



ZAP ASSEMBLY GUIDE

V1.5
Updated 9/8/2010

WELCOME TO BOLTAGE

Boltage uses state of the art hardware built by the Dero Bike Rack Company. Dero has made significant contributions to the Boltage Program, and they also offer a number of other great solutions--so check them out at www.dero.com.

This guide contains all the instructions necessary for assembling and attaching the ZAP RFID reading unit to a pole. Please follow the instructions carefully and exercise all necessary precautions to prevent injury.

This guide assumes you have already installed your mounting pole. If not, please see the ZAP Pole Guide for specifications and installation instructions, available at www.boltage.org/start.html.

Tools needed:

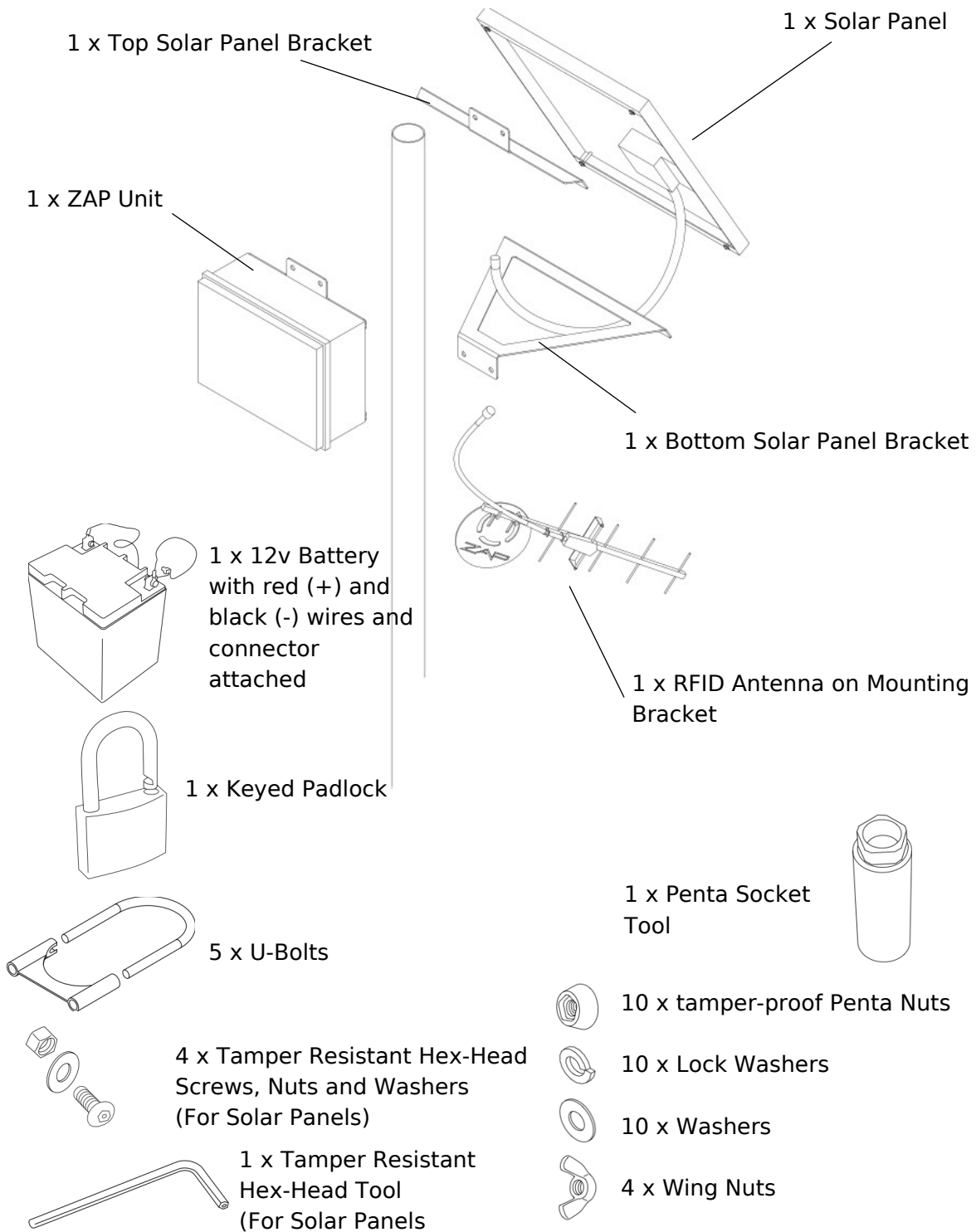
- 12' Step Ladder
- 3/8" Drive Socket Wrench

