

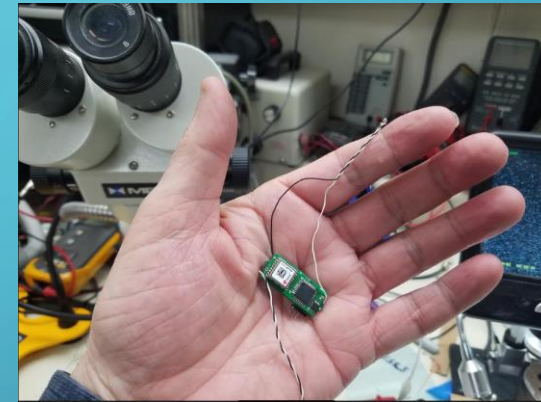
A decorative graphic on the left side of the slide consisting of white and light blue lines that resemble a circuit board or a stylized tree. The lines are vertical and horizontal, with small circles at the ends, creating a complex, branching pattern.

WTFN PICO BALLOON LAUNCH

PROPOSAL FOR A LAUNCH OF A PICO BALLOON

WHAT IS A PICO BALLOON

- A small party balloon filled with lifting gas
- Carries a small tracking device/controller board
 - Radio transmitter
 - GPS
 - Software to determine location and send controlling signals
 - Shut off transmitter when automatic operation is prohibited by government (fencing)
- Solar panels for power during the day
- Sanctioned by the FAA so is legal to construct, launch, and track. Most countries automatic transmission is legal.



PICO BALLOON LAUNCH – HAVING FUN





WHY SO MUCH INTEREST

- Simple construction and launching.
 - No complex construction, or costs.
- Meets the imagination of the amateur to travel the globe and DX operations
 - Most amateurs are also space enthusiasts.
- The unpredictable nature of the flight
 - Once the balloon is launched the flight path is up to the winds and nature.
- Confirming and recovery of the balloon in foreign territory
 - The HW may not come back, but the recovery with pictures are treasures.
- Building of unique radio transmitters and flight telemetry.
 - It is possible to apply your own skills to build transmitters and tracking controllers yourself. Imagination is your only limitation.

ROBUST NUMBER OF LAUNCHES AROUND WORLD

- Wide spread projects throughout the year
 - 366 repositories on GITHUB “high altitude balloon” HW and SW.
- Upwards of 1,000 or more launches every year by amateurs around the world.
- Great learning experience for everyone involved.
- Organized “Super Launches” held through out the country.
- Perfect activity to launch at a hamfest or another amateur event.
- Very active and engaging part of the hobby and is only 35 years old. Pico balloons the last 25 years.

NEW U4B TRACKER FLIGHT – STILL IN PROGRESS



BALLOON FLIGHTS CAN BE MANY HOURS OF FUN

- Can track flight directly from your QTH up to over 2,000 km.
- Due to the distance likely to be able to track each pass around the planet from QTH.
- May also track flight on web pages when out of range.
- Some flights have lasted as long as 3 months.
- Winter is one of the best times to launch but launch can occur anytime of the year.

