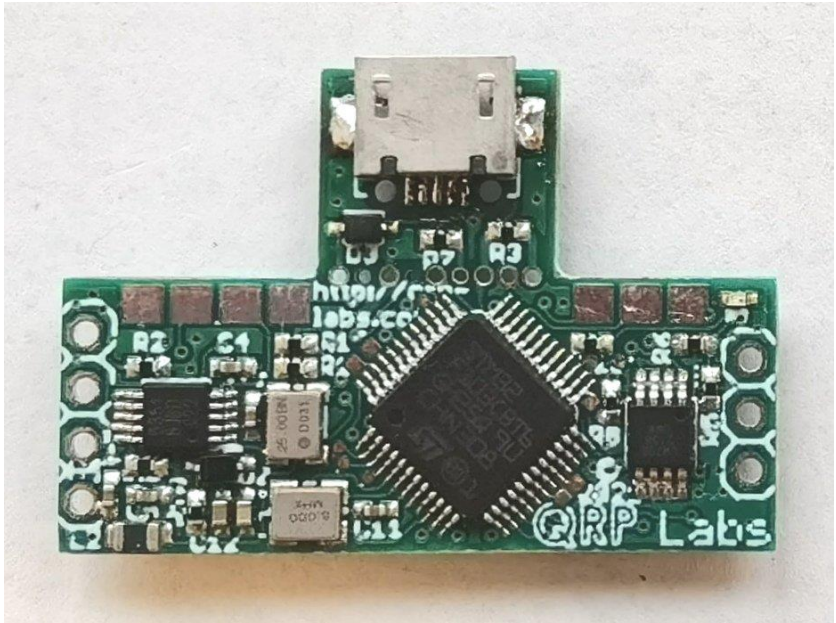
TALARC Balloon Construction

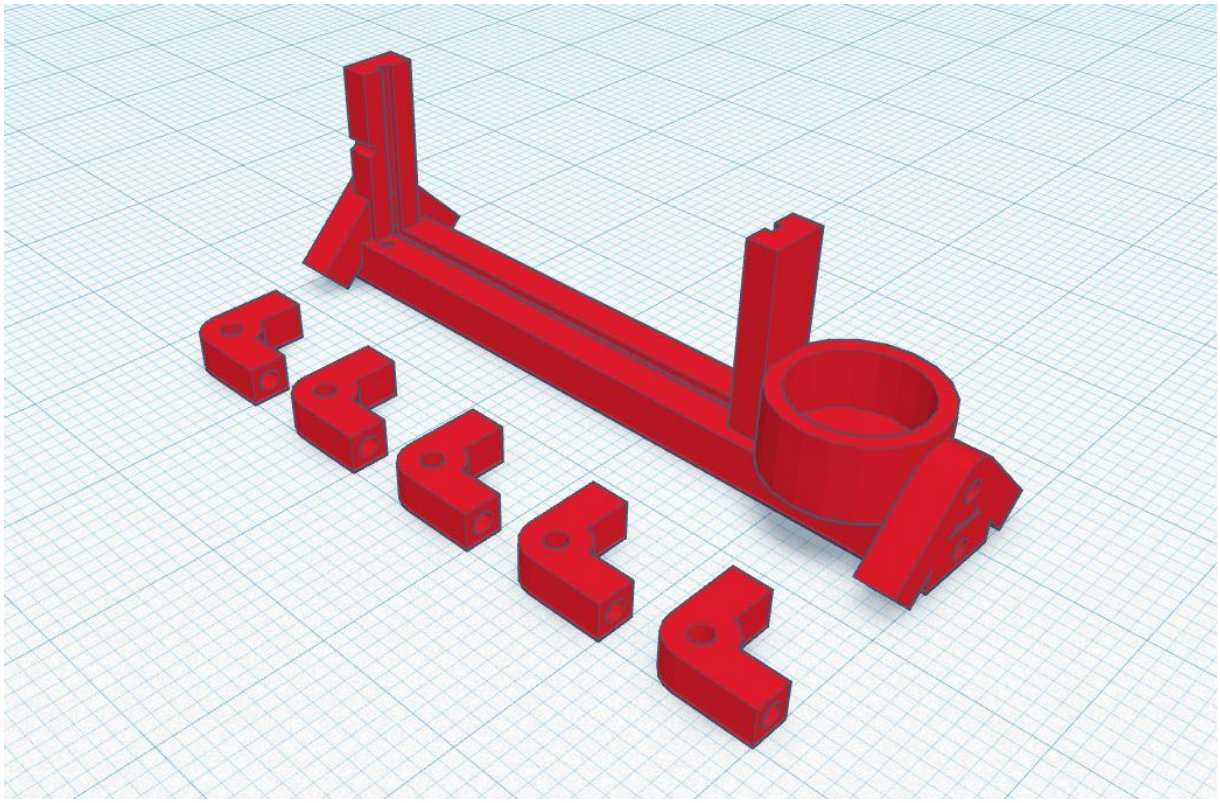
- Yokohama balloon - The balloon needs to be stretched (starts at a circumference of ~95"), so we slowly pressure fill (<0.6 psi) it up to about 103-107" in circumference using an aquarium air pump and pressure meter. Our balloon was stretched to about 104"