- Exercise caution when installing equipment.
- Check for power lines and overhead wiring or other obstructions.
- Keep pedestrians clear of area until all steps of ZAP installation are complete.

We advise keeping original packaging in the event you will need to return any components of the ZAP unit.

Please follow all directions for installation carefully. Failure to do so may result in damage to the unit.

PARTS LIST

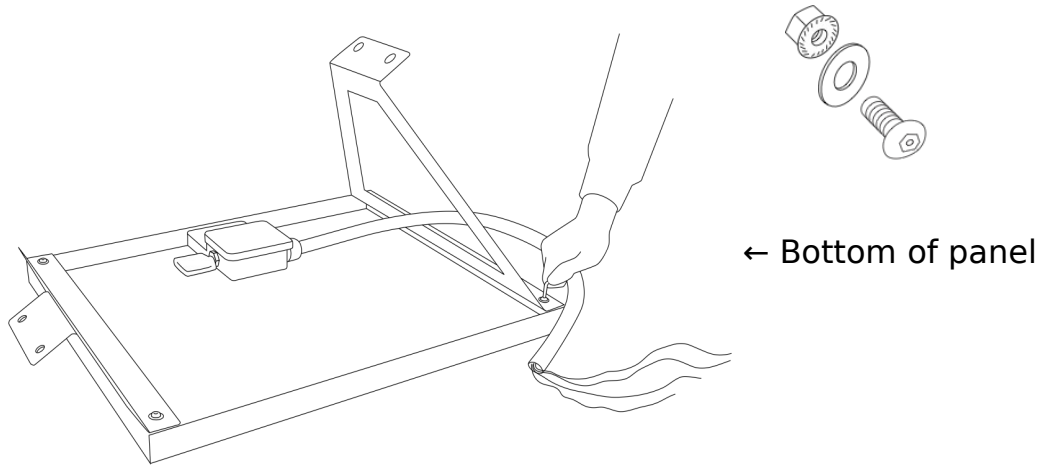


Open the 4 boxes and verify that all parts are included before beginning assembly. Please note this drawing not to scale.

INSTRUCTIONS

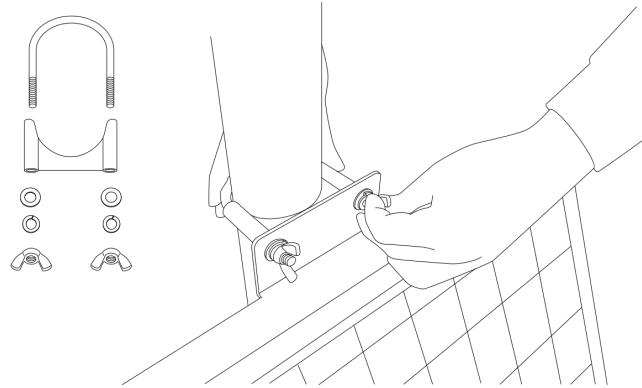
1. Attach solar panel to solar panel brackets (2) using tamper-resistant pan-head cap screws, lock nuts and washers. Be careful to ensure that the brackets are oriented as shown in the drawing.