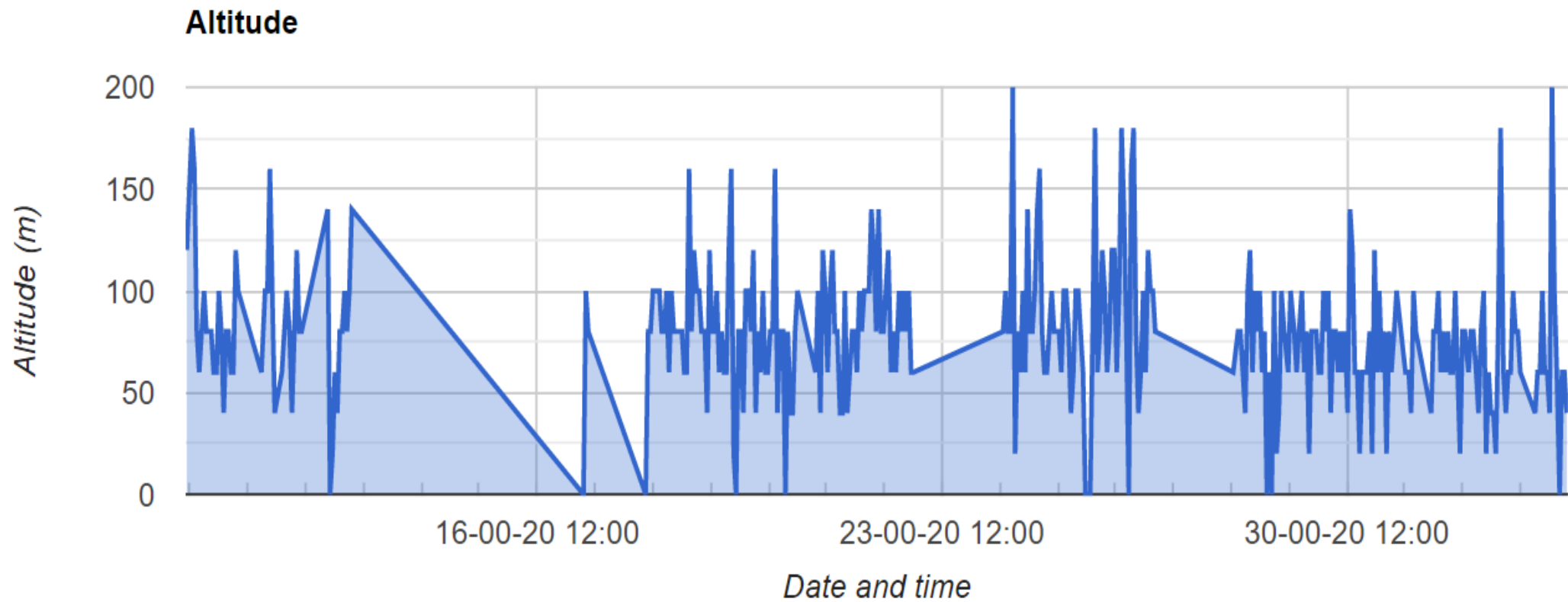
NORMALLY A TEAM EFFORT

- Someone does the final testing on the ground and assembly at their QTH or lab.
- Likely purchase controller board and of course the controller board must be programmed.
- Normally controller board is positioned at a ground location where many individuals may test their receive station.
 - Confirm they can track the balloon. It is not unreasonable to expect the ability to track the balloon all the way to Europe direct.
- 1 or 2 individuals on launch day to fill, and release the balloon.
- Tracking station at launch site to monitor first hour or so of launch. Ensure safe take off and ascend.
- Project management to coordinate all of team effort
- No down range coordination required.
- This is an ideal club project to involve members in the winter where outside work is limited.

