# Boosting Aircraft

## *SAFETY ORIENTATION*

This manual will take you step-by-step through your working day. It will alert you to all the safe practices that should be adhered to while using the battery pack.

It has been said, “The best safety feature is an informed, careful worker” Good safety practices not only protect you but also the people around you. Make these practices a dynamic part of your workday.

Most accidents can be prevented. Do not risk injury or death by ignoring good safety practices.

- Battery pack training must be given to employees before allowing them to use it.
- Procedures must be reviewed annually thereafter, as per OSHA (Occupational Safety and Health Administration) regulation 1928.57.
- Lead-acid batteries require careful handling due to the presence of sulfuric acid and the potential for flammable hydrogen gas release during charging.
- All procedures listed in the aircraft POH must take precedence.
- The most important safety device on this equipment is a SAFE worker. It is their responsibility to understand all safety and usage instructions in this document, and to follow them.
- An untrained worker exposes himself and bystanders to possible serious injury or death.
- Think SAFETY! Work SAFELY!

## GENERAL SAFETY

- Read and understand the Operator’s Manual and all safety decals before operating the battery pack.
- This battery pack was designed for a specific application. DO NOT modify or use this battery pack for any application other than which it was designed.
- Battery packs that are operated improperly or by untrained personnel can be dangerous, exposing themselves and/or bystanders to possible serious injury or death.
- Have a first-aid kit available for use should the need arise.
- Provide a fire extinguisher for use in case of an accident. Store in a highly visible place.
- Wear appropriate protective gear. This list may include but is not limited to:
    - *Protective boots/shoes with slip resistant soles*
    - *Eye protection*
    - *Work gloves*
    - *Hearing protection*
    - *Respirator or filter mask*
    - *Hi-Visibility safety vest*
- Consult your doctor about operating machine while taking prescription medications.

- Review safety related items annually with all personnel who will be using or maintaining the battery pack.

## Equipment safety guidelines

- Safety of the workers and bystanders is one of the main concerns when designing and developing this battery pack. However, every year many accidents occur which could have been avoided by a few seconds of thought, and a more careful approach to handling equipment.
- Do not allow personnel to use this battery pack until they have read this manual. They should have a thorough understanding of the safety precautions.
- Review the safety instructions with all users annually.
- In order to provide a better view, certain photographs or illustrations in this manual may show an assembly with safety guards removed.
- If removal becomes necessary for repairs, replace the guard prior to use.
- Personnel must be responsible, properly trained and physically able. You should be familiar with farm equipment in general.
- If its ability to do a job, or to do so safely, is in question - DO NOT TRY IT.
- Do not modify the equipment in any way.
- Unauthorized modification result in serious injury or death and may impair the function and life of the equipment.
- The design and configuration of this battery pack includes safety decals and equipment. They need to be clean, readable and in good condition.

### *OPERATING SAFETY*

Make sure that anyone who will be using the battery pack or working on or around it reads and understands all the operating, maintenance, and safety information in the operator's manual.

- Keep working area clean and free of debris to prevent slipping or tripping.
- Ensure the area where lead-acid batteries are charged is well-ventilated to prevent the buildup of flammable hydrogen gas.
- Wear gloves and safety glasses when handling batteries to prevent skin and eye contact with the acid.
- Keep batteries away from heat, sparks, open flames, and any ignition sources as these can ignite the hydrogen gas.
- Remove jewelry and metal objects to prevent accidental short circuits, which can cause sparks and rapid heating of metal.

### *BATTERY SAFETY*

- Keep all sparks and flames away from battery, as the gas given off by electrolyte is explosive.
- Avoid contact with battery electrolyte. Wash off any spilled electrolyte immediately.
- Wear safety glasses when working near batteries.
- Do not tip batteries more than 45 degrees, to avoid electrolyte loss.
- To avoid injury from spark or short circuit, disconnect battery ground cable before servicing any part of electrical system.
- When storing conveyor for an extended period:
    - Remove the battery.
    - Be sure it is fully charged.
    - Store it inside.
    - Do not sit battery on a cold, concrete floor.
- Before using the battery, after it has been in storage, be sure it is charged.

