proceed with the normal start up procedures

Shutdown Procedure

1. Apply Brake pedal



2. Press/select the Neutral Mode



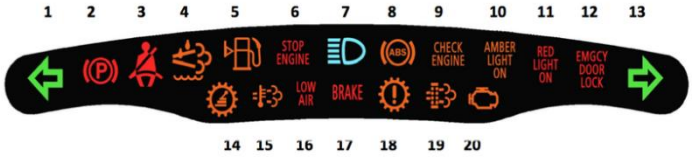
3. Turn the key to the OFF position

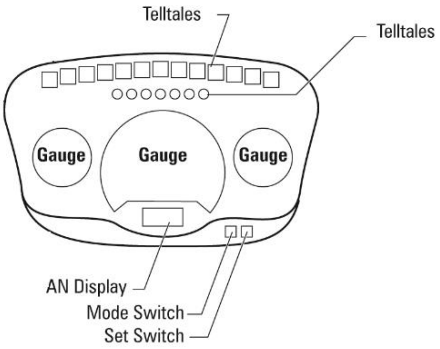
4. Set the parking brake

Note: The driver must apply the park brake before leaving the vehicle; failure to do so may result in a vehicle roll away

CHAPTER 4 - COMPONENT INFORMATION (Dash)

Center Dash Indicator lights





Note: Indicators/Symbols may vary between build revisions

1. Left Turn
2. Park Brake
3. Seat Belt Warning
4. N/A
5. Low Fuel
6. Stop Engine
7. High Beam
8. ABS Fault Indictor
9. N/A
10. Amber Light On
11. Red Light On
12. Emergency Door Lock
13. Right Turn
14. N/A
15. N/A
16. N/A
17. Brake Malfunction Indicator (Hydraulic)
18. N/A
19. N/A
20. Wait to Start

Note: If any warning lamps or faults are present on the dash or Parker display screen during the startup procedure and remain ON please make note of these indicators and report them to your "Center Supervisor" or "Dispatch Representative" before taking the bus on route

LCD Message Center

The alphanumeric display message center is a seven character, multi-segment, liquid crystal display (LCD) that allows the driver to see vehicle information beyond that provided by the gauges and telltales. The display includes:

- Odometer, trip odometers and an engine hour meter
- Vehicle data and warning messages
- Automatic and manual test menus

Mode and Set Switches

The UIP-B contains Mode and Set switches that allow the driver to view data screens and run diagnostic tests in the LCD.

Audible Warning

The UIP-B contains and audible device that sounds to alert the driver to a condition that requires attention.

Gauges

The UIP-B contains three stepper-motor driven gauges. The diameter of the center gauge is 3 inches and the diameter of the other gauges is 2 inches. The gauges are all LED backlit, and the pointers are illuminated from hub to tip.

Telltales

There can be up to 20 telltales, which are dead-fronted and cannot be seen unless illuminated. Telltales are activated by messages received from the vehicle data bus or by remote switches and analog sensors in the vehicle.

CHAPTER 5 - MANUAL SYSTEM CONTROLS

Heater Controls

Note: To turn off the electric heater the heater request knob must be turned all the way left, failure to do this will allow for the electric heater to stay enabled and waist energy when not in use

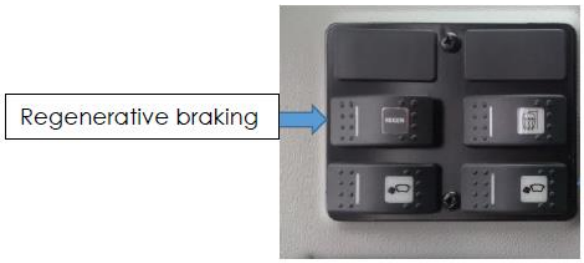
Wiper Operation

ON / OFF: Press the switch to start or stop the wipers

WASH: Press the wash button and maintain it pressed to send the windshield washer fluid

INTERMITTENT: Push the switch downward to decrease speed and upward to increase speed

Regen Braking



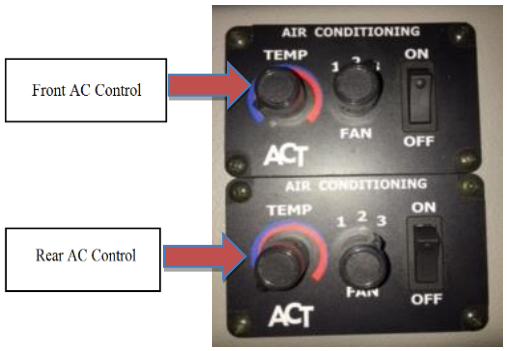
1. Allows the bus to generate additional range if the driver optimizes the Regen braking system
2. Use Regen when going downhill, anticipate stops

Regenerative braking system doesn't work?

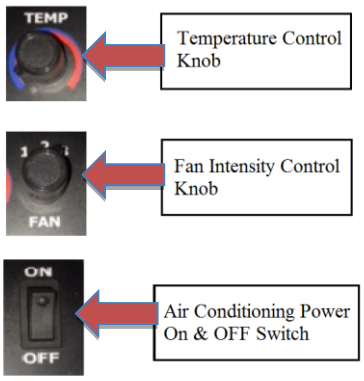
1. Check REGEN switch in the upper left switch panel ? Make sure it is in enable position
2. If S.O.C. is close to 100% : very little REGEN, batteries are fully. The lower you get in S.O.C. the more REGEN you get
3. Check battery module temperature. Needs to be over 50F / 10 Celsius (if lower, plug eLion to charging station)
4. Is there an ABS fault code light ? If so, eLion disables REGEN for protection and non-slip

Interior Controls

AC Controls



Front & Rear AC Controls
(AC equipped buses only)