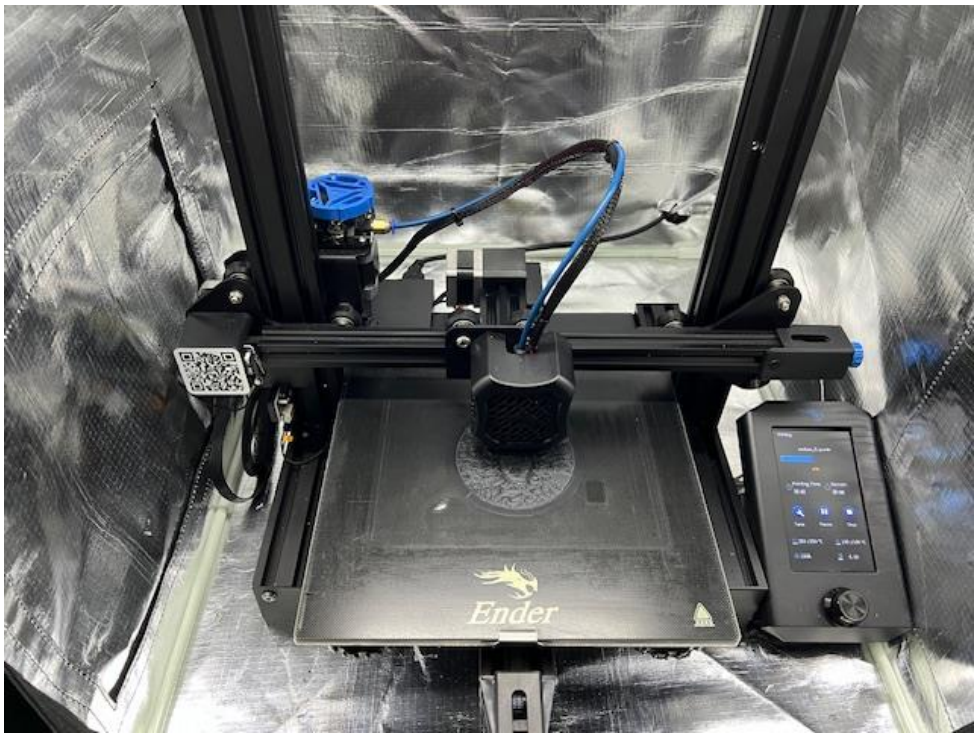
- QRP-Labs U4B – Electronics product description page with links to other technical documents.



- Solar Panels - There are lots of different sizes, power, voltage and currents available. You pick the one that works best for your project. We picked a small, efficient and light one from Digi Key, the AnySolar Ltd SM141K07TF.

- Frame - Component parts were designed using Tinkercad and 3D printed using a Creality Ender 3 v2. The components were connected using 1mm carbon fiber rods and tiny drops of super glue.