### *STORAGE SAFETY*

- Store the conveyor on a firm, level surface.
- Store in an area away from human activity.
- If required, make sure the unit is solidly blocked up.
- Remove the battery and store in dry location.
- Do not sit battery on a cold, concrete floor.
- Make certain all mechanical locks are safely and positively connected before storing.
- Do not permit children to play on or around the stored machinery

## Battery pack operation

The Battery pack is designed to aid an aircraft that has run down its battery to get started. It is not intended to charge a dead battery.

It is the responsibility of the owner and operators to read this manual and to train all personnel before they start working with the machine. Follow all safety instructions exactly - it is everyone's business.

By following recommended procedure, a safe working environment is provided for the operator, coworkers, and bystanders in the area around the work site.

### *COMPONENTS*

Components may vary, and their positions may change depending on the options contained on the battery pack.

The main components are listed below:

1. Handle
2. Wheels
3. Voltage Selector
4. Voltage Meter
5. Quick Connectors
6. Charging Terminals
7. Storage Box
8. Jumper Cables
9. 12V Booster Cable (Piper)
10. 24V Booster Cable (Cessna, DA40)

### *Components and controls*

Before starting to work, all operators must familiarize themselves with the location and function of the components and controls of their specific unit.

#### Handle

Push button handle of the rolling battery pack is made for opening and closing for easy storage.



### Voltage Selector

3-position battery switch can choose between 12V and 24V operation and off when not in use or charging. *Maximum voltage: 32V DC*




### Voltage Meter

Real-time Monitoring: Voltage meter test range DC 5-36V, accuracy 0.1V, precise 3-digit LED digital display, timely monitoring of battery voltage to prevent malfunctions




### Quick Connectors

The battery quick connector and battery cable plug design make device connection easier and faster, and convenient to use. Positive and Negative terminals cannot be mixed due to the design of the housing.



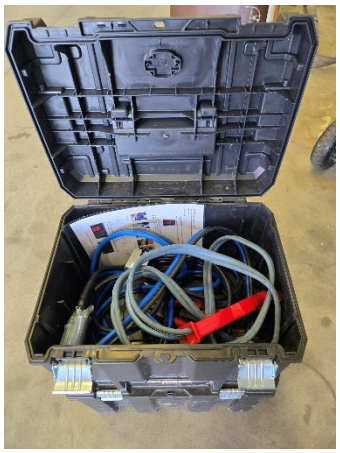
### Charging Terminals

When not in use and the battery levels are low, use the charging terminals on the back of the battery box to charge the unit.




### Storage Box

Storage for boosting cables.



### Jumper Cables

We operate two different cables at Summit for the Flying School. One system is 24-volt for Cessna/Diamond aircraft and Piper aircraft which run on a 12-volt system.

Cessna/DA40 24 volt



Piper 12 volt



### *Pre-operation checklist*

Efficient and safe operation of the Battery pack requires that each operator reads and follows the operating procedures and all related safety precautions outlined in this section.

Before operating and each time thereafter, the following areas should be checked:

1. Ensure that the box is not cracked or damaged.
2. Make sure the battery pack is properly charged by cycling the voltage selector switch.
3. Ensure that both cables are present in the storage box.
4. Check the condition of the cables in the storage box.

### *Battery pack operations*

*Verify that the starting battery has the same output voltage as the aircraft starting battery. If the output is different, DO NOT attempt to use. 12VDC to 12VDC, and 24VDC to 24VDC only.*

**Communicate with the pilot that they are not to engage the master switch or start that aircraft until you are clear of the area.**

## Connecting

- Position the battery pack along the leading edge of the aircraft on the external *battery port* side of the aircraft.
- Ensure that the booster back voltage selector is in the off position.