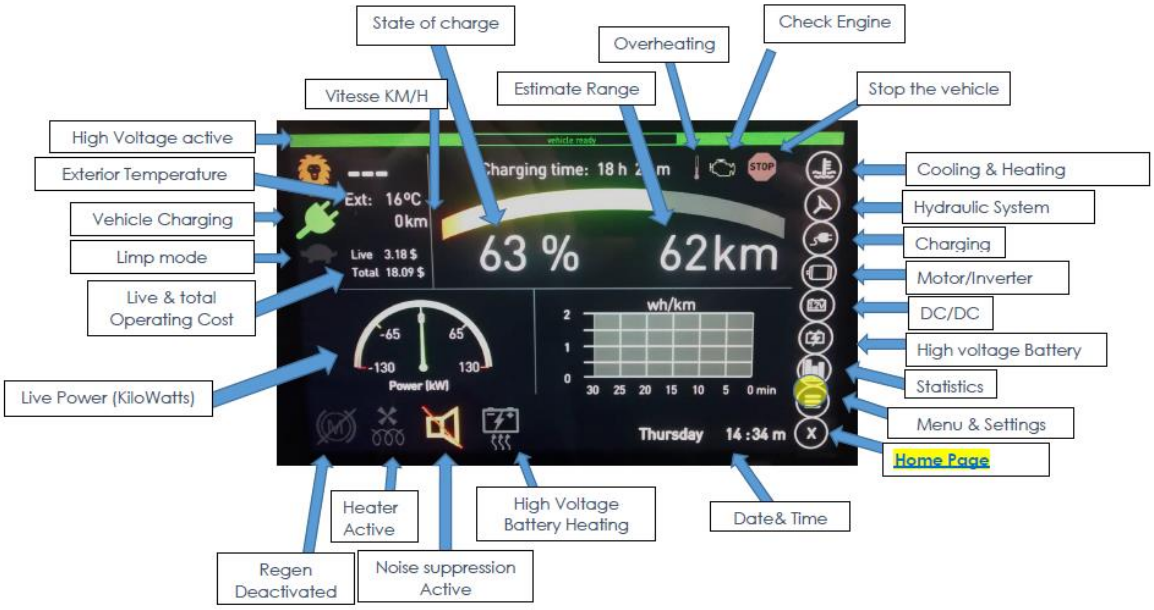


Front AC Evaporator Unit

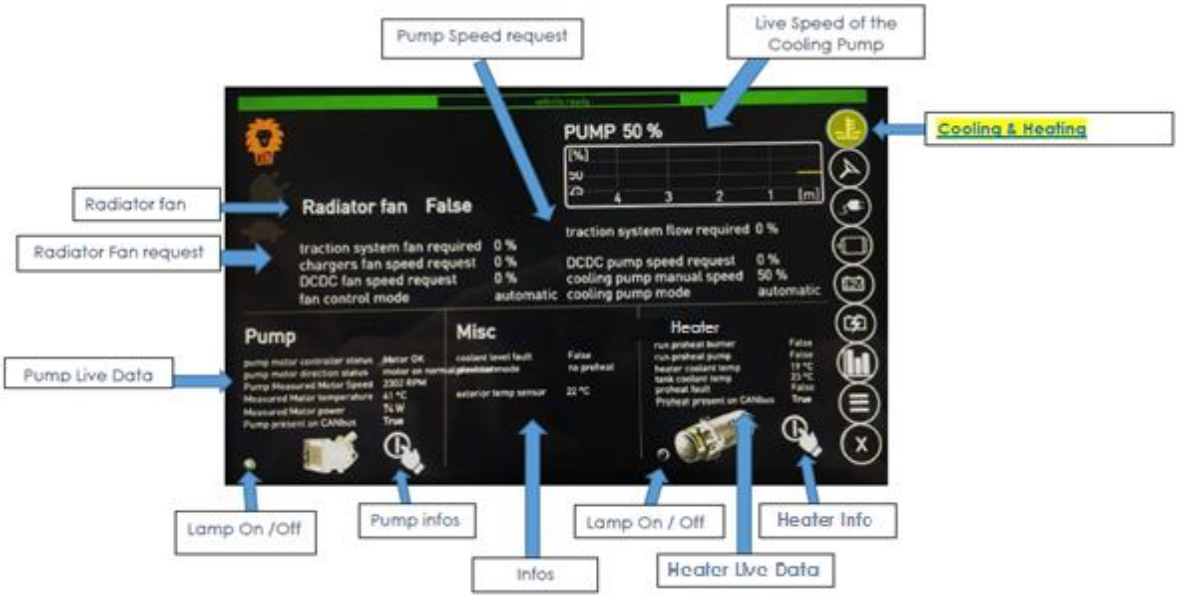
Rear AC Evaporator Unit

CHAPTER 6 - COMPONENT & SYSTEM INFORMATION (Parker Display)

