

# FIRST RESPONDERS MANUAL Battery Electric Vehicle (BEV)



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### TABLE OF CONTENTS

SECTION 1 - IMPORTANT	PRELIM.INFORMATION 1
SECTION 2 - IDENTIFICAT	ION9
SECTION 3 - IMMOBILIZAT	ΓΙΟΝ11
SECTION 4 - CAB TILT, RA	ISING, & LOWERING 13
SECTION 5 - EMERGENCY	′ HANDLING 18
SECTION 6 - OCCUPANT A	ACCESS 26
SECTION 7 - STORED ENE	ERGY 33
SECTION 8 - FIRE RESPO	NSE 39
SECTION 9 - SUBMERSIO	N RESPONSE42
SECTION 10 - COLLISION	RESPONSE 45
SECTION 11 - TOWING	
SECTION 12 - IMPORTANT	ADDT'L INFORMATION. 50

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### SECTION 1 - IMPORTANT PRELIMINARY INFORMATION

#### Safety Alert Symbols

Before operating this vehicle, be certain that you have read and fully understand each and every step of the driving and safety information in this *Battery Electric Vehicle (BEV) First Responders Manual.* Be certain that you fully understand and follow all safety warnings. It is extremely important that this information is read and understood before the vehicle is operated. If you do not fully understand how to operate this vehicle and/or do not agree to follow all safety warnings, do not operate this vehicle.

The *Battle Motors BEV First Responders Manual* uses the following "Safety Alert Symbols" to identify known or potential hazards. These risk levels were created by the Society of Automotive Engineers (SAE) with your safety and the safety of others in mind. Be certain that you fully understand and follow all safety warnings. Carefully study and follow the safety alert messages appearing in this manual and the LABELS posted on the unit.

**NOTE:** A note defines an operating procedure, practice, condition, etc., which is essential to proper operation of the vehicle.

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### NOTICE

Unsafe practices where personal injury is not likely but property damage could occur, are identified by NOTICE labels on the vehicle and boxes in this publication. The Notice label is in white type on a blue background with a black border.

# 

The meaning of this safety alert symbol is: Caution! Attention! Potentially Hazardous! Unsafe practices may result in minor or moderate injury. The caution label is in black type on a yellow background with a black border.

## 

The meaning of this safety alert symbol is: Warning! Attention! Potentially Hazardous! Unsafe practices could result in death or serious injury. The warning label is in black type on an orange background with a black border.

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## 

The meaning of this safety alert symbol is: Danger! Attention! Imminently Hazardous! Unsafe practices will result in death or serious injury. The danger label is in white type on a red background with a black border.

# 🐴 HIGH VOLTAGE

The meaning of this safety alert symbol is: Danger! Attention! Imminently Hazardous! Unsafe practices will result in death or serious injury. The high voltage label is in white type on a red background with a black border.



# 🔥 HIGH VOLTAGE

Never cut orange high voltage cables. Always assume the orange cable is energized.

# 🔥 HIGH VOLTAGE

Never touch damaged or submerged high voltage cables or components.

# 

Do not perform any operation on a damaged truck without appropriate HVPPE.

# 

Remove all metallic jewelry including watches, rings, or glasses containing metal. Failure to follow these instructions may result in serious personal injury or death.



# 

Always wear appropriate Personal Protective Equipment (PPE) including high voltage, Class 0 (1000V) rubber insulated safety gloves and self-contained breathing apparatus (SCBA).

# Common High Voltage Personal Protective Equipment (HVPPE)

- Insulating HV gloves with a minimum rating of class 0 (1000V) tested within the last six months per OSHA law.
- 2. Self-Contained Breathing Apparatus (SCBA).
- 3. EH-rated boots (suggested).
- 4. Safety Goggles.



#### Information for the Owner

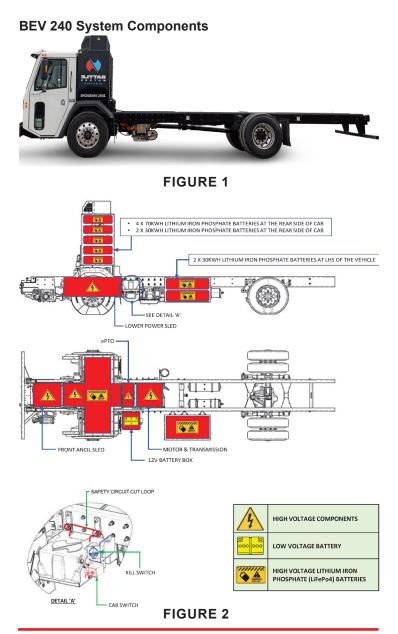
If there are questions on the maintenance and performance of your vehicle, please discuss them with your Battle Motors Dealer. Your authorized dealer has trained mechanics, necessary tools and spare parts to fully service your electric vehicle. If necessary, the dealer will contact the manufacturer for any assistance.