- Connect the proper booster cable to the booster pack for the aircraft in need of service.
- Verify with the pilot that the aircraft master switch is off.
- Open the external battery port (a screwdriver may be required)



Seminole



Arrow



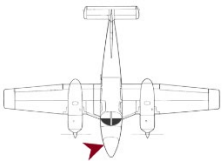
Cessna 172

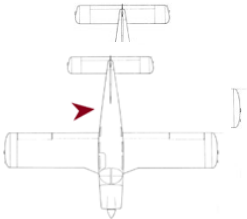


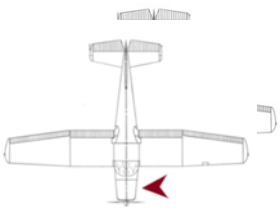
Cessna 152



DA 40









- Connect the battery pack to the aircraft.
- Turn on the battery pack by selecting the proper voltage (12v/24v).





- Clear the area and signal the pilot that they may engage the aircraft master and start the aircraft.

*Disconnecting*

- If the aircraft starts, turn off the battery pack.
- Leave the cable attached to the battery pack so that the cable does not swing towards the propeller.
- **Carefully** approach the aircraft and remove the battery connection from the aircraft. Keep a hand on the leading edge of the wing or main strut of the aircraft as you approach the spinning propeller to gauge your approach.
- Place the cable end on the battery pack.
- Close the aircraft external battery port. (Screwdriver may be required)
- Remove all equipment from the area.
- Then you can signal the aircraft/pilot to clear the area.

## Fuelling/Defueling

INSERT SILVER CART HERE

- Fuel hoses and connections shall never be run over by ground equipment.
- With the exception of fuel trucks, mobile equipment shall not be positioned within the venting areas during fuelling of defueling.
- Operators of fuel bowsers must have completed a vehicle inspection to ensure the vehicle in their charge is serviceable and suitable prior to positioning up to SUMMIT GROUP aircraft.
- Fuel bowser operators must proceed at a slow walking pace (5km/h). A final brake check must be performed at approx. 2 meters from the aircraft.

**Before fuel hoses are attached to the aircraft, it is imperative that the aircraft must be grounded, by means of grounding/bonding cable being attached/clamped to the aircraft's static grounding point.**

## Electrostatic Charges & Aircraft Bonding

Distinct types of electrical potential difference, with the accompanying hazard of spark discharge, are possible during aircraft fuelling operations. The hazard of sparking can be eliminated by ensuring that the fuelling vehicle is electrically connected to the aircraft; so that a difference in electrical potential cannot occur between the two.

Bonding between the aircraft and vehicle is made by connecting a conductor between designated points, on clean and unpainted metal surfaces of the aircraft and the fuelling vehicle. Electrically conductive fuel hoses normally provide a back- up conductive path for discharge, but aircraft fuelling procedures recommend that conductive hoses should not be regarded as adequate bonding between aircraft and fuelling vehicle.

Where the over-wing fuelling is employed, the nozzle is normally bonded to the aircraft before the filler cap is removed; however, where under-wing fuelling is employed, the automatic metal-to-metal contact between the aircraft fitting and the coupling eliminates the need for separate bonding connection.

Drag chains on fuelling vehicles or conductive tyres on fuelling vehicles and aircraft are often used as additional safeguards but are not considered effective by themselves. They are useful however, since in the event that the aircraft / vehicle bonding is broken or faulty, the electrostatic charge could be discharged from the aircraft or vehicle through their respective tyres or drag chains.

As an additional safety measure, some practices specify individual electrical grounding of aircraft and vehicle. This measure would prevent any possible hazard caused by a broken or faulty bonding. It appears however, that this possibility is negligible if proper maintenance and testing of the wire used for bonding purposes between aircraft and fuelling vehicle is carried out.

In summary, where no electrical grounding is specified, the normal order of procedure to eliminate electrostatic discharge during fuelling operations by fuelling staff is as follows:

1. Bonding of aircraft and fuelling vehicle to one another.
2. Bonding of fuel nozzle to aircraft for over-wing fuelling arrangements.

Where electrical grounding is specified, the normal order of procedure is as follows:

1. Grounding of fuelling vehicle.
2. Grounding of aircraft.
3. Bonding of aircraft and fuelling vehicle to one another.
4. Bonding of fuel nozzle to aircraft for over-wing fuelling arrangements.

On completion of fuelling operations, all disconnections should be made in reverse order.