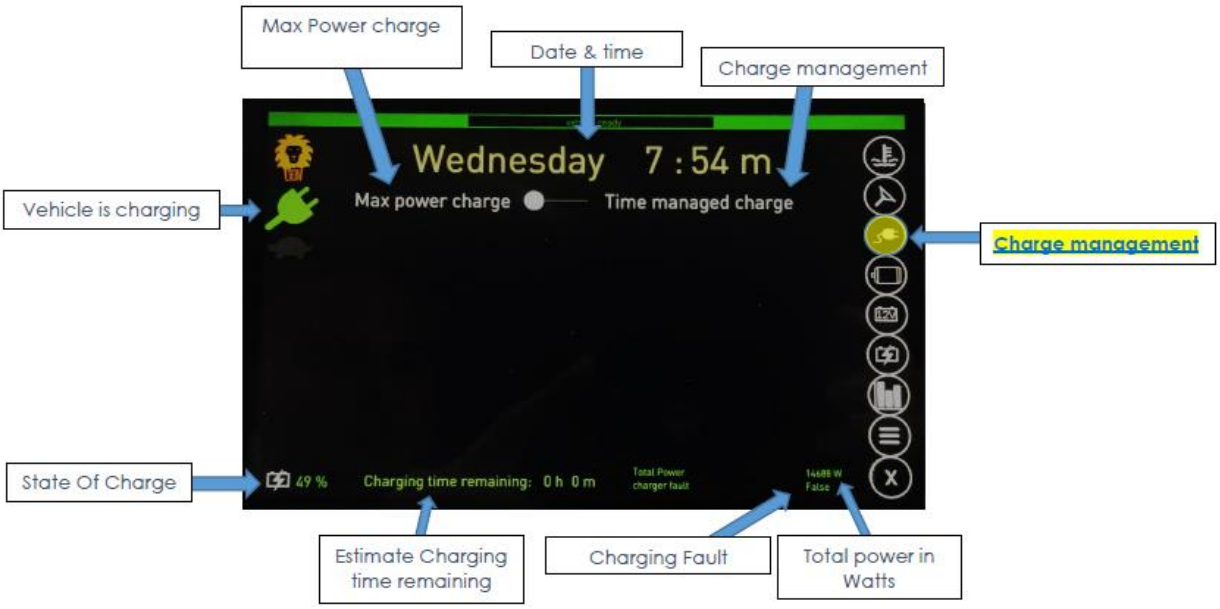
System information page



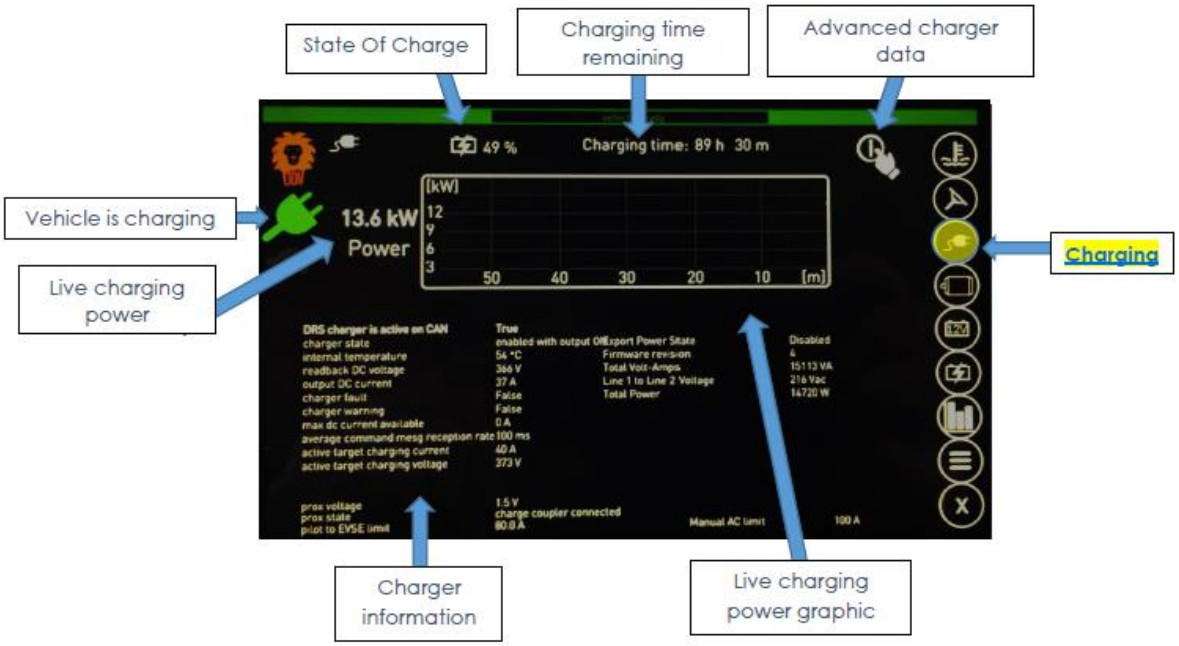
Cooling and heating information page



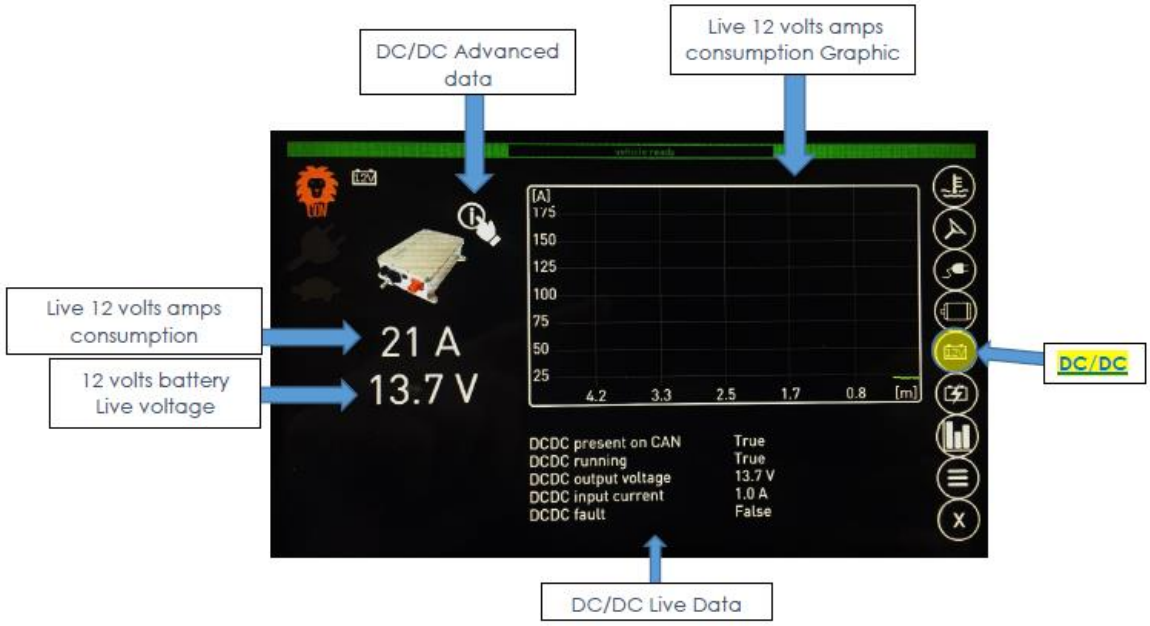
Charging information page 1



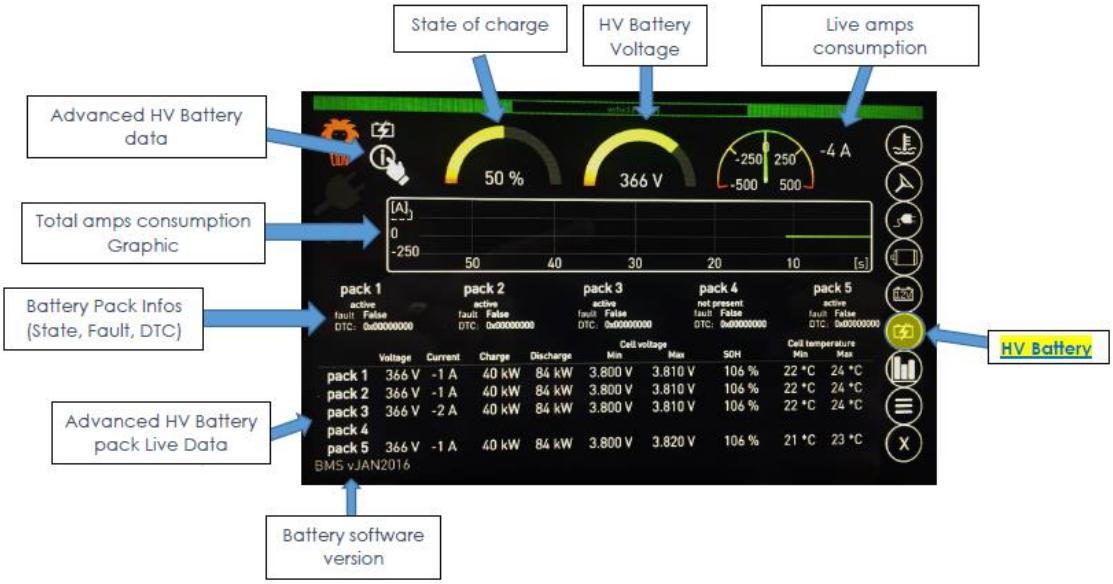
Charging information page 2



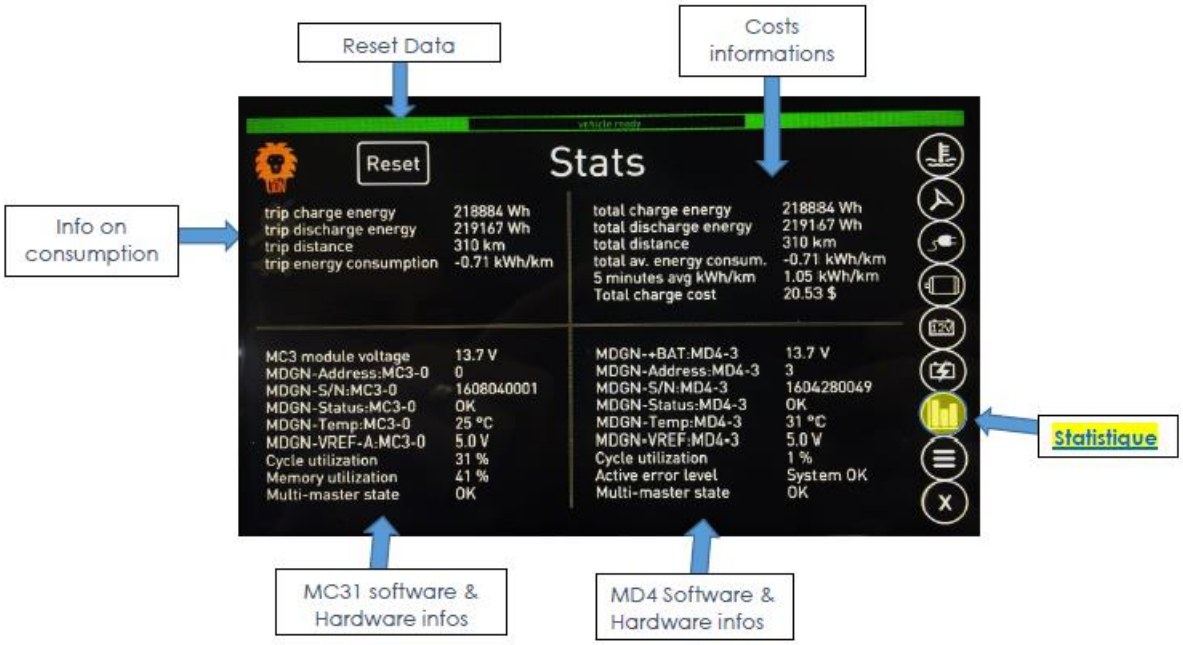
12V DC to DC information page



High Voltage battery information page



Statistics information page



Main Menu

CHAPTER 7 - STEERING COLUMN

Steering Settings

1. To adjust the steering wheel position, use the lever on the left side of the steering column
2. To tilt the steering column, pull the lever towards the driver.
3. To use the telescoping steering, push the lever down

Hazard Flasher

1. The hazard flasher switch is located under the steering column

    - To turn on the hazard lights, pull down on the black switch
    - To cancel the flashers, push the switch back

Turn Signal Lever & Headlight Switch

1. The turn signal lever is located to the left of the steering column
    - To activate the directional lights, pull down the lever to signal left and upward to signal right
2. The high beam activator is located on the turn signal lever
    - Pull the lever forward towards you to activate the high beams, to turn the high beams off repeat the same procedure

High-beams do not activate if your marker light switch is in the off position

CHAPTER 8 - CHARGING THE VEHICLE

Charging

1. Wait until the bus is completed OFF = the driver screen will shut down
2. Plug-in the bus and wait until **GREEN** pilot light stays ON (blinking light = charging in setup mode)

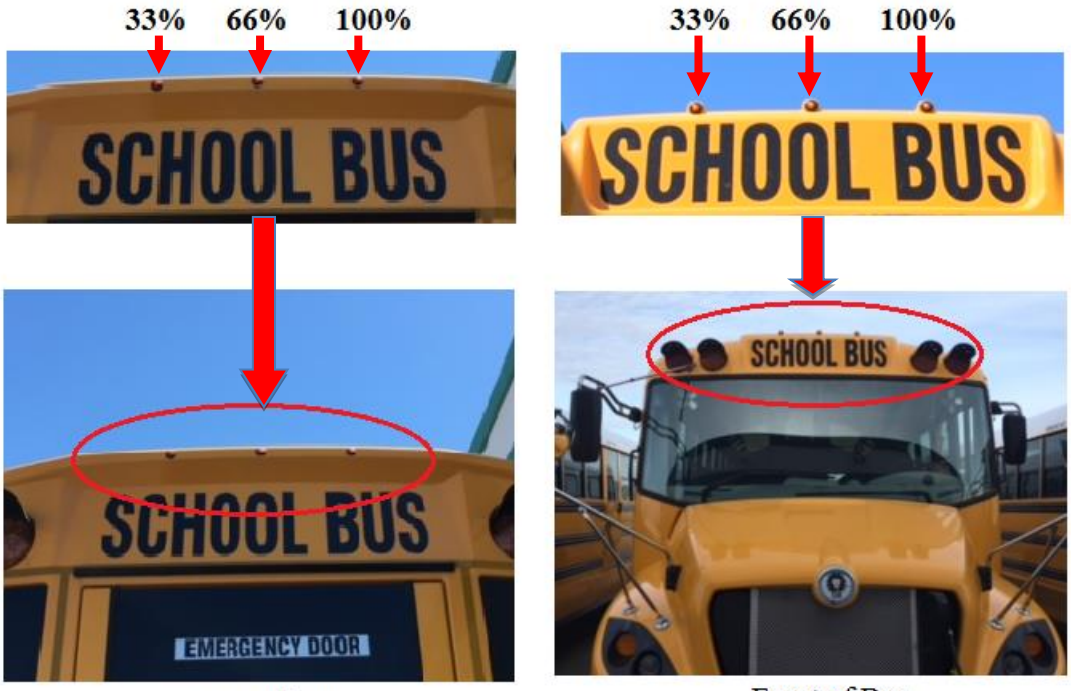
J1772 Charge Inlet Location

3. Once the **GREEN** pilot light stays on, bus is charging

Charging Mode doesn't start?