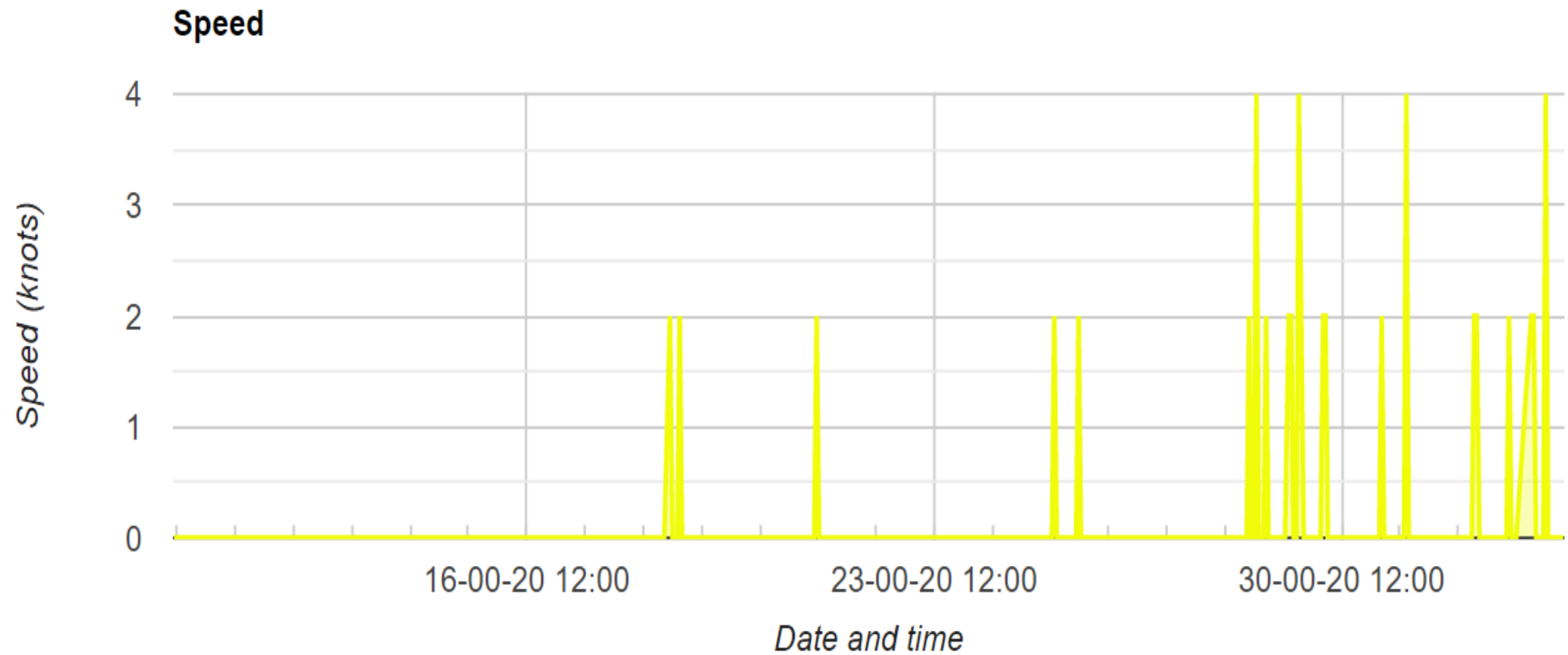
WHAT CAN A FLIGHT DO

- Measure and track
 - Altitude of the balloon
 - Flight speed of the balloon
 - Atmospheric temperature at the balloon altitude
 - Track and report location of the balloon
 - Voltage on the controller board
- Report information via CW message, and WSPR (extended) protocol.