In addition to this document, there are additional operator's manuals supplied by component manufacturers. These manuals are gathered in the Owner's Packet and placed in the cab. Be sure to read all the manuals thoroughly before operating the vehicle.

Also, various safety labels are placed on components by the component manufacturer. Be sure to read and follow these labels to prevent damage to the vehicle, personal injury or even death.

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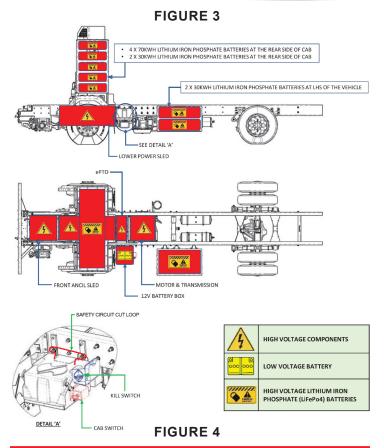






#### **BEV 400 System Components**







### **SECTION 2 - IDENTIFICATION**

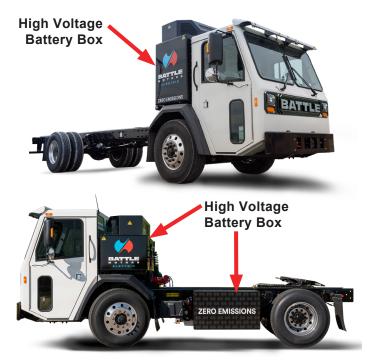


FIGURE 5

# <u> HIGH VOLTAGE</u>

If any damage is present to either high voltage battery box do not touch or come in contact with any portion of the vehicle unless you are protected by the correct high voltage personal protective equipment (HVPPE).

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#### Vehicle Identification Number

The full 17-digit Vehicle Identification Number (VIN) and Engine/Motor Serial Number can be found on a printed sticker near the center of the cab in the left-hand side foot well or can be found in the left-hand doorjamb depending on model. The VIN includes such information as the vehicles make, model, weight class, motor/engine, horsepower, model year and the serial number.



FIGURE 6

#### Vehicle Serial Number

The vehicle serial number is the last seven (7) digits of the VIN. The serial number is also stamped on the outer web of the left side frame rail directly next to the cab latch. It can be viewed after safely tilting the cab forward. See Section 4 - Tilting the Cab.



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### **SECTION 3 - IMMOBILIZATION**

### 🔨 WARNING

This electric vehicle does not have an internal combustion engine. Lack of noise does not mean the vehicle is OFF.

Always approach the truck from the sides to stay clear of the potential travel path. Due to the reduced noise of the electric vehicle it could be difficult to determine if the truck is charging or moving.

A wheel chock is an important tool because a parking brake alone is not always enough to keep a vehicle from rolling during a stop. It is also important to stabilize tires and the vehicles to ensure they do not disengage and cause injury.

1. Bring the truck to a complete stop. Pull to apply the parking brake.



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#### **SECTION 3 | IMMOBILIZATION**



2. Next, position chocks in both the back and the front of each wheels.



FIGURE 9

# 

Failing to completely stop the vehicle and apply the parking brake before exiting the cab can cause pinching or crushing. Do not exit the vehicle without first applying the parking brake.

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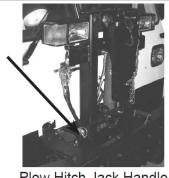


### SECTION 4 - TILTING, RAISING, AND LOWERING THE CAB

### TILTING THE CAB

### **Battle Motors Snow Plow Hitch Option**

Units with the factory-installed Battle Motors plow hitch require tilting of the hitch prior to raising the cab. To tilt the plow hitch, support the hitch and remove the retaining pin. Lower the hitch away from the cab.



Plow Hitch Jack Handle Storage



Plow Hitch Tilted to Raise Cab

FIGURE 10

### NOTICE

Plow hitch must be tilted prior to tilting the cab. Failure to tilt plow hitch prior to tilting the cab will result in damage to the cab and/or plow hitch.