1. Was the bus completely OFF?
2. Unplug charging station, wait 15 seconds & reconnect
3. Reset 12V system

Exterior Charge “SOC” Indicators



Rear of Bus

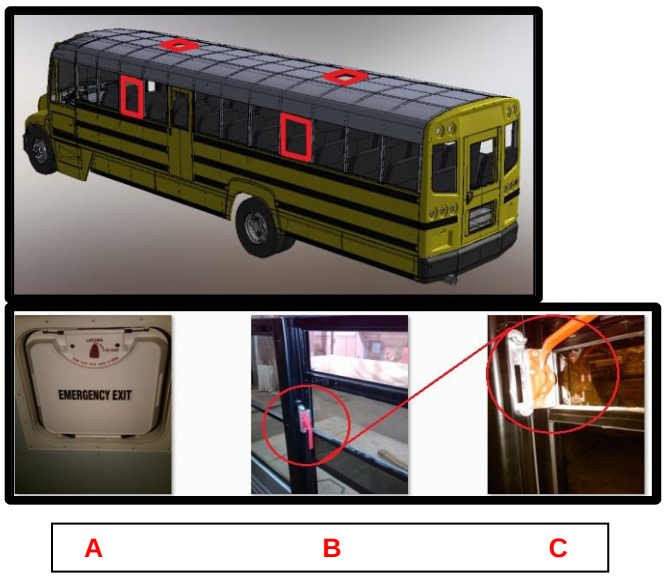
Front of Bus

The front and rear upper marker lights will indicate % of charged when the bus is plugged in and in charge mode, the charge % is 33% for marker one, 66% for marker two and 100% for marker 3

CHAPTER 9 - EMERGENCY EXITS

Interior unlocking system

1. Push the lever to the left and push against the door to open



2. Use of roof exits (escape hatch) and emergency windows

   - **A** Roof exits (escape hatch) opening mechanism is accessible from inside and outside. Simply turn the handle and push the hatch to the outside.

   - **B -- C** Window opening mechanism is accessible on each emergency window. Simply lift the red handle and push the window to the outside of the vehicle.

Side Emergency Door Location

The exit door is located in the middle of the bus on the driver's side and works the same way as the rear end door. Refer to the verification points and maintenance recommendations to ensure that the exit side door works properly at all time.

CHAPTER 10 - HOOD and DRIVER COMPARTMENT

Hood

1. To open the hood, undo the fastening latches on both sides.

Remember to always inspect the latches to make sure they secure before operating the bus.

Driver compartment

The standard driver storage space is located above the driver's window

CHAPTER 11 - REAR DOOR EMERGENCY LOCK (Vandal lock)

A barrel fixed to the rear door (and to the side door, if applicable) must be removed and inserted into the receptacle on the dashboard. The engine will not start if the cylinder is not inserted. An indicator light in the instrument panel will indicate the situation.

****** Warning: The vehicle will not enable if a door is locked ******

- A warning light inside the **ORANGE** circle shows that one or more doors are still locked

- The GREEN circle is pointing out where the barrel must be inserted to lock the rear emergency door

- The **RED** circle is pointing out where the barrel must be inserted before being able to start the bus

CHAPTER 12 - SAFETY PRECAUTIONS

• Never assume that the vehicle is shut off simply because it is quiet.

• Some of the under-hood parts get hot and may cause serious burns. Use caution when working on or around these parts.

• To avoid the risk of electrocution, do not touch inside any battery pack, high voltage component, or high voltage fuse box. The high voltage system may still have a remnant charge even though the system has been shut off.

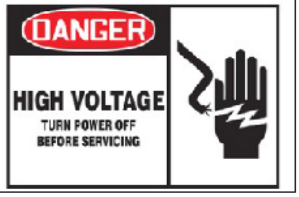
• If the vehicle is in the water, to avoid shock from the electrical system, do not touch any of the high voltage components or harnesses.

• In the event of a fire, a Type ABC fire extinguisher may be used for an electrical fire caused by wiring harnesses, electrical components, or oil fire.

• If you must walk away from the vehicle, notify an appropriate responder or a rescue person of the fact that the vehicle is electrically powered and contains a high voltage system and warn all others.

High Voltage Safety

Protection from electrocution	The high voltage components and harness have insulated cases or orange-colored coverings which provide insulation and easy identification. The high voltage battery cases are electrically connected to the vehicle ground. This ground connection is added to help protect the vehicle occupants and emergency responders from high voltage electrical shock.
Warning Labels	See Below



High Voltage and Low Voltage Color Code

In every eLion electric bus you can find different colors of wiring. In general all Red colored wires are 12 volts supply, the grounds are black and every wire with a voltage over 60 Volts is orange

ORANGE: On the electric bus you'll find different types of high voltage power:

- There is the 400 Volts DC that comes from the High-voltage battery. This is the main source of power for each high voltage component on the bus
- 208 Volts AC power is used to supply power to the hydraulic pump that operates the power brakes and power steering
- 350 Volt 6 phase AC lines come from the motor inverter to supply power to the electric motor

RED: All the red wires you'll find on the bus are mainly 12 volts supply. There are some exceptions but in general they are all 12 volts.

Black: Every black wire is designated as ground. There are also some exceptions, always refer to the corresponding wiring diagrams to be sure.

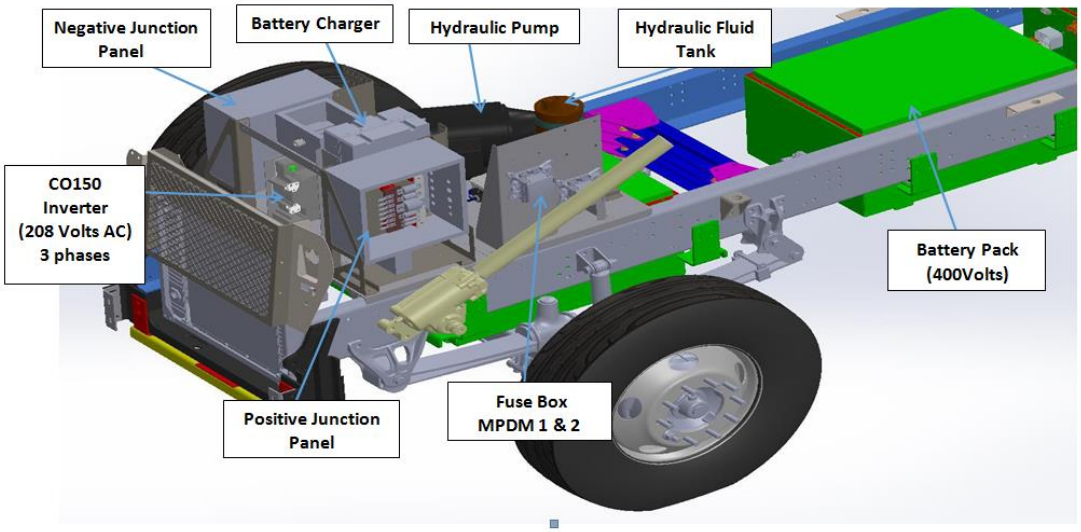
No 12V = No 400V

Safety Switches

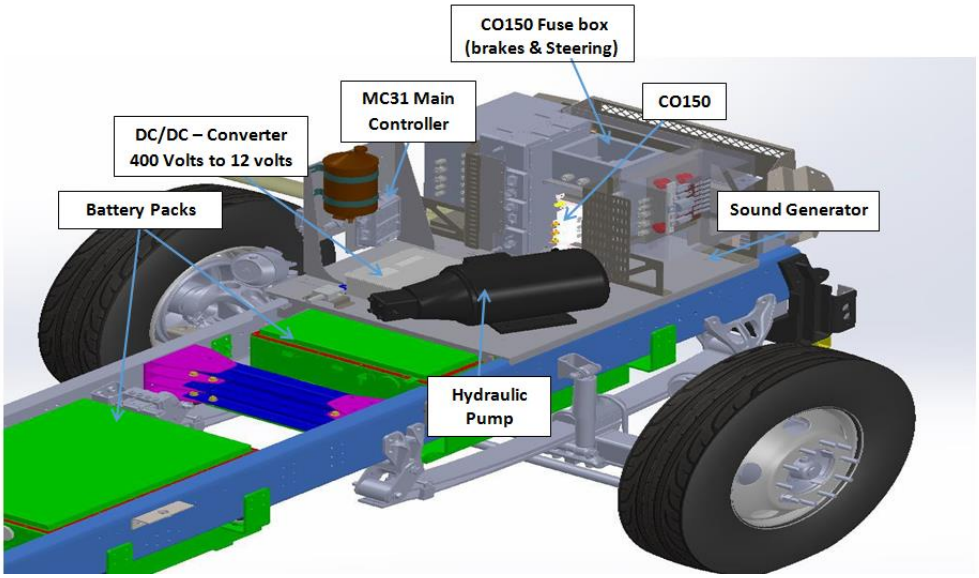
There are 3 safety switches you can find on the electric bus. 2 of the safety switches will completely cut the 12 volts supply, by doing that no components are activated and the 400 volts will not be able to pass current