(Washer goes on bolt side)



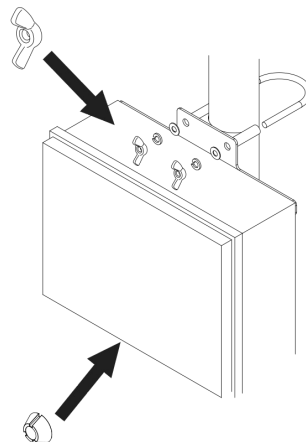
Lay solar panel on upside-down cardboard box, blanket, grass or other soft surface while attaching mounting brackets.

2. Place u-bolt around pole and loosely affix top of solar panel to u-bolt with wing nuts (wing nuts are temporary until step #5). Slide panel up pole while ascending ladder. You can adjust the wing nuts so that the assembly will “bind” on the pole as you slide it up - in other words it will slide up, but will bind and not slide down. Move panel into position (with upper u-bolt close to top of pole) and tighten wing nuts so that the panel is secured to the pole and will not slide. Solar panel **MUST** face due south. **Do not**

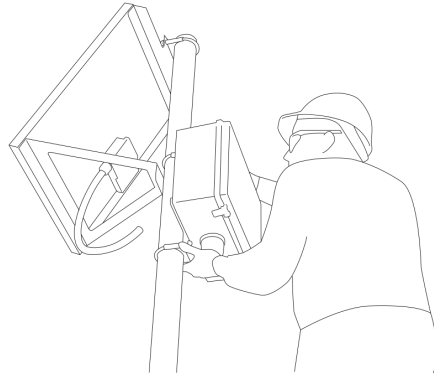


attach lower u-bolt yet.

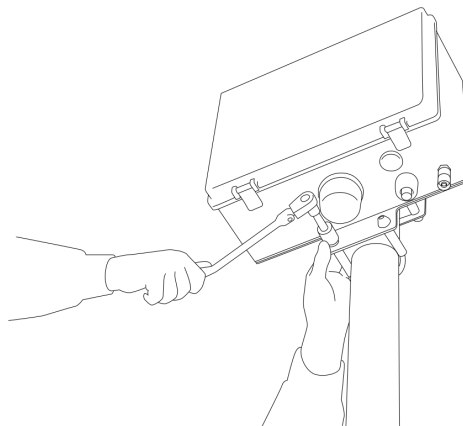
3. Loosely affix top of ZAP enclosure to pole with u-bolt and wing nuts and bottom of ZAP enclosure with u-bolt and tamper-proof nuts.



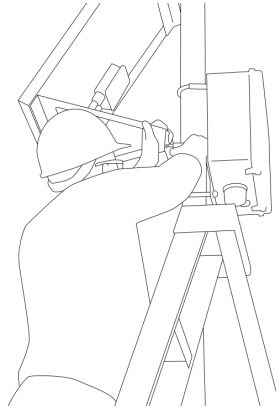
4. Slide unit up pole into position so that both the u-bolts are positioned above the lower solar panel u-bolt. You will need to pull bottom bracket of solar panel away from pole slightly to move ZAP enclosure into correct position.



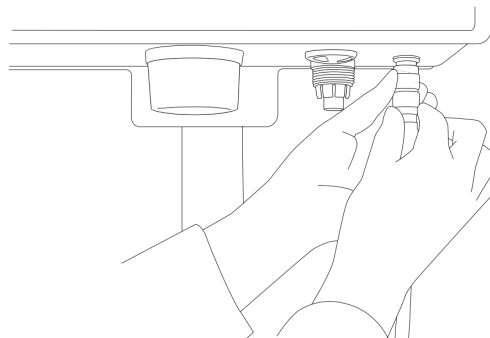
5. Tighten tamper-proof nuts at bottom of enclosure (ZAP box). Then individually replace wing nuts at top of unit with tamper-proof nuts.