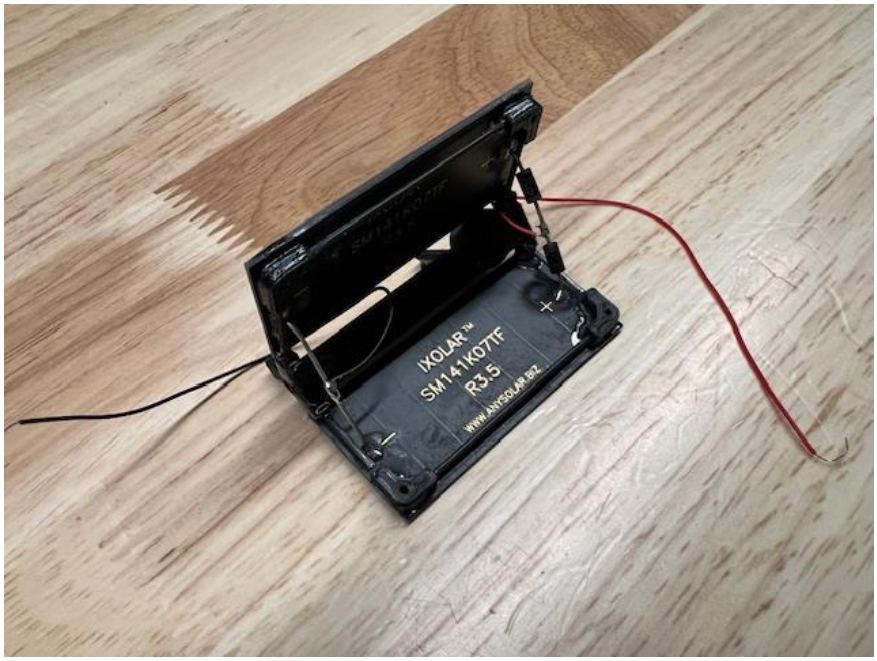


- Supercapacitor - I selected a 40 Farad 4.0 Volt capacitor from China. Having one of these stabilizes the voltage/current supplied to the U4B. A 3.9 Volt 0.5 watt Zener diode is added across the capacitor to act as a shunt regulator to keep it within voltage limits.

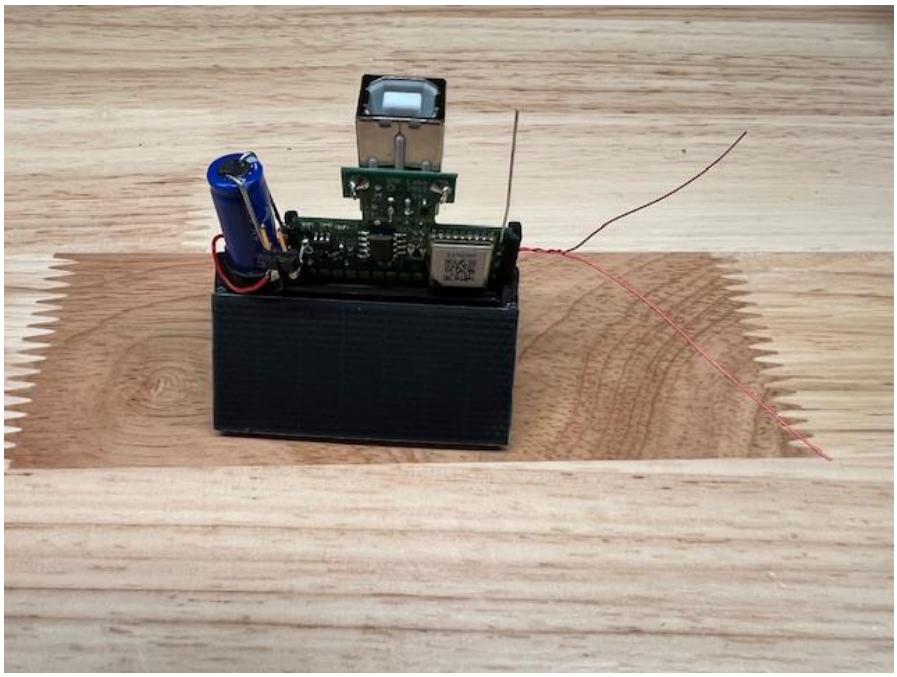
- Two 34 gauge copper wires are each cut to 8’ 4” in length, which are used for construction of the HF 10m (28.126 MHz) dipole antenna on this balloon. Fishing line is used to support one leg the copper wire going up to the balloon for connection of the payload (some builders say you don't need the fishing line).

- Construction of the payload from components begins.

A US Quarter has been added to the photo for scale.



The solar panels are mounted on ABS plastic and carbon fiber rod frame with super glue. The Schottky blocking diodes are added to the positive side of the solar panels and a straight connection is made on the negative side. Fine gauge insulated wires are added to the positive and negative side of the panels for connection to the supercapacitor, Zener diode and circuit board on the topside of the payload frame.



The completed payload is shown above. The GPS antenna is the copper wires on the right. The short wire sticking up on the right is the connection point for one leg of the HF dipole antenna. The other leg is out of view under the solar panels. A jumper has been added to select flight mode. The USB connector with circuit board is broken off just before flight.

- A test the payload is made to make sure everything is working properly before launch.
- Determine final mass of the payload, which in this case was about 13 grams; float mass, which was about 7 grams; volume of balloon, which was about 0.305 M^2; type of lifting gas, which was Hydrogen; etc. After plugging all information into the spreadsheet, the estimated altitude the balloon should achieve will be calculated. In this case the prediction was 46,000', which was spot on. After launch, balloon's final altitude is fluctuating 44,000 – 47,000'.