



BATTERY BACKUP SYSTEM

LIVING-HINGE UPStealth Battery Panel



The Battery Backup System (BBS) will power the Traffic cabinet in the event of a power failure or other user selectable event such as time of day. The BBS system will supply 120VAC $\pm 3\%$ at 60 Hz $\pm 0.1\%$ to the cabinet.

A front panel switch will allow the user to bypass the internal inverter and force the cabinet to run on the AC Power line. In the normal position, the BBS Controller constantly monitors the AC Line Voltage and in the event of a power failure switches the cabinet power to the Inverter output in less than 8 milliseconds. The transfer time can be changed in 8 millisecond increments up to 200 milliseconds if needed by the cabinet equipment. Two relays are used to switch the AC+ and AC- legs of power line to isolate the Inverter power from the AC line Voltage.

The BBS Inverter is powered by battery panels that incorporate a "living hinge" and are sized such that the battery panels can be inserted in the space between the Cabinet Rack and the Cabinet shell. The battery panels incorporate smart battery chargers that are controlled by the main Controller/Inverter. Communication between the Controller/Inverter and the battery panel chargers is through a serial bus contained in the interconnect cable. The Main Controller/Inverter is able to turn any battery panel ON or OFF.

Battery Panel size and capacity is based on the cabinet size and load requirements. 500W and 300W battery panels will be standard with other custom panels available on request. The Controller/Inverter can connect to 4 battery panels with the optional hub up to 16 panels can be attached to one Controller/Inverter. The temperature of the battery cells is continuously monitored so that charge parameters can be modified based on temperature. The number of battery panels in a system will NOT affect battery charge time. Charging or discharging of the battery panel does not add a significant amount of heat to the cabinet.

The Battery Panels use cells based on Nickel Zinc Chemistry. The cells do not have any environmental restrictions and are able to be disposed of or recycled easily. There are no transportation restrictions on the batteries.

The Main Controller/Inverter has a 4 line by 20-character LCD display with a white LED back light. A keypad controls the cursor on the display and allows the user to select different operational parameters as well as check the status of the system. The LCD displays the current line Voltage, the cabinet Power Consumption, and battery status including calculated backup time.

Eight relays are available on the back panel with uncommitted Com, NO, and NC contacts. The control of the relay is set up on the front panel with the keypad and display or through a PC connected to the USB port. The relays are controlled by the following events:

- Power Failure
- Battery Capacity (Low Battery) 0-100%
- Time following Power Failure (Flash)
- Time of Day
- Temperature

Any of the relays can be programmed for multiple triggers such as Battery Capacity and Time following Power Failure. The status of all of the relays is available on the front panel display. The relays use individual 3 pin Phoenix type connectors that plug into the back panel for easy removal of the BBS Controller.

The BBS communicates with a PC using a USB port or optionally an Ethernet port. All of the information available on the front panel is also available to the PC. The Ethernet allows the BBS to respond to NT/CIP commands from a Traffic Master and present a WEB page to a standard PC type computer. An event log shows the history of power disruptions that affect the cabinet. The Event log shows the total number of power failures, total length of time on Battery power, and show any Battery failures.

The BBS is able to exercise and determine the status and capacity of all battery strings on a continuing basis. An accurate backup time can then be calculated. The depth of discharge value can be adjusted if more backup time is required versus battery life. The Voltage at which the BBS switches to battery power and then back to the AC line is settable by the user. An over-voltage point can also be set where the BBS switches to battery power if too high of a voltage is sensed on the AC power line. The BBS will also monitor the power consumption of the cabinet, which can be used as a diagnostic tool by the traffic technicians.

The Main Controller/Inverter will be a rack mount unit 17" wide 3.5" high and 13" deep excluding the connectors. An external bypass switch can be added to the system to allow removing the BBS without powering down the cabinet.

The battery panel can be charged without being connected to the Inverter, The Wall Charging Adapter plugs into the military barrel connector located on the battery panel, while the other end of the charging adapter plugs into a 120 VAC wall outlet. The BBS will allow the user to easily Hot

Swap in the event of a longer run time being desired, this is due to the ease of removal and installation of the battery panels. LED's are located on the battery shelf to communicate the charging status of the panel.

The BBS will Cold Start which allows the unit to be turned on and supply AC power to a traffic cabinet when there is no AC Line Power available.