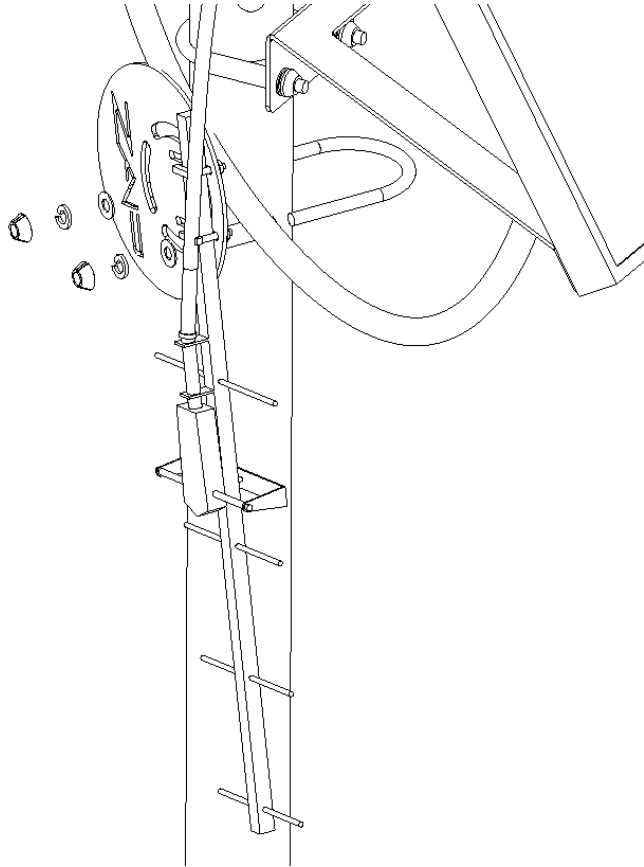
6. Using u-bolt and tamper-proof nuts, secure bottom of solar panel to pole. Then individually replace wing nuts at top of panel with tamper-proof nuts.



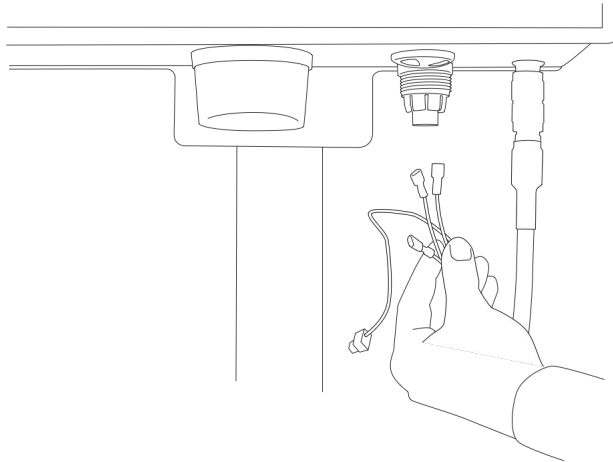
7. Attach RFID antenna to enclosure by threading the antenna's cable connector onto corresponding jack until very snug. You may allow the antenna to hang from the enclosure until you are ready to attach the antenna bracket to the pole.



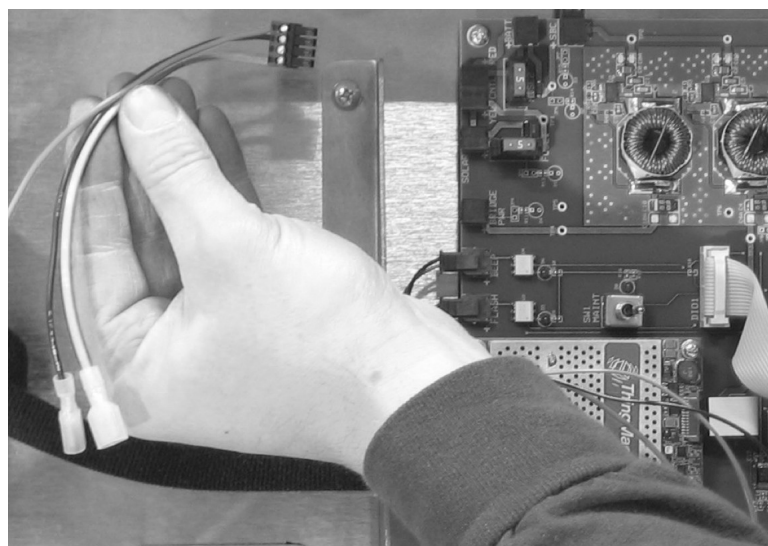
8. Attach antenna bracket to pole (with U-Bolt) using diagram as guide. The tip of the antenna should point towards the ground where the kids will be scanned. The bracket can be left slightly loose to allow for adjustment left/right and up/down.