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# DANGER

Apply the parking brakes to prevent vehicle movement and possible injury or death.

### **RAISING THE CAB**

**NOTE:** Before raising or lowering the cab, the transmission must be in neutral, turn off the ignition, all items inside the cab must be secure, the area in/around the cab must be clear, and the doors must be closed and latched. Read the label with cab tilting information.

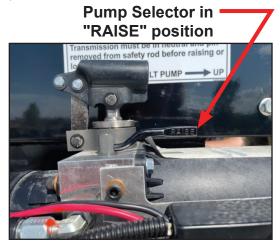
# 

Do not rely on hydraulic pressure to hold the cab in a partially tilted position. Always fully tilt the cab and put the lock pin in the safety bar to prevent personal injury or death.

- 1. Park the truck on a flat, even surface before you begin.
- 2. Check and correct the following:
  - All areas in and around the cab are clear.
  - All items in the cab are secure.
  - The doors are closed and latched.

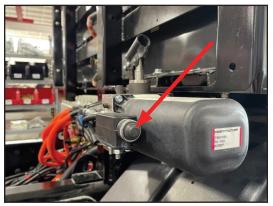


3. Place the pump selector lever in the "RAISE" position.



### FIGURE 11

4. Press and hold the electric cab jack button until the cab has moved over center and into its full tilt position.



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5. Place the lock pin into the safety bar. The pin is attached to a cable located on the passenger's side of the vehicle.



FIGURE 13

### LOWERING THE CAB

**NOTE:** Before tilting the cab back down, always make sure the area under the cab is clear and the pin has been removed from the safety bar. Keep clear of the cab when it is raised and lowered. Read the label with cab tilting information.

- 1. Remove the lock pin from the safety bar.
- 2. Check and correct the following:
  - All areas in, under and around the cab are clear
  - All items in the cab are secure
  - The doors are closed and latched
- 3. Place the pump selector in the "LOWER" position.
- 4. Press and hold the electric cab jack button until the cab has tilted back over center and into its original position. The hydraulic latch will automatically engage.

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**NOTE:** The pump lever must remain in the "LOWER" position anytime the cab is down.



FIGURE 14

**NOTE:** If for some reason the battery is disconnected or has lost its charge, the pump can be operated manually. Instead of pressing and holding the electric cab jack button, you will need to use the manual pump handle to raise or lower the cab. The handle can be found mounted near the bottom of the passenger's seat. Slide the handle into the pump and move it in an up and down motion to raise or lower the cab.



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### **SECTION 5 - EMERGENCY HANDLING**

Use the following procedures to disable the High Voltage Energy in an emergency situation.

# 

Never paint over or restrict from view or access, the Safety Circuit Cut Loop, Master Disconnect (Kill Switch), or identifying stickers. Failure to comply may result in serious personal injury or death.

### 🔥 HIGH VOLTAGE

When shutting down the high voltage system wait at least fifteen minutes for the complete discharge of high voltage capacitors.

### 🔥 HIGH VOLTAGE

HV system shutdown procedure is designed to disable the vehicles HV system, not to discharge the High Voltage (HV) battery. THE BATTERY WILL REMAIN ENERGIZED.

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# A HIGH VOLTAGE

After performing any HV shutdown procedure to disable the HV system, never assume the system is no longer energized. Always use appropriate HVPPE and verify de-energization with a multimeter.

#### **Primary Procedure**

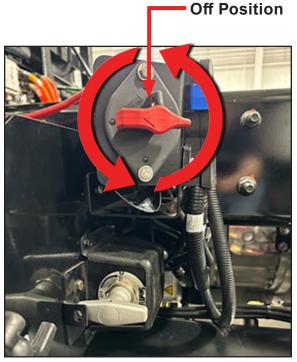
 If the vehicle is on (ignition key is in the RUN position), turn the vehicle ignition key counterclockwise to the OFF position (vertical to the horizon) and remove the key.



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2. Turn the Master Disconnect (Kill Switch) counterclockwise to the OFF position (horizontal to the horizon).



**FIGURE 17** 

**NOTE:** All the components are designed to discharge their own capacitance within five (5) minutes.

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### If Unable to Perform the Primary Procedure

- 1. Go to the left side of vehicle.