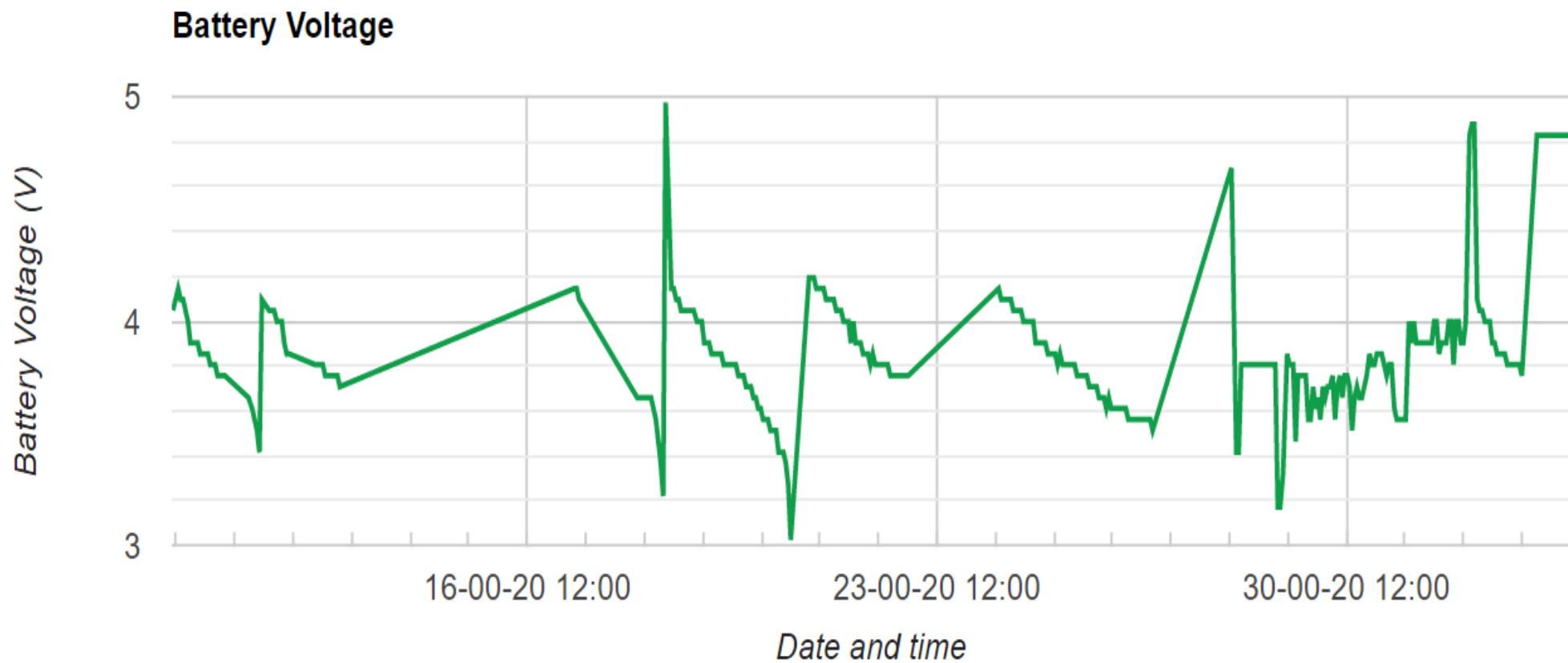
ALTITUDE TRACKING



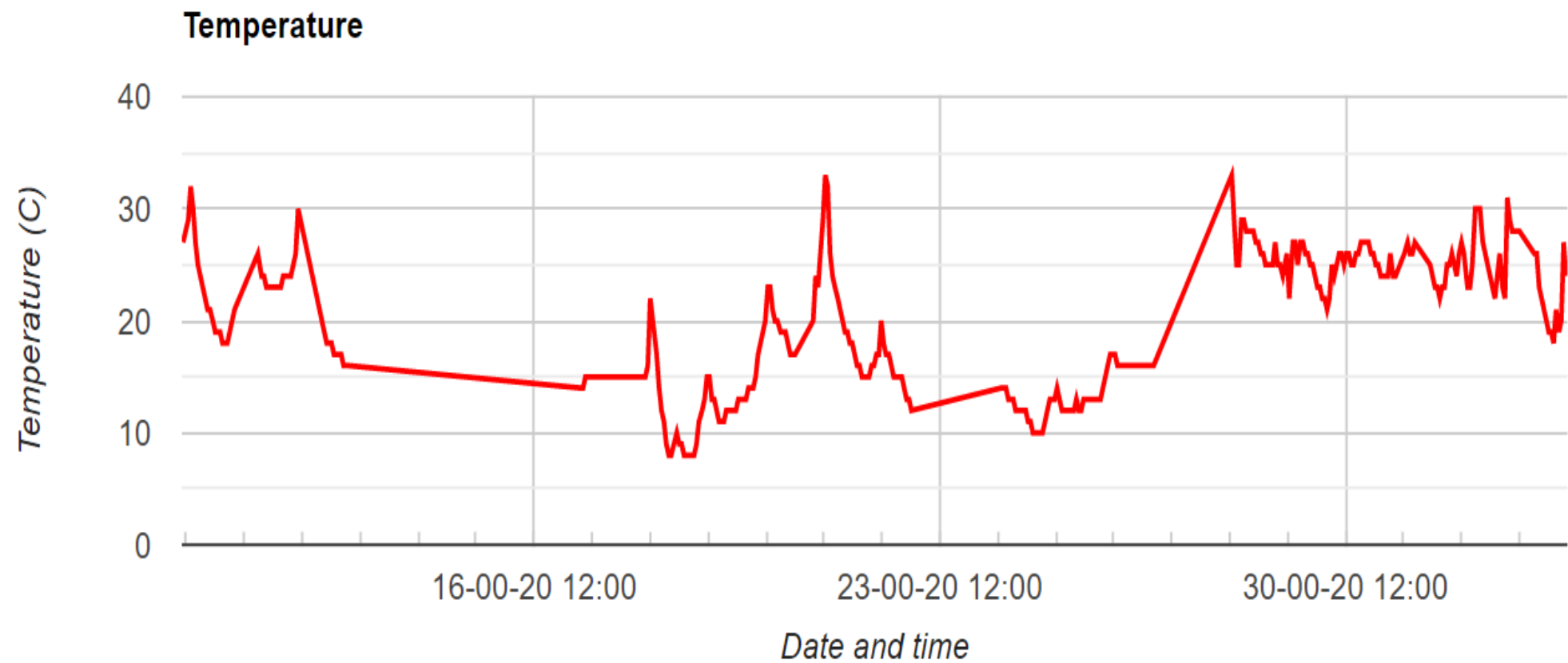
BALLOON SPEED



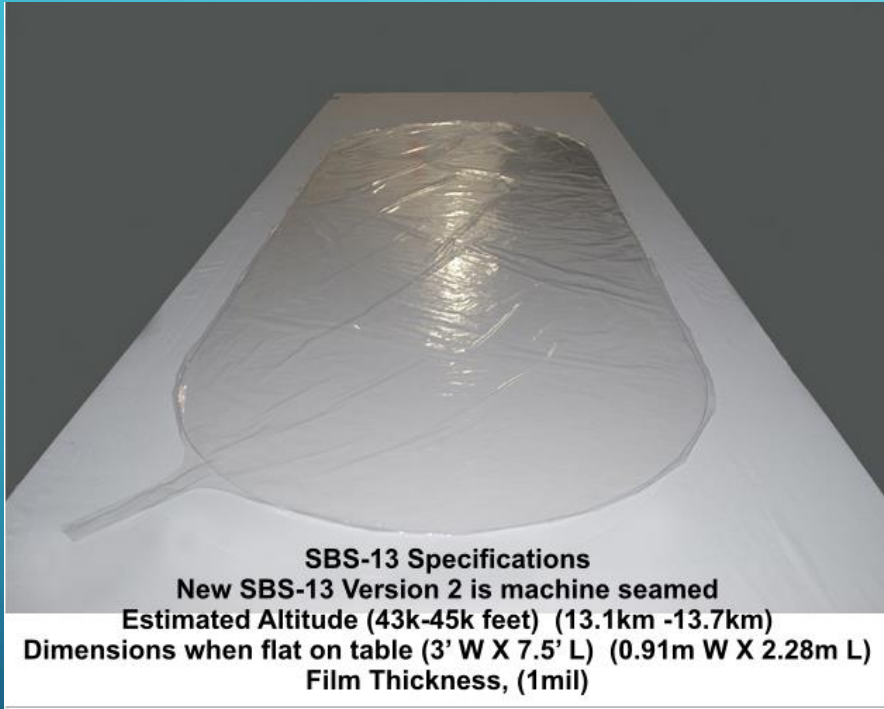
CONTROLLER BATTERY VOLTAGE



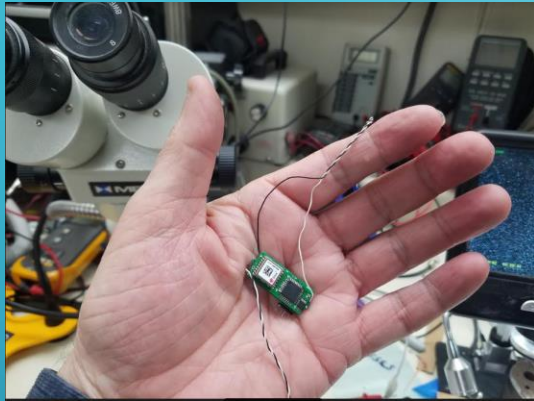
ATMOSPHERIC TEMPERATURE



BALLOONS



TRACKING TRANSMITTER



U4B QRP Labs

1

U4B runs a modified WSPR to support all the data which can be sent.

2

U4B is the newest controller soon to come out and most capable controller to date. Costs \$50, reasonable to lose, programs in BASIC.

3

U4B supports altitude, Long/Lat, Speed, Temperature.

4

U4B will support sending CW.

5

U4B supports multiple I/O pins, and I2C interface. Pins also each have A/D so can make digital measurement; not limited to analog only.

6

The manufacturer has made one of the last test flights which has circumnavigated the planet 6 times in a one month flight recently.

LIFTING GAS



- Hydrogen or Helium. Higher altitudes with hydrogen
- Only small quantities required.
- Members have access to suppliers

MISCELLANEOUS

- Antenna wire – antenna must be constructed
- Lifting wire connected to the balloon
- Labeling on board – contact information and finder reward