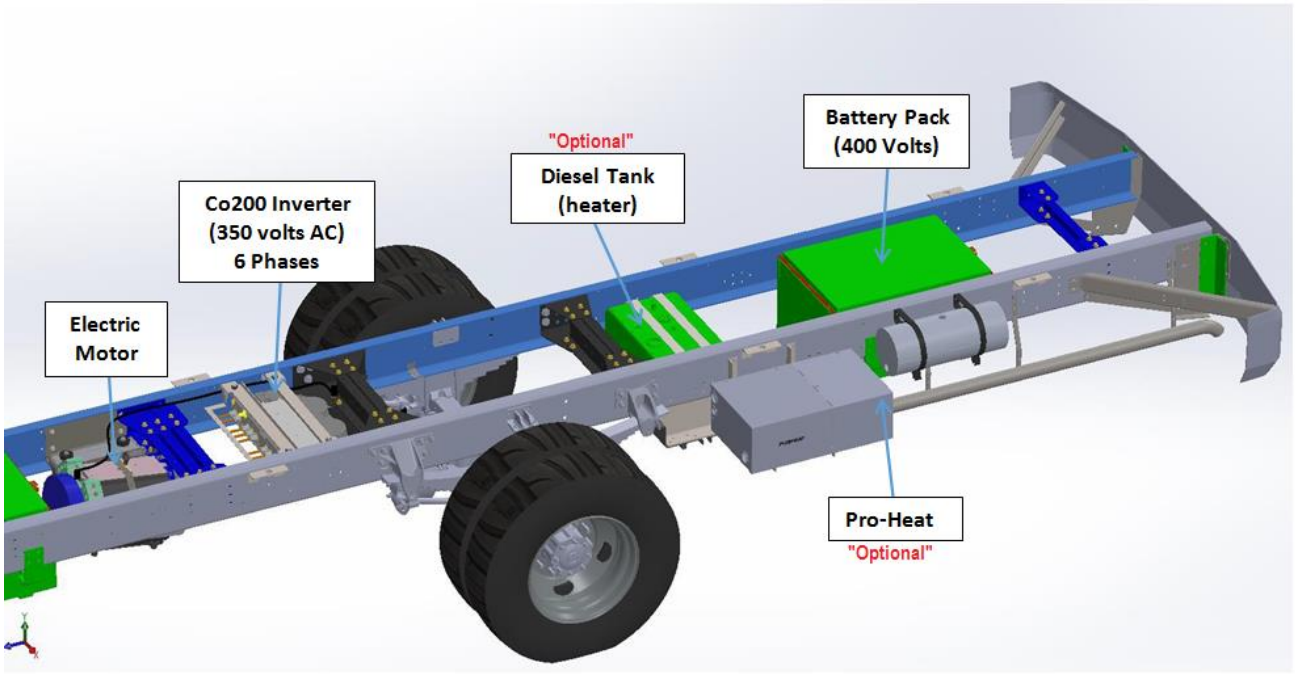
1. 12 volts safety switch based in the 12 volts battery compartment.
2. 12 volts safety switch in the driver's cockpit, it's a quick & easy access for the driver in case of an emergency failure. You can find it at the left foot of the driver.
3. The push button near the second 12 volts switch is to cut off the 12V supply to the coolant pump

High Voltage Component Locations



Note: Components and locations may vary between build revisions





CHAPTER 13 - EMERGENCY INFORMATION

In Case Of Fire

In case of emergency, you can fight a battery fire with any A-B-C Fire extinguisher.

The goal with a fire in a battery pack is to cool it down

If possible, you can use water to do it quickly.

** Strongly recommend to shut the safety switches OFF

Towing

If you can, it's better to tow the bus by lifting the rear wheels to protect the electric motor. If you can't, you can tow it by the front but you can't go faster than 35 mph.

You still can remove the driveshaft to tow the bus by the front.

Resettable Crash Sensor

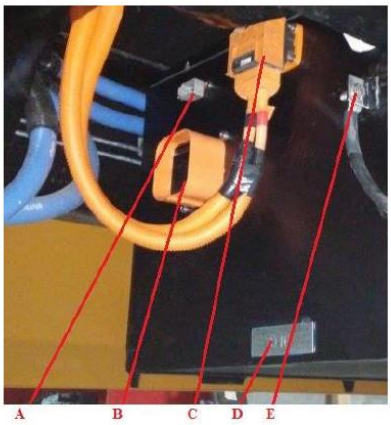
The bus is equipped with a resettable crash sensor. It's located in the left frame rail completely in the front of the bus.

** If activated, the High voltage will be turned OFF

First Responders & Emergency Equipment

In some cases in addition to shutting off the 12V it may be necessary to remove the Master Service Disconnect fuses (MSD) to isolate batteries in the event of a more severe accident, In this case first responders can be directed to remove the Mid Pack fuses located on each individual battery packs.

A- Communication Connector
B- Mid Pack Fuse (MSD)
C- High Voltage Connector
D- Identification Label
E- Ground

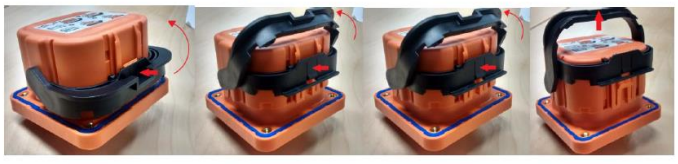


The Triangular Hazard Reflectors are located under the driver's seat

Removing the Mid Pack Fuse

You can find the Mid Pack Fuse on each battery pack. If we remove this fuse, we cut the battery pack in half and the we are safe to open the high-voltage circuit.

- To remove the fuse, you have to press down the lock and pull the handle backward.
- In the middle of the travel the handle will stop, you have to press again on the lock and pull backward until the handle reach his final position (90 degrees).
- When the handle is fully down, pull on it to remove the Mid Pack Fuse.
- The battery pack is now completely secured and deactivate.



Fire extinguisher & First Aid Kit are located next to the entry door

CHAPTER 14 - MAINTENACE and CHECKPOINTS

*** Batteries must be completely disconnected every time you touch the electrical system or if welding is performed ***

- *Always disconnect the negative (-) battery cable first.*
- *Do not connect auxiliary components or supplement to the engine terminals or ECU. Parasite or false signal in these areas may adversely affect engine performance.*
- *Lion Bus maintenance department does not approve installation of wiring that leads to a voltage drop greater than 0.5 volts on the entire length of the installation.*

1. Disconnect the NEG (-) terminal of the battery and protect it to prevent accidental contact.

2. If necessary, remove the POS (+) cable of the battery. This is usually necessary if you intend to remove it.

3. When adding electrical components ensure that the batteries and charging circuit are capable of supporting the additional charges.

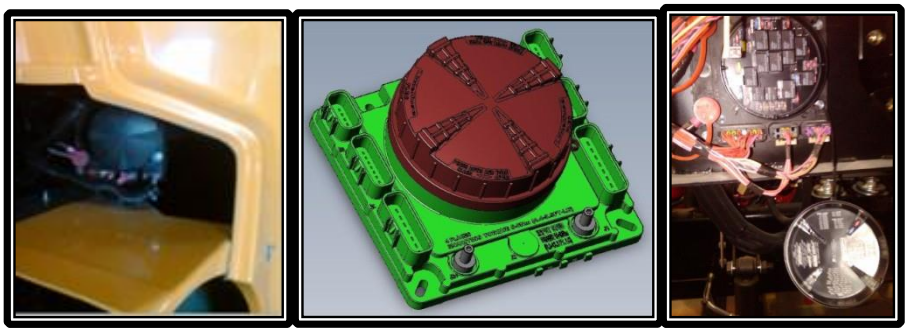
Fuse Box

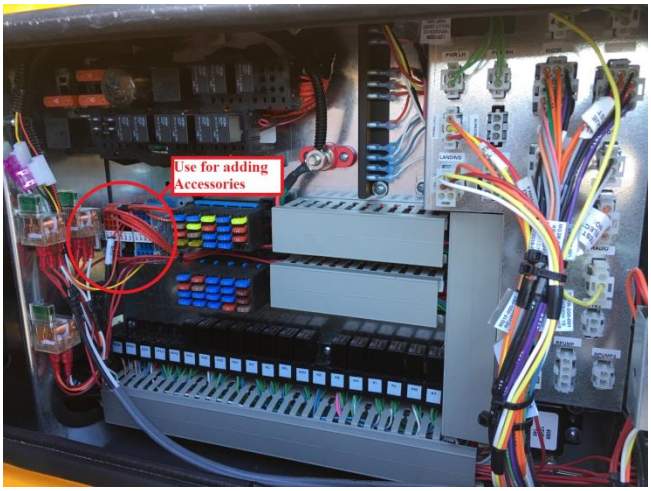
The fuses of the chassis are located in a sealed box under the hood on the left side. Body fuses are located in the exterior electrical panel underneath the driver's window

Chassis Electrical System

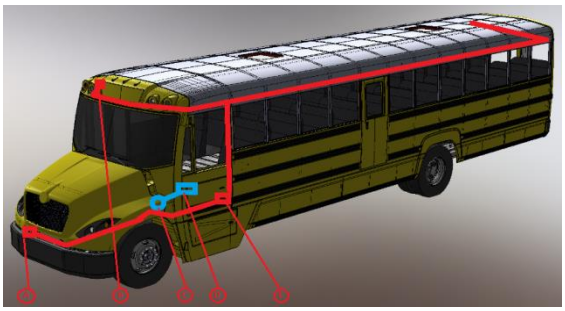
Power distribution unit location

The PDU (Power Distribution Unit) is an electrical panel located under the hood and over the left side quarter fender. The cover is a twist--lock type. Electrical system fuses are located on the PDU. The function of each fuse is indicated on a sticker inside of the PDU cap. When replacing a non---functioning fuse, please communicate with our technical service if the fuse blows automatically after being replaced.