FIGURE 18

 Behind the cab, typically on the left side of the vehicle, locate the Safety Circuit Cut Loop found near the 12V DC Battery Box (See Figure 21). This circuit section can be used to disable the High Voltage system. See picture below of the Safety Circuit Cut Loop.



FIGURE 19

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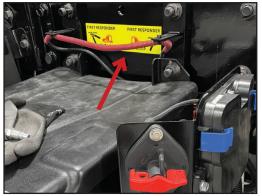


3. Turn the Master Disconnect (Kill Switch) counterclockwise to the OFF position (horizontal to the horizon).



**FIGURE 20** 

4. In the event of an EMERGENCY, locate the Safety Circuit Cut Loop as indicated below.



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- 5. Use bolt cutters to cut the Safety Circuit Cut Loop on each side of the label to disconnect the traction voltage supply from the traction batteries.
- 6. Remove a one (1) foot or 12-inch section of wire.



FIGURE 22

### If Truck is Charging

If no visible sign of danger, carefully remove the charging plug from the charging inlet. See Figure below.



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# If Charging Plug Cannot be Pulled Out-Retract the Pin Manually

1. Turn off the master disconnect (counterclockwise so it is horizontal to the horizon) to initiate the high voltage disconnection process.

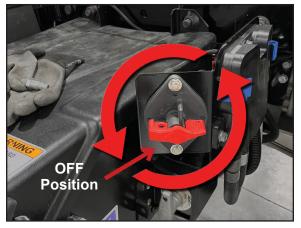
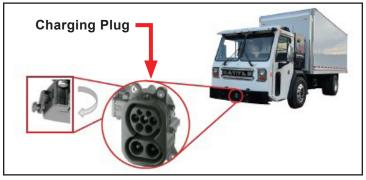


FIGURE 24

2. Rotate the lever and remove the charging plug.



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### Post-Battery Damage Observation



If high voltage battery is damaged, store vehicle at least 50 feet from structures or vehicles.

Risk of delayed fire can happen after the fire suppression or if the Lithium Iron Phosphate batteries are damaged.

Park the BEV truck involved in an accident in a suitable place maintaining a safe distance from the other vehicles, buildings, and combustible objects.

Observe the truck for a minimal period of 48 hours using a thermal infrared camera.

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### **SECTION 6 - OCCUPANT ACCESS**

#### **Opening Door From the Outside**

**NOTE:** The ignition key and the door key are separate keys. The key to the door is small and silver with a rounded top. The ignition key has a square top and is covered in black plastic.



1. Insert the key in the door lock and turn it clockwise to unlock the right-hand side door.

### Right-hand side door handle –





**FIGURE 27** 



2. Insert the key in the door lock and turn it counterclockwise to unlock the left-hand side door.



**FIGURE 28** 

3. To open the door, grasp the handle and pull out while exerting some force on the door.

#### SECTION 6 | OCCUPANT ACCESS



#### **Opening Door From the Inside**

1. To open the door from inside the cab, pull the handle while exerting some outward force on the door.



**FIGURE 29** 

#### Standard Seat Adjustments

- 1. Move the lever under the front of the seat base.
- 2. Slide the seat fore or aft to the desired position and release the lever to lock the seat in position.



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#### Sears Atlas Air Suspension Seat Adjustment

- **1. Backrest Adjustment**: Pull up on the handle located on the left-hand side just below the backrest. Move the backrest to the desired position and release the handle.
- 2. Slide Adjustment: Lift the handle to adjust seat to desired fore-aft position.
- **3.** Suspension Height Adjustment: Push the chrome knob located on the right-hand back rest bracket inward to inflate and raise the suspension. To deflate and lower the suspension, pull out on the chrome knob.

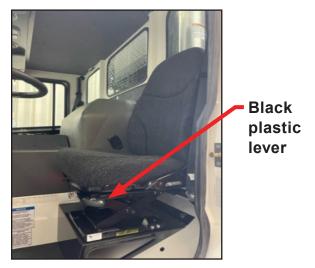


FIGURE 31

#### Steering Column Adjustment

1. PUSH the telescopic steering adjust lever to adjust the telescopic length of the column.



PUSH lever to adjust height of steering wheel

PULL lever to adjust angle of steering wheel

### FIGURE 32

2. PULL the telescopic steering adjust lever to adjust the tilt of the column (use steering tilt lever).



### **FIGURE 33**



#### Windows and Wind Screen

1. The wind screen is made of laminated glass.



**FIGURE 34** 

- 2. The rear and side windows are made of tempered glass.
- 3. In some cases, when there is a folding door present, the bottom window on the door is Lucite.