- Web site changes or Project X, Tracking, and Finder Reward
- Geo fence must be defined and programmed into controller.

Item	Budget
Control Board U4B	\$ 50.00
Lifting Gas	\$ 30.00
Balloon	\$ 15.00
String	\$ 5.00
Antenna Wire	\$ 5.00
SOLAR Panels	\$ 30.00
Finder Reward	
Donuts at launch	\$ 15.00
Coffee at launch	\$ 15.00
Total	\$165.00

PROPOSED BUDGET

BALLOON LAUNCH

- Can launch from any open space
 - Parks, elementary schools, large parking lots, parking garage roof, etc.
- Very simple down range tracking. No recovery team.
- Need WSPR receiving station at launch site with computer
- Balloon fill and transport

LIST OF TO DO'S

- Club approval
- Securing a launch site
- Placing orders
- Programming controller and testing
- Testing solar performance
- Assembly of the balloon vehicle

POSSIBILITIES

- Launch one balloon each
 - APRS
 - WSPR
- Add magnetometer board to the controller to sense earth's magnetic field.
- Add small light weight battery for extended operation at night – few hours
- Isotope sensor to measure upper atmosphere charge.
- Add camera and storage to record flight for viewing
- Add sensor to record Xray and radiation exposure



Let's join and have an adventure