

**PATENT
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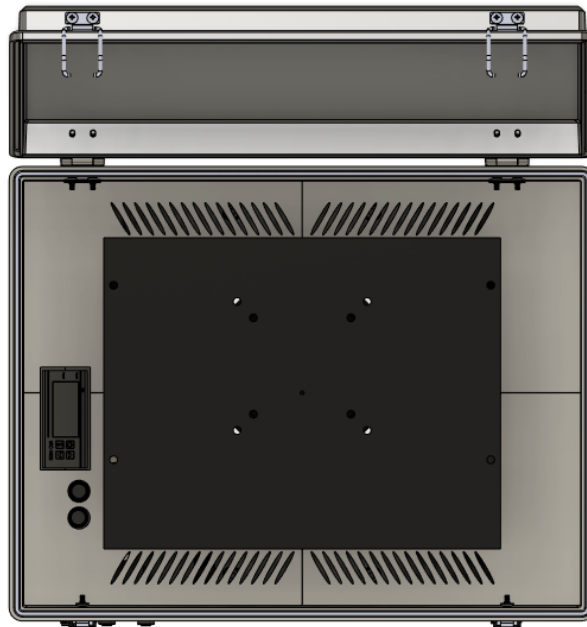
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OUTDOOR COMPUTER MOUNTED PROTECTION AND POWER SUPPLY ENCLOSURE DEVICE



- **Protective Case** made from durable UV-resistant plastic composite.
- Built-in **Power Supply** that can accept 9-40V DC and output 12/ 24V for onboard devices.
- Integrated **Temperature Controller** to regulate temperature within the box with standard cooling and optional heating. Pre-set to 60° F with $\pm 15^\circ$ window for heating/ cooling so that equipment is not constantly running. (User configurable)
- **Customizable:** All boxes can be tailored to your specific application. Ex: Trimble Groundworks 1.10 vs 2.0, Vermeer vs Hercules.
- **External Size L x W x D (With RAM® Mount):** 17.14" x 13.20" x 10.995"

Background:

This project stemmed from the use of the Verso12 and Trimble groundworks in the fields of West Texas. Environmentally the area of operation had an abnormally scorching summer causing the devices to overheat and bog down during operation. The units would get hot enough that you were unable to use the touch screens due to the elevated temperatures. If they worked at all, they would burn your fingertips due to being extremely hot to the touch. The main goal of this project was to provide a shade and cooling source to help alleviate some of the operational bugs related to the heat. During this process, we took a step back to evaluate what other problems we could solve. First, we evaluated the nightly protection used on the unit to help keep the unit from getting damaged at night by weather. The solution that was in place by the end user at the time was that they cut a small black trashcan/bag into the back of the trashcan to go around the Verso12 Hardware and Cables.

This solution was fine for the price. It more or less got what they needed to be done. The shortcomings from this however, soon became prominent. The use of the trashcan if installed negligently would catch the cables/connectors on the display and over time would cause constant damage and repair/replacement of the display harness. This solution would also allow a significant build-up of condensate on the unit at night. The alternative was the operators would simply fail to use it at all allowing further damage of the unit. The goal for us was to integrate a solution into the tablet itself that would require minimum reliance on the operator and provide optimal protection from the elements, while still being able to perform its original function with as little inconvenience as possible. Our solution was to integrate everything into one mountable box. Providing protection from the elements, consistent device power, and customizable/ expandable solutions for the user.

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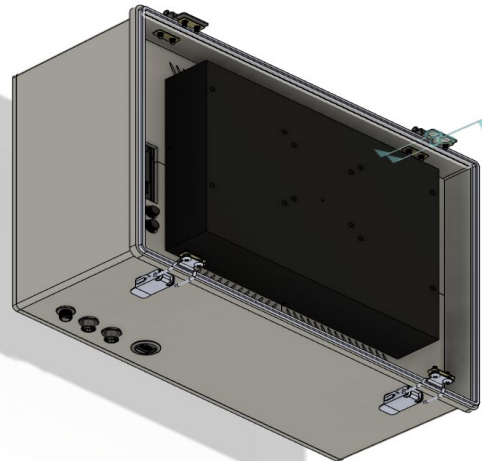
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Solution:

This box performs the cooling functions needed while also providing adequate protection from the elements when not being used. The selected box material allows for impact protection in temperatures ranging from -40°C up to 85°C¹. The box is also UV stabilized and is adequate for operation in direct sun exposure. Application Specific I/O ports along with a standard USB-A Port and our standard M12 Power Port. We have also integrated a power supply into the box that will accept system voltage ranging from 9-40V DC. The power supply will then boost or BUCK convert and condition the voltage to both 12V/ 24V DC to supply power for the onboard components. For a machine supply of 12V, a 10amp fuse is used, for 24V machine power a 5amp fuse is used. The box also features 2 80mm cooling fans with an airflow capacity of up to 44.3 CFM each, creating forced airflow across the display in the summer. The box will then exhaust the hot air back out to the box via the 2 large air and moisture vents located on the back of the unit. When not in use by the fans, these vents also equalize internal and external temperature and pressure as well as prevent internal condensation³.

**New to the Weather Protection Boxes:
Optional Cold Weather Protection**

Temperature Controller and Insulation: We can now integrate a temperature controller and insulation into the box for cold/ warm weather operation utilizing a PTC radiator and the dual 80mm fans. Pre-set to 60° F with ±15° window for heating/ cooling so that equipment is not constantly running along with the insulation to help maintain temperature longer.

1: Regardless of the range for the box itself, it is not recommended by any means to operate equipment or personnel for extended times in this environment.

2: The device does not have an integrated toggleable power isolation other than the fuse protection. The system will need to be wired into key-switch power from the host machine or tied in with the battery disconnect if you wish for it to not be operational while the machine is not being used.

3: These vents are the limiting factor to the IP rating on the box as they are only designed to meet an IP32 specification from the manufacturer.

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