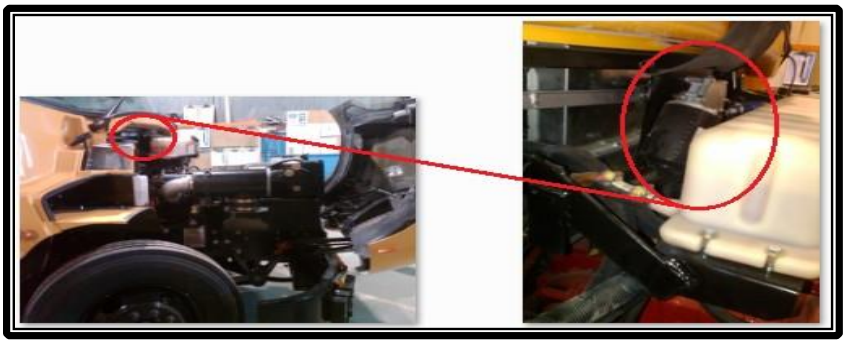




Electrical Wiring

Accessory Battery	
FUSE PANEL AND WIRING DIAGRAM	
HARNESS ROUTING BEHIND PANELS	

Wiper Motor Location



Windshield washer's position

Checkpoints

Weekly

Check if windshield wipers condition is adequate in the event of inclement weather.

- Check the condition of the blades
- Confirm that the scanning is carried out efficiently over the entire swept area
- Check if the windshield washer squirts consistently
- Align buzzard towards the windshield to obtain greater efficiency from the windshield washer

Maintenance

Quarterly

Tighten the wiper arms if they are loose. Tighten until a resistance of 21 Li ft (28 Nm). ***Do not tighten further, as you will damage the motor and the pins that are connected***. In addition, if needed, change the wipers depending on climatic changes.

Annual

Lubricate the pivots once a year

Mirrors

Checkpoints

Quarterly

Make sure the mirrors' anchor on the vehicle body is securely bolted in place. There should be no movement at the mirror base.

Maintenance

Quarterly

Lubricate with a spray all parts where there may be mirror movements.

Headlights Adjustments

A) Headlights are adjusted at the factory according to standards
B) Possible adjustment by the operator

Day Time Running Lights

This vehicle is equipped with daytime running lights that turn on when the handbrake is released. Clearance/marker lights light up on the same circuit.

***Note that headlights (hi- low beam) are not accessible when daytime running lights are in operation. ***

Turning on the headlights overrides the daytime running lights, having done so, check if headlights are functioning by deactivating the parking brake and ask a third party to confirm.

****Note** : Headlights (high- low beam) do not work if the parking brake is engaged or if the dimmer switch is off .***

Lights

Checkpoints

Daily

Verify if all lights are operational when vehicle is ON. School Bus warning lights as well as all other lights related to school bus operation shall work before the bus leaves and gets on the road. All lights shall work by activating its specific switch. A visual inspection shall be made by a third party to make sure everything works properly.

Maintenance

Weekly

All lights should be cleaned weekly with a glass cleaner to have the vehicle's optimal visibility.

Emergency Equipment

Checkpoints

Daily

Verify presence of fire extinguisher. It needs to be secured in its support and gauge needs to indicate FULL

Maintenance

Yearly

Once a year, an inspection shall be made by a professional to assure good functioning of the device.

First Aid Kit

Checkpoints

Daily

A First Aid Kit shall be present and secured correctly at all time.

Quarterly

An inspection shall be made by the driver/operator to make sure all components required are present.

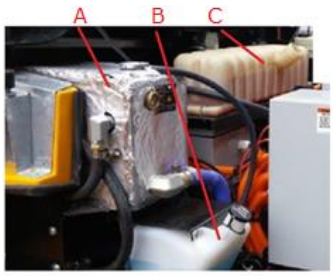
Triangular Hazard Reflectors

Checkpoints

Daily

An inspection shall be made by the driver/operator to make sure all reflectors required are present. The box is located under the driver seat.

Fluids



a) Heating Coolant Tank
b) Windshield Washer Tank
c) Main cooling tank (charger/motor/radiator)

Checkpoints

An inspection shall be made to verify all fluids are at proper level for vehicle operation.

Battery Compartment

***** Battery tray must be locked before moving the vehicle. *****

Procedures to open/close the battery box and electrical panel doors

To Open

To Close

Battery Replacement

Lion Bus uses type C31S-10 950 CCA batteries. The bus can be equipped with two or three batteries depending on the chosen options. A single 8D battery can also be installed

Electric Compartment

The electric compartment can be found outside the vehicle on the driver's side right above the battery replacement compartment.

Tires and Wheels

Lion Bus is equipped with standard 7.5in rims to improve vehicle's turning radius.
Rims are ub-mount and standard tires are 11R22.5.

Heating

During winter, it is important to verify that every component of the system provides warm air everywhere inside the bus. It is important to verify if warm air comes out the front heaters (windshield and driver) and also from the floor passenger heaters. You can also verify that the fans are working well by listening to the noise they make.

Fans operation shall be verified to make sure they operate properly. Uncommon noises may indicate malfunctioning and potential heating issues.

To warm-up the body, select desired air-flow (fresh air or circulated); adjust temperature and fan speed.

****** In very cold weather, do not blow very warm air directly on a cold windshield; this could crack the glass. Turn on the fan to the defrost position at a low speed and increase the speed gradually as the cabin gets warmer. If interior temperature is still warm, set heater to fresh air and gradually increase temperature. ******

Maintenance

Make sure you select a coolant that complies with Lion OEM standards.

Yearly

Radiator cleaning must be performed in order to maximize heating system performance.

Cleaning of radiator is as follows:

1. Remove the heater cover
2. Blow dust inside the radiator with a low-pressure airflow to prevent radiator blades damages

Side windows

Checkpoints

Quarterly

Inspect the window sealers inside and outside condition. Also, make sure there is no water infiltration by verifying if the window is correctly sealed on the steel structure.

Maintenance

Weekly

Verify and remove any object that can prevent window movement. Clean the frame using a soft soap and cloth to remove dirt.

Quarterly

Add a silicone lubricant on the latches and in the slides of the side windows.

Windshield

Checkpoints

Quarterly

Inspect the rubber to make sure it is securely bonded on the fiberglass front mask and that it has not deteriorated. Make sure the windshield is still roped into the rubber gasket and that the glass is still in its original position.

Checkpoints

Quarterly

Inspect the rubber to make sure it is in place and that it is not deteriorated.

Checkpoints

Quarterly

Inspect the urethane sealant to make sure it is in place and not deteriorated.

"Milking" (tightness leak in thermos window)

This vehicle can be equipped with thermos side windows, option for cold weather.
This technology is based on a set of two windows bonded with a vacuum (or gas) between them.
In the event of a leak, the window will show a condensation zone. It must be replaced.

The laminated windscreen can suffer from similar problems. Delamination of one layer will show a whitish area (milking). It must be replaced.

Checkpoints

Daily

Make sure that the warning buzzer of the emergency door works when it opens. Also ensure that the door locking mechanism movement is easy to operate and it has no difficulty opening and closing.

Quarterly

Check that the rubber is in good condition, that it is in place and that it is not deteriorated.

Maintenance

Quarterly

1. Lubricate the door hinges.
2. You should also lubricate the rod and locking mechanism of the emergency door.
3. Clean and lubricate the rubber around the door with suitable lubricant

Emergency Windows

Checkpoints

Daily

Make sure that the warning buzzer is working if the emergency window is opened. Also, ensure that the movement of the window locking mechanism is easy to operate and that there is no difficulty in opening or closing it.

Maintenance

Quarterly

Lubricate the locking mechanism of the window so that its movement is easy and there is no blockage in the opening Lubricate the hinges with a lubricant spray.

Roof Emergency Exit

Checkpoints

Daily

Make sure that the warning buzzer is working when the hatch is opened. Also, check that the movement of the locking mechanism is easy to operate and that there is no difficulty in opening or closing it.

Maintenance

Quarterly

Lubricate the lock mechanism of the hatch so that its movement is easy and there is no blocking when opening.

Seats, Seat Belts, Barriers

Driver's Seat

Checkpoints

Break-in period + Quarterly

Check that the driver's seat is secured to the floor. There should be no possible movement of the seat relative to the floor when the bolts are properly tightened. If the clamping is not sufficient it is necessary to immediately retighten. Recommended tightening torque: 47 ft. Li (64 Nm)

Daily

Check the condition of the covering material and repair all imperfections observed. During this inspection, verify if any part of the seat is stained or unstitched. Remove any element capable of cutting, tearing or damaging the material covering the driver's seat.

Maintenance

Weekly

Clean driver's seat with a conventional fabric cleaner for the back and seat. Use a mild soap for the outline.

Passenger Seats

Checkpoints

Break-in period + Quarterly

Check that the passenger seats are secured to the floor and walls of the bus with bolts. When tightened correctly, there should be no possible movement of the seats. If the clamping is not sufficient, it is necessary to tighten the bolts immediately. Recommended Torque: 300 Li in (37 Nm)

Daily

Check the condition of the covering material and repair any imperfections observed. During this inspection, note if any part of the seat is stained or unstitched Also remove any element capable of cutting, tearing or damaging the material covering the passenger seats.