**FIGURE 35** 

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#### **High Strength Zone**

**NOTE:** There is no High-Strength and Ultra-High-Strength Steel in the cab. The cab structure is made predominantly of plain carbon sheet steel that does not exceed 413 Mpa.



### **SECTION 7 - STORED ENERGY**

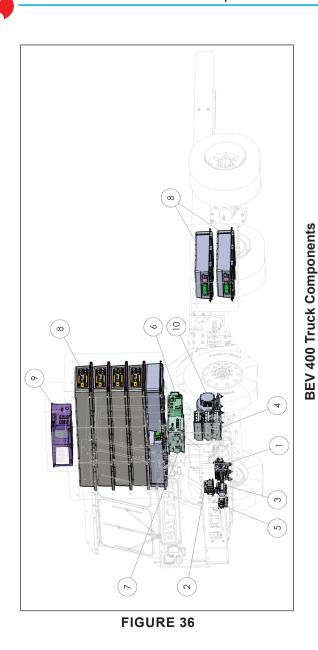
#### **BEV 400 Truck Components**

ITEM NO	PART NAME	DESCRIPTION	
1	POWER STEERING PUMP	4KW POWER STEERING PUMP	
2	EVCC	ELECTRIC VEHICLE CHARGE CONTROLLER IS PART OF THE ELECTRIC CHARGING SUBSYSTEM, FACILITATING COMMUNICATION BETWEEN WALL CHARGER AND VEHICLES AS WELL AS PROVIDING SHOCK AND THERMAL PROTECTION WHILE PROVIDING HIGH VOLTAGE CONTACT CONTROL.	
3	A/C COMPRESSOR	3KW A/C COMPRESSOR	
4	ON BOARD CHARGER (OBCC)	THREE 6.6KW ON BOARD CHARGERS THAT TAKE THE AC INPUT FROM THE WALL CHARGER TO CHARGE THE HIGH VOLTAGE BATTERIES AT 19.8 KW	
5	HEATER PUMP	12KW HEATER PUMP	

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6	PDU	POWER DISTRIBUTION UNIT RECEIVES 700V DC INPUT FROM THE S-BOX AND DISTRIBUTES TO THE HIGH VOLTAGE COMPONENTS. IT ALSO INCLUDES A DC/DC CONVERTER TO CHARGE THE 12V BATTERIES.
7	S-BOX	SMART JUNCTION BOX RECEIVES 700V INPUT FROM THE HIGH VOLTAGE BATTERIES AND ACTS AS THE MAIN CIRCUIT BREAKER FOR THE HIGH VOLTAGE SYSTEM.
8	HV BATTERY (396KW SYSTEM)	FOUR 70KW AND TWO 30KW LI-ION BATTERIES LOCATED BEHIND THE CAB AND TWO 30KW BATTERIES LOCATED ON THE SIDE OF THE FRAME.
9	CHILLER	7KW CHILLER PROVIDES THE COOLING SYSTEM FOR THE HIGH VOLTAGE BATTERIES.
10	AIR COMPRESSOR	7KW AIR COMPRESSOR



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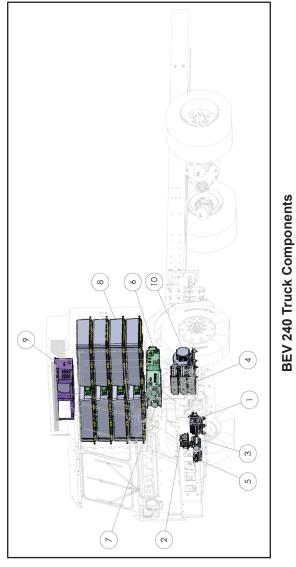
#### **BEV 240 Truck Components**