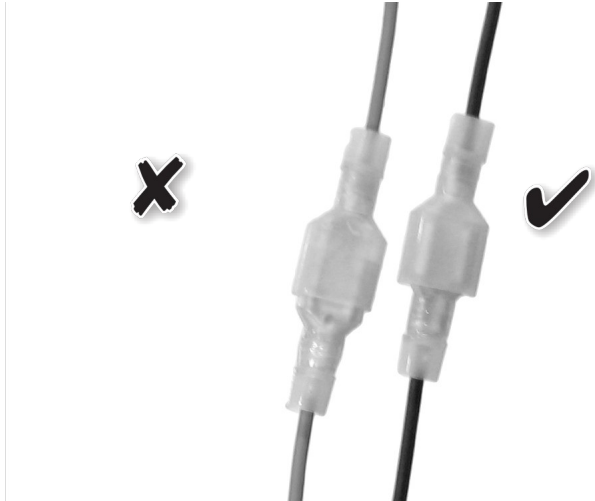
9. Remove the liquid tight fitting cap from the bottom of the enclosure and slide it over the conduit coming from the solar panel. Insert the 4 wires from the solar conduit through the liquid tight fitting on the underside of the enclosure.



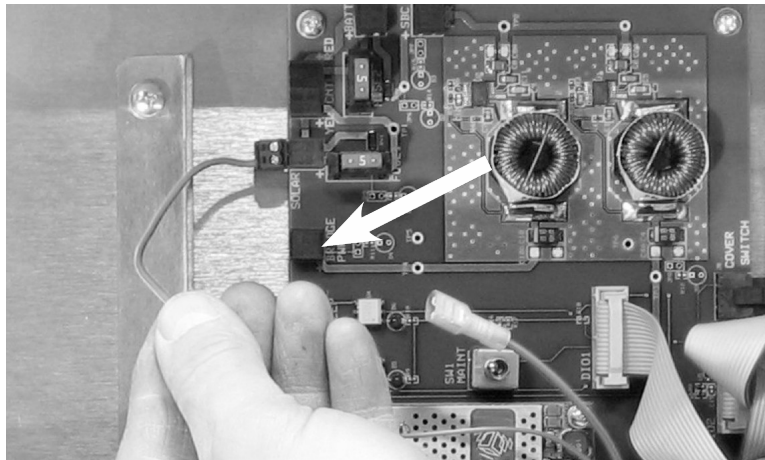
10. Detach 4-pin connector (only 3 wires in use) from the board to make connection of solar panel wires easier.



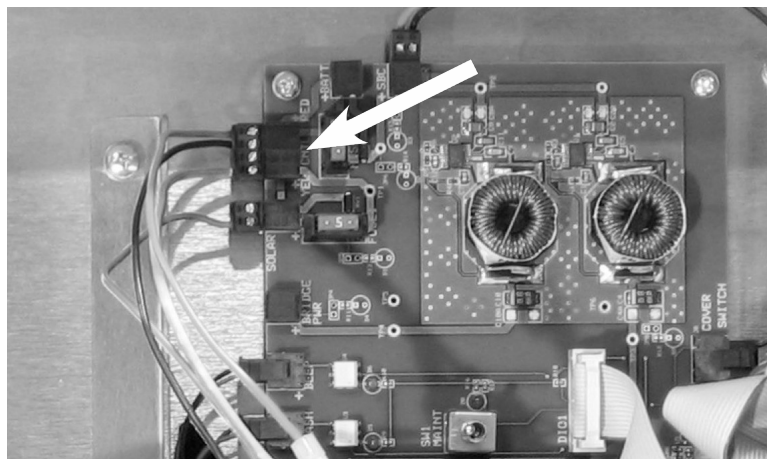
11. Connect each wire from solar conduit to corresponding wire from 4-pin connector. Refer to image for proper connection.



