Miniature Telemetry Transmitter for Long Duration Super Pressure Balloon Flight

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A low cost miniature transmitter was constructed and flown on a .91 m diameter mylar balloon in order to determine the relationship between the free lift and the float altitude. The single board device incorporated a micro-controller, GPS, 100mW transmitter, and a temperature/pressure sensor with a mass of only 4 grams. For this work, a total of six flights were made. All of the balloons achieved neutral buoyancy and were tracked using the Automatic Packet Reporting System (APRS) on the 2 meter band. Two of the balloons were able to send data for about 50 hours and traveled more than 4000 km before contact was lost. It was found that all of the balloons had float altitudes between 7500 and 8000 meters. The actual float altitude can vary by about 1000 meters in regions of rising and sinking air currents. Mechanical improvements were made to ensure that catastrophic failure does not cause early termination of the flight. Improvements were also made to the low pass filter on the transmitter output. Lastly, thermal protection was added to keep the components from failing due to low temperatures. Future work will include an attempt to circumnavigate the Earth with a single party balloon.

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