ITEM NO	PART NAME	DESCRIPTION	
1	POWER STEERING PUMP	4KW POWER STEERING PUMP	
2	EVCC	ELECTRIC VEHICLE CHARGE CONTROLLER IS PART OF THE ELECTRIC CHARGING SUBSYSTEM, FACILITATING COMMUNICATION BETWEEN WALL CHARGER AND VEHICLES AS WELL AS PROVIDING SHOCK AND THERMAL PROTECTION WHILE PROVIDING HIGH VOLTAGE CONTACT CONTROL.	
3	A/C COMPRESSOR	3KW A/C COMPRESSOR	
4	ON BOARD CHARGER (OBCC)	THREE 6.6KW ON BOARD CHARGERS THAT TAKE THE AC INPUT FROM THE WALL CHARGER TO CHARGE THE HIGH VOLTAGE BATTERIES AT 19.8 KW	
5	HEATER PUMP	12KW HEATER PUMP	



6	PDU	POWER DISTRIBUTION UNIT RECEIVES 700VDC INPUT FROM THE S-BOX AND DISTRIBUTES TO THE HIGH VOLTAGE COMPONENTS. IT ALSO INCLUDES A DC/DC CONVERTER TO CHARGE THE 12V BATTERIES.	
7	S-BOX	SMART JUNCTION BOX RECEIVES 700V INPUT FROM THE HIGH VOLTAGE BATTERIES AND ACTS AS THE MAIN CIRCUIT BREAKER FOR THE HIGH VOLTAGE SYSTEM.	
8	HV BATTERY (240KW SYSTEM)	EIGHT 30KW LI-ION BATTERIES LOCATED BEHIND THE CAB.	
9	CHILLER	7KW CHILLER PROVIDES THE COOLING SYSTEM FOR THE HIGH VOLTAGE BATTERIES.	
10	AIR COMPRESSOR	7KW AIR COMPRESSOR	





#### **FIGURE 37**

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### **SECTION 8 - FIRE RESPONSE**

# 🚹 DANGER

First Responders must be approved to wear SCBA breathing apparatus.

# 🚹 HIGH VOLTAGE

Never attempt to penetrate the high voltage battery or its casing to apply water.

# 🚹 HIGH VOLTAGE

Avoid contact with orange high voltage cabling and areas identified as high voltage risk by High Voltage warning labels.

## A HIGH VOLTAGE

Allow 2 minutes for the high voltage system to de-energize after disabling the high voltage disconnect switch.

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### <u> HIGH VOLTAGE</u>

Always assume that all high voltage components are energized. Cutting, crushing, or touching high voltage components can result in serious injury or death.

# 

Failure to disable the low-voltage system prior to occupant extraction may cause supplemental restraint system (i.e. airbags) to deploy causing injury or death.

# 🚹 HIGH VOLTAGE

When fire is involved, consider the entire vehicle energized and do not touch any part of the vehicle.

# 

Always wear appropriate Personal Protective Equipment (PPE) including high voltage, Class 0 (1000V) rubber insulated safety gloves and self-contained breathing apparatus (SCBA).

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## 

When handling a submerged vehicle, failure to wear proper PPE could result in serious injury or death.

# 

Hot metals may be ejected during high voltage lithium battery fires, failure to wear proper PPE could result in serious injury or death.

- 1. If the circumstances permit, disable the system using The Primary Procedure as mentioned in the Emergency Handling section above before performing steps 2 and 3.
- If occupants are still inside the vehicle or are trapped, use a CO2 or dry chemical fire extinguisher to protect the occupants until a hose line is available or until the occupants are removed.
- 3. Establish a 50-foot secure perimeter around the vehicle.



### SECTION 9 - SUBMERSION RESPONSE



Avoid any contact with the traction voltage cables and electric components.

# 

Never come into contact with a submerged BEV truck or the water surrounding it without proper Personal Protective Equipment (PPE) including high voltage, Class 0 (1000V) rubber insulated safety gloves and self-contained breathing apparatus (SCBA). Electrocution causing serious injury or death may result.

## 

Water intrusion can damage all electrical components regardless of system voltage.

## 

The damage level of a submerged vehicle may not be visible.



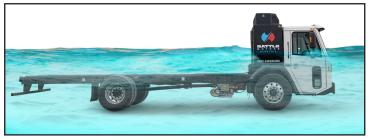
# 

Submersion in water can damage 12V and 700V Lithium Iron Phosphate components.

# 🚹 HIGH VOLTAGE

Handling a submerged truck without the appropriate PPE may result in serious injury or death due to electric shock.

If possible, disable direct hazards. See Section 5 - Emergency Handling.