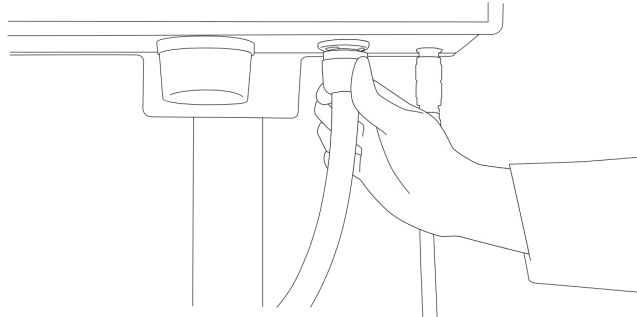
12. MAKE SURE THE RFID ANTENNA WIRING IS FIRMLY CONNECTED BEFORE PERFORMING FOLLOWING STEPS OR DAMAGE TO RFID READER MAY RESULT. Attach solar connector to SOLAR port on green board.



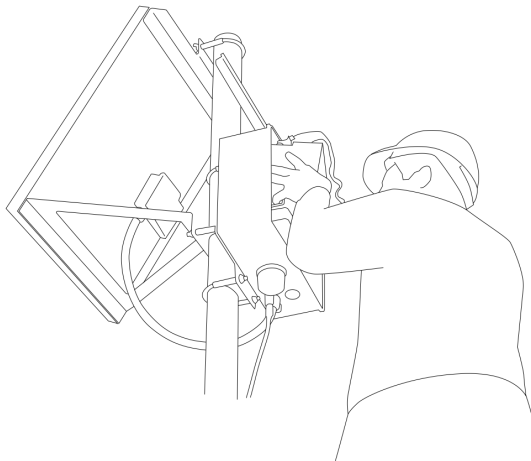
13. Attach 4-pin connector to port on green board.



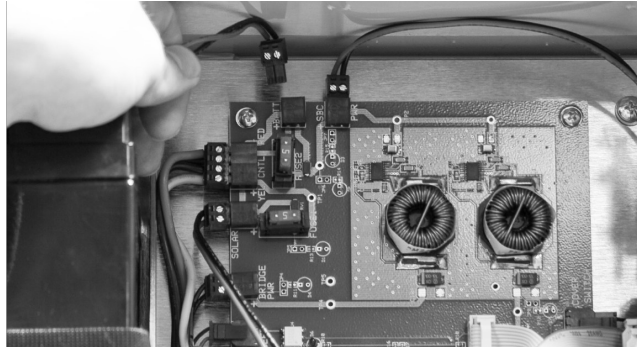
14. Tighten liquid tight fitting cap.



15. Install battery on its side with terminal leads facing circuitry. The red positive terminal should be at the top of the battery, and the black negative terminal at the bottom. Attach velcro straps to secure into position. NOTE: your networking bridge (wifi or cellular modem) should already be installed in the enclosure - if it is not, install it before installing the battery. For details see the ZAP Wifi Guide www.Boltage.org/start.html

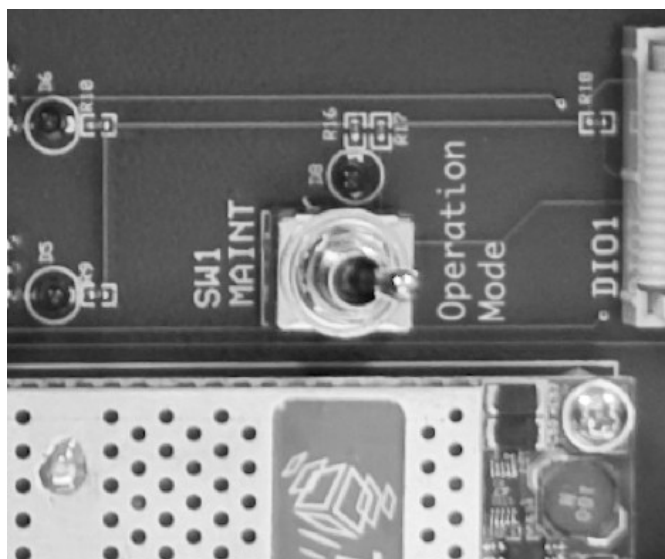


16. Set the toggle switch to MAINT. Power up the system by connecting the battery connector to the BATT terminal on the green circuit board.



