(CAB) Controllable Altitude Balloon

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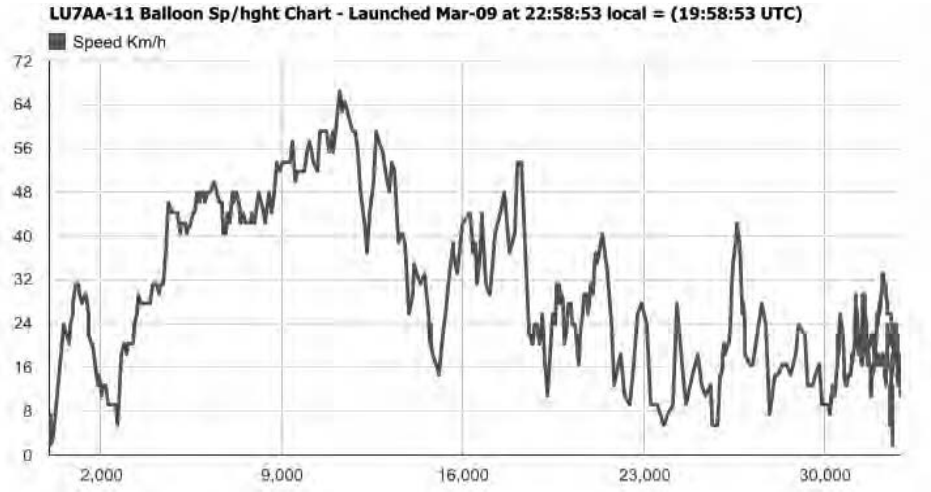