**FIGURE 38** 

#### (Scenario) Vehicle Wading in Water

Pay attention to the following items if the vehicle is traveling on roads with water:

DEPTH	SPEED	TIME
≤12 IN	≤5MPH	≤10 MIN

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#### (Scenario) Immersion

Pay attention to the following items if the vehicle is accidentally immersed in water:

- 1. Do not turn on the power supply.
- 2. Have vehicle towed to an authorized Battle Motors dealer for inspection and repair. See Section 11.

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### **SECTION 10 - COLLISION RESPONSE**

# 

If the traction batteries are damaged, there is a risk of thermal or chemical reaction.

# HIGH VOLTAGE

Batteries should always be treated as energized.

# 

Always wear appropriate Personal Protective Equipment (PPE) including high voltage, Class 0 (1000V) rubber insulated safety gloves and self-contained breathing apparatus (SCBA).

When the vehicle is involved in a collision, the entire vehicle could be energized. Do not perform any operation on a damaged truck without appropriate HVPPE.

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#### In Case of a Traffic Accident

 Safely stop the vehicle, open the door, carefully evacuate all passengers, remove the key and if conditions permit, raise the cab to remove the Manual Service Disconnects (MSD). To remove the MSDs, push inward on the tab located on the lever. Pull the lever up part way and push the tab a second time. Pull the lever the rest of the way, in an upward fashion, and then remove the MSD by sliding it out of its inlet.



**FIGURE 39** 

- 2. Handle the traffic accident according to local regulations.
- 3. Have the unit towed to an authorized Battle Motors dealer for safety inspection prior to driving the vehicle.



### **SECTION 11 - TOWING**

## 

Before towing the truck, it is mandatory to disconnect the drive shaft from the wheels.

## A HIGH VOLTAGE

The electric motors can produce electricity when moving the truck with the rear drive tire on the ground. This remains a potential source of electric shock even when the high voltage system is disabled. Do not touch the truck when it is in motion.

## 

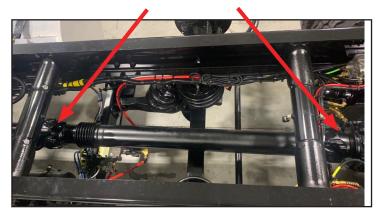
Warning signs of hazardous damage: sparks, smoke, increasing temperature gurgling/bubbling sounds from high voltage battery.

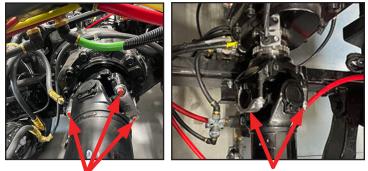
If any of these signs are observed, ventilate the vehicle immediately and park away from other structures and vehicles. The high voltage battery may be giving off harmful/flammable gases and may become a delayed fire hazard.

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Before towing the truck, it is mandatory to disconnect the drive from the wheels. Use a 13mm 12 point socket to remove the four bolts connecting the U-joint straps on each side of the driveshaft (8 bolts total). This will allow removal of the driveshaft before towing.





**FIGURE 40** 



#### Maximum Loading During Lifting and Towing

This information specifies the loading which can be applied when using towing hook, towing hitch cross-member, axle and torque stay anchorages.

**Single towing hook**: Do not load the hook more than then vehicle gross weight.

**Double towing hooks**: Do not load each hook more than half the vehicle gross weight.

**Towing hitch, towing hitch cross-member**: Max. 200mm (7.8 inches) from center of member web.

- Lengthwise: 20 tons
- Vertically (lift): 7 tons
- Sideways: 17 tons

**NOTE:** When the vehicle is towed with the rear suspension lifted, the steering wheel must be locked with a steering lock.

**NOTE:** If roof deflector cannot be removed, tow from the front of the vehicle only.

### 

If high voltage battery is damaged, store vehicle at least 50 feet from structures or vehicles.

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### SECTION 12 - IMPORTANT ADDITIONAL INFORMATION

### <u> HIGH VOLTAGE</u>

Never cut orange high voltage cables. Always assume the orange cable is energized.

## 🚹 HIGH VOLTAGE

Never touch damaged or submerged high voltage cables or components.

## 

Do not perform any operation on a damaged truck without appropriate HVPPE.

### WARNING

Remove all metallic jewelry including watches, rings, or glasses containing metal. Failure to follow these instructions may result in serious personal injury or death.

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## 

Always wear appropriate Personal Protective Equipment (PPE) including high voltage, Class 0 (1000V) rubber insulated safety gloves and self-contained breathing apparatus (SCBA).

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