Maintenance

Weekly

Clean passenger seats with a cloth and mild soap to remove dirt and stains.

Quarterly

Use mild soap and a brush to thoroughly clean seats. Apply soap, rub until stain removal, rinse and dry in open air.

Child Seat Anchors

Infants and Children

All vehicle occupants must be protected. This includes infants and young children. The travelling distance, age or size of the passengers does not change the need for all passengers to use safety harnesses. The law in every state in the United States and every province in Canada requires that children under a certain age be secured when the vehicle is moving. Whenever babies and young children are present, a suitable harness must protect them. These devices must follow safety standards for motor vehicles.

****** Passengers should never hold a baby or a child in their arms during transportation. In a collision, a baby may become too cumbersome to maintain. For example, in a crash at only 40km / h, a 5.5 kg baby will suddenly represent 110kg in the arms of the person. A baby should always be strapped in specific harnesses; even young children should be restrained by a suitable harness. ******

Child seat anchors performance

When you attach a child safety seat, refer to its operating manual. The manual must be affixed to the seat itself, in a booklet, or both.

If the vehicle is equipped with the child seat anchor, you will find two anchors at the front bottom of the seat where the backrest cushion joins. A third anchor is located at the bottom rear of the seat.
In order to use this system, you will need a children seat facing forward that has anchor points at its base and a superior anchor point. You can also have a children seat oriented backward with two anchor points.

When possible, use universal anchor system rather than the normal seatbelt of the vehicle to attach the child seat.

****** If a child seat is not attached to anchors, the seat will not provide sufficient protection. In a crash, the child could be seriously injured or killed. Make sure child seats are installed using anchors. ******

Driver Seat Belt

Checkpoints

Quarterly

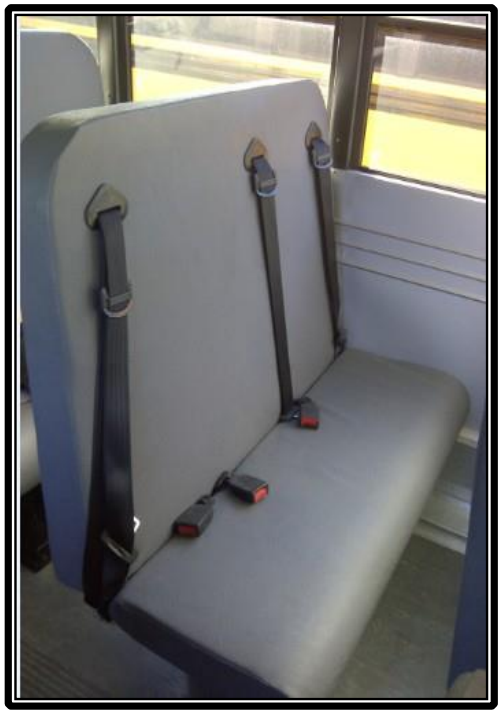
Check the driver's seat belt anchor. The seatbelt adjustment is on the driver's sidewall and at seat level. Anchoring and belt tightening should ensure that the belt is securely in place.
Recommended Torque: 600 Li in (65 Nm)

Maintenance

Quarterly

Use a mild soap and a brush to clean the belt entirely.

Passenger Safety Belts



Checkpoints

Quarterly

Check the passenger belts' anchorage on the seat's structure and ensure that the bolts are properly anchored and tight enough.

Maintenance

Quarterly

You can clean it using mild soap and a brush.

Barriers

Location of Barriers

Barriers are located at the front of the vehicle, more precisely behind the front steps and behind the driver's seat.

Checkpoints

Break-in period + Quarterly

The barriers anchorage is done the same way as the seats' anchorage. Check that the barriers are grounded with bolts. Check that there are no possible movements between the various components. If movement is possible, tighten each bolt before the bus departs.
Recommended Torque: 310 Li in (37 Nm)

Maintenance

Quarterly

You can clean the barrier with a mild soap and a brush.

Child Checkmate (If equipped)

Please note that the child checkmate system will only be activated if the switch "Master" was activated during the school bus run.

The horn will inform the driver that the normal process was not made if the following procedures were not made.

1. Shut down the engine
2. Position the key in "on "position
3. Press at least 3 seconds on the red button located at the top of the rear door
4. When the warning horn stops, release the red button
5. Remove the key from the ignition switch

The five previous steps represent a short summary. Refer to our utilization guide for complete procedures; www.childcheckmate.com

Mounting Mudguards

Location

The mudguards are fixed to the C cross-member at the rear of the wheel boxes.

Checkpoints

Quarterly

Check that the mudguards are in place and in good condition. Ensure that bolt tightening is sufficient to maintain the mudguards in position between each inspection.

Electric Panel

Panel location

The main components of the electrical system are located in the electrical box, which is accessed through an external panel underneath the driver's window.

Checkpoints

Quarterly

Make sure the electrical components are securely anchored to the panel and that the electrical panel is waterproof.

Yearly

Check electrical connections. Coat with dielectric paste in case of early corrosion.
Inspect for formation of verdigris on electrical components.

Maintenance

Weekly

Visually inspect and clean low voltage connections as needed to prevent corrosion.

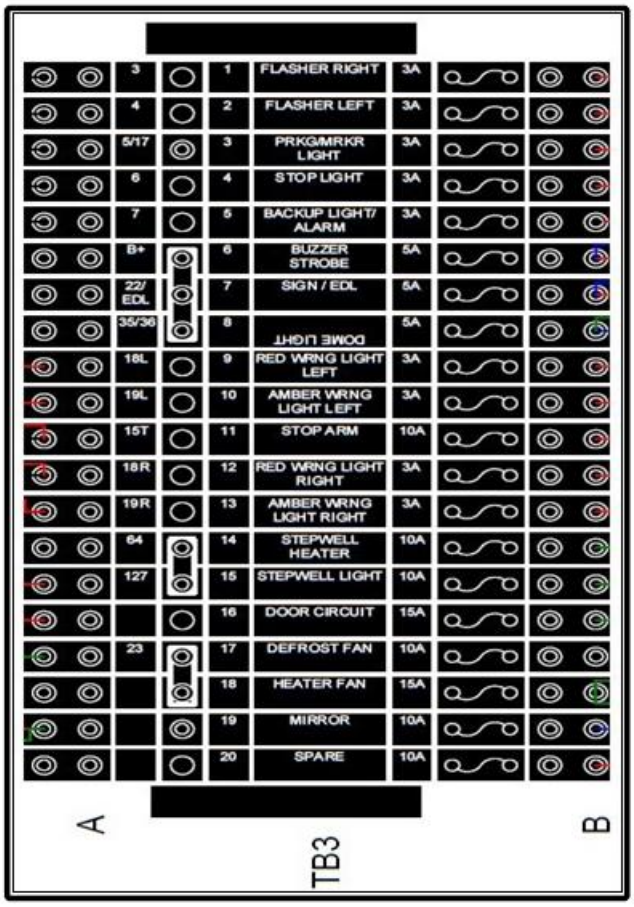
*******Do not use abrasive or high alkalinity cleaners.***

Do not use cloths and do not scratch the surface with a razor blade or a sharp object.***

Troubleshooting Electrical Problems

This procedure solves electrical problems at the source by identifying the element that prevents the normal current flow and should only be done by a qualified technician.

1. If no electric element is functioning, check if voltage is present at input and output of the solenoid under the hood.
2. If there is no voltage at the solenoid, it is advisable to check the vehicle's battery. You can also check if the wire activating the solenoid is connected to the on position/ Accessory at the ignition switch.
3. If voltage is present at the solenoid, check for voltage at the output of the fuse box.
4. If measures taken indicate voltage at the output of the fuse box, ensure that this voltage is also present in the various switches when they are closed.
5. If there is any voltage beyond this point, check Weldon electronic flashing lights' module in the case of alternating flashers or functioning elements. If it happens on other parts, it is necessary to verify directly the electrical components that are not working.
6. In the case of alternating flashers, check the lights involved.



The eLion Bus uses a 12-volt electrical system with negative grounding for Low Voltage wiring.

Working on Electrical Components

If electrical equipment is added or if electrical components are repaired on a Lion Bus, certain mandatory rules should be followed to avoid the possibility of equipment damage or the risk of an explosion. Triggering an arc or sparks can occur when making or breaking electrical connections.

If the additional charge exceeds the load circuit parameters, upgrade the circuit to higher power. Changing the load circuit to accommodate the added charge may affect the warranty. Always obtain prior written approval from Lion Bus when changing electrical circuit. If distributors, vendors or customers perform any vehicle modifications or equipment installation without Lion Bus approval that can adversely affect the performance of the vehicle or other vehicle components. Lion Bus will not accept liability or claim on the product according to the terms of the limited warranty. Those claims become the sole responsibility of the company or entity that performed the modifications or installations.