You should now see a red LED near the toggle switch indicating the ZAP unit is in maintenance mode.

17. Move the toggle switch to "OPERATION" mode. (Red light just above toggle will go out when in "operation" mode)



When the ZAP is set to OPERATION mode, it will attempt to connect through the network. This may take up to 4 minutes. When it successfully connects it will beep three times and turn on the green led light on the red SBC card.

If a red light comes on (no green light), please contact Boltage for troubleshooting help.

18. After your ZAP is set to "OPERATION" mode, it is ready to start scanning tags. If you leave the cover of the ZAP open the unit will continuously signal the scanning of a single tag. The cover should only be open while "fine tuning" the antenna. At this point, when a tag moves through the ZAP's "scan area" the ZAP will beep and the green light on the outside of the enclosure will light up. The default position for the RFID antenna is straight down towards the ground. You may need to adjust the RFID antenna position slightly for optimal performance. Given the dynamic nature of RFID technology there no way to completely control the scan area and don't be surprised if it seems to "move around" as the active scan area is influenced by all nearby objects. In very general terms the scan area can be described as a cone with the point at the bottom tip of the antenna and the open end drawing a half-ish circle on the ground (with the metal pole blocking the other half).

This is mostly a trial and error process. Start with the antenna pointed straight down on the side of the pole the kids will pass by. This should result in a scan area that extends about 10' from the pole. To create a larger scan area, you can point the tip of the antenna out away from the pole in the direction of your desired area. With the cover to the ZAP enclosure open and a ZapTag attached to a backpack someone should walk past the ZAP like a kid would. The ZAP should beep and the light will flash. When you are not in the desired scan area the ZAP should be quiet. Adjust the direction the antenna points to adjust the scan area.

* Please note that there must be a direct line of sight between the antenna and the tag. The kids will learn this with practice.

19. After you have the RFID antenna adjusted, close and lock the ZAP enclosure. This will put the ZAP in its day-to-day operating mode - it will read tags, but will only beep once every 15 minutes for a given tag. NOTE: the toggle switch should be in "OPERATION" mode. Make sure the RFID antenna is securely bolted to the pole.

20. At this point you can perform an end-to-end system test. Scan a few tags at the ZAP. If the system is operating properly the tags will be reported to www.Boltage.org within 15 minutes. You should see the number increase by the number of scanned tags next to your school name at <http://www.boltage.org/results.html> The server will only count a tag once per day regardless of the number of times scanned.

LED INDICATORS ON SOLAR CONTROLLER

The ZAP solar panel is pre-assembled with a fully automatic solar charge controller that includes many electronic functions to protect both the controller and the system. Refer to the table below for a description of LED indicators.

Green LED (blinks 3 times): Indicates correct installation. Displayed at installation start up (when solar or battery power is first applied).
Green LED (ON): Bulk charging stage. Solar power is available and the battery is being charged. A single blink of the green LED every 5 seconds indicates that the SunKeeper is still operational.
Green LED (fast blinking): Regulation / Float stage. The battery has charged to Regulation voltage, solar power is being limited to prevent over-charge. When the battery is fully charged at Regulation voltage, the SunKeeper will transition to Float stage and the green LED will continue blinking.
No LED (OFF): Night condition. No solar power is available for charging. The SunKeeper is in sleep mode until solar power becomes available. A single blink of the green LED every 5 seconds indicates that the SunKeeper is still powered and operational.
Red (blinking) LED: System installation error and/or operation fault.
Red (ON) LED: Critical fault.