1. Always use a proper wiring section, protected with insulating material.

Never install a cable outside the wiring table estimates that produces a voltage drop exceeding 0.5 volts on the entire added circuit; calculations and measurements must include the return or ground path.

2. Make sure all electrical components added are protected by a fuse or circuit breaker.

Always provide additional cable from the electrical panel. Never make a connection or splice an existing cable harness unless invited to do so by Lion Bus's Engineering Department. Any added components must be installed on a dedicated circuit breaker in the electrical panel. Never connect a new component on an existing circuit installed by the manufacturer, which is used as a power circuit for other components.

3. Push type connectors (push lock) must be insulated.
4. When installing wires, always use Lion Bus approved fasteners to ensure that insulation does not come into contact with sharp edges at any point along the length of the wiring.
5. All wiring must be supported by tie---wraps at least every 762mm (24").
6. If the wire is connected to a moving component, like the engine, make sure that there are loose loops of sufficient length to prevent tension on the wire or the connections and ensure that the wire will not touch moving parts.

7. Install a terminal wire clamp at both ends of the loose loop so that the loose loop (and not the wire) absorbs all movements.
8. The wires must be not come into contact with heat. Tie all wires at a distance of at least 100mm (4") of the high temperature parts (such as the exhaust system) or position heat shields to protect the wires.
9. Install an insulated rubber ring (Grommet) when wires pass through a wall.
10. Every wire with positive (+) wires or qualified as “hot” must be recovered with the appropriate material.
11. All potentially positive (+) wires that could be exposed to extreme atmospheric conditions or frictions must be recovered with the appropriate material.

******Always wear protective clothing when working on energized conductors of large cross section, including isolated shoes. ******

12. Do not run electrical wires within 150mm (6") of a component related to fuel (such as fuel lines, tank, etc.).

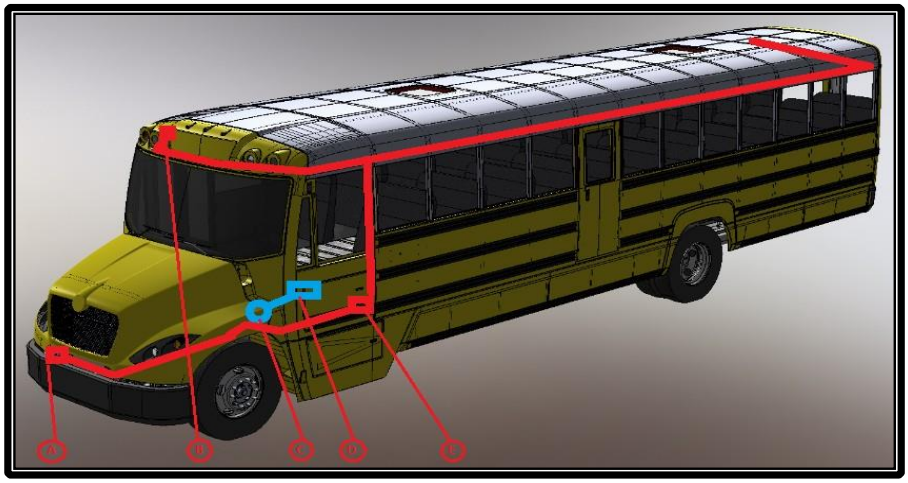
13. Never make a connection or splice an existing harness when adding components. Always bring an appropriate length of wiring to a correct source in the electrical panel. Refer to steps 8 and 9 mentioned above.

14. When adding electrical components, it is sometimes necessary to use a relay to connect the device. High---powered components such as headlights are an example.

15. Any added components must be installed with wiring exceeding amperage of at least 25% of the rated load.

16. If the batteries cables are both disconnected, always connect POS (+) cable first to prevent arcing. Connect the NEG (-) cable last to avoid arcing.

Electrical Connector Locations



A) Front Bumper
B) Top of front door
C) Chassis fuse box
D) Chassis relay
E) Main connector of the bus

Harness Covers

To access electrical harness, remove the harness covers. Carefully handle these parts.

1. Remove ceiling lights and speakers.
2. Remove screws at the top of the windows
3. Slide the harness covers toward the center of the bus to remove.

1 2 3

BUS MAINTENANCE

The best way to preserve the appearance of your new vehicle is to keep it clean. Frequently wash using cold water and mild soap. Do not wash the bus in the sun or use rough or sandy cleansers. Similarly, soap or harsh cleaning chemicals may damage the bus paint or gel coat and therefore they should be avoided.

Do not allow soap to dry on the paint surface or gel coat. Rinse thoroughly and immediately to preserve the finish of the paint and gel coat.

****** Pressure washing is not recommended. Always test the effects of pressure washer and chemicals on a similar finished surface before using them on your bus. If you use a recirculating pressure washer, a filter must be installed to prevent the projection of dirt removed from the vehicle. ******

Always use a non-abrasive wax to remove any accumulated residue and preserve the surface finish. It is recommended to polish the bus with wax once a year.

Calcium chloride and other ice melting chemicals can stick on painted or gel coated surfaces. If you leave these chemicals on the paint or gel coat, they may damage the surface and predispose it to corrosion. Oils covering roads, tree sap, pollution, industrial discharges and bird droppings can damage paint and gel coat. These chemicals and compounds must be removed as quickly as possible.

Paint chips resulting from the impacts of gravel, deep scratches and damage caused by harsh chemicals must be repaired as soon as possible. These types of damages can quickly lead to major problems of corrosion and surface damages. This could result in voiding the warranty on exterior finish.

Petroleum products and salts deposited on the roads can quickly damage floor covering. These compounds must be removed quickly from the floor to keep it in good condition. Frequent cleaning with a sponge and mild soap is recommended to prevent the floor's premature deterioration.

****** Continued attention is needed to ensure that the footsteps and entrance areas of the bus are kept clean. Never use this area to store ice scraper, brush, dusting etc. This practice is not only hazardous to passengers, but can also interfere with proper operation of the door. ******

Air Conditioner

Maintenance

For any changes, please consult the ACT instruction manual and their assigned recommendations. You can also find ACT emergency number as well as your air conditioning model above the right front fender.

It is not recommended to use the air conditioning system during winter snow conditions as the snow could damage the outside finish of the bus.

CHAPTER 15 - GLOSSARY

1. ***Accessory Battery*** - Lead acid battery that supplies voltage to the 12V system. Not to be confused with the High Voltage Lithium-ion NMC/LMO Battery-packs.
2. ***Alternating Current (AC)*** - an electric current that reverses direction at regular intervals having magnitude that varies continuously in sinusoidal manner.
3. ***Battery Pack*** - Lithium-ion NMC LG Chem B10 Batteries that store and output DC power (Maximum Voltage 400V) needed to propel the vehicle.
4. ***Battery Management System (BMS)*** – is an electronic system that manages the rechargeable HV batteries (cells or battery pack), such as by monitoring its state, calculating secondary data, reporting that data, protecting the battery, controlling its environment, and/or balancing it.
5. ***Charge Port*** - Is the receptacle that the EVSE (Electric Vehicle Supply Equipment) plugs into in order to charge the vehicle.
6. ***Current*** – The flow of electric charge through a conductive medium.
7. ***Derate*** – To lower the rated electrical capability.
8. ***Direct Current (DC)*** – An electric current of constant direction, having a magnitude that does not vary or varies only slightly.
9. ***DC/DC Converter*** - This component converts the voltage from the Lithium-ion battery packs to provide power to the 12V battery to operate the vehicle's low voltage (12V) electric components.
10. ***Electric Motor*** – Provides direct power to the drive axle which propels the vehicle.
11. ***Kill Switches*** - These switches can be used to disable the high voltage during an emergency or whenever checking low voltage components under the hood.
12. ***Electric Vehicle Supply Equipment (EVSE)*** - is an element in an infrastructure that supplies electric energy for the recharging of plug -in electric vehicles.
13. ***High Voltage (HV) - In*** this guide, HV refers to the DC NMC/LMO battery pack voltage and/or the AC system voltage.
14. ***High Voltage Cables*** - Orange-colored power cables carry high voltage current between each of the high voltage components.
15. ***High Voltage Service Disconnect*** - Isolates the NMC/LMO battery packs from the rest of the high voltage electrical system.
16. ***Low Voltage (LV)*** – In this guide, LV is referring to the accessory battery voltage and/or the 12V system.
17. ***Motor Inverter*** - Converts DC power stored in the NMC/LMO battery packs to AC power and controls motor torque by regulating the motor current.
18. ***Hydraulic Pump*** - This pump circulates hydraulic fluid to the power steering and brake systems.
19. ***On Board Chargers*** - Inverters that converts AC power to DC power that increases the voltage of the NMC/LMO batteries to charge the NMC/LMO battery packs.
20. ***Regenerative Braking (Regen)*** - is an energy recovery mechanism which slows a vehicle or object down by converting its kinetic energy into another form, which can be either used immediately or stored until needed.
21. ***State of Charge (SOC)*** – Remaining energy in the NMC/LMO battery pack.

<u>In Case of an On-Road Drivability Issue or an Emergency</u>

Contact your center supervisor, automotive department or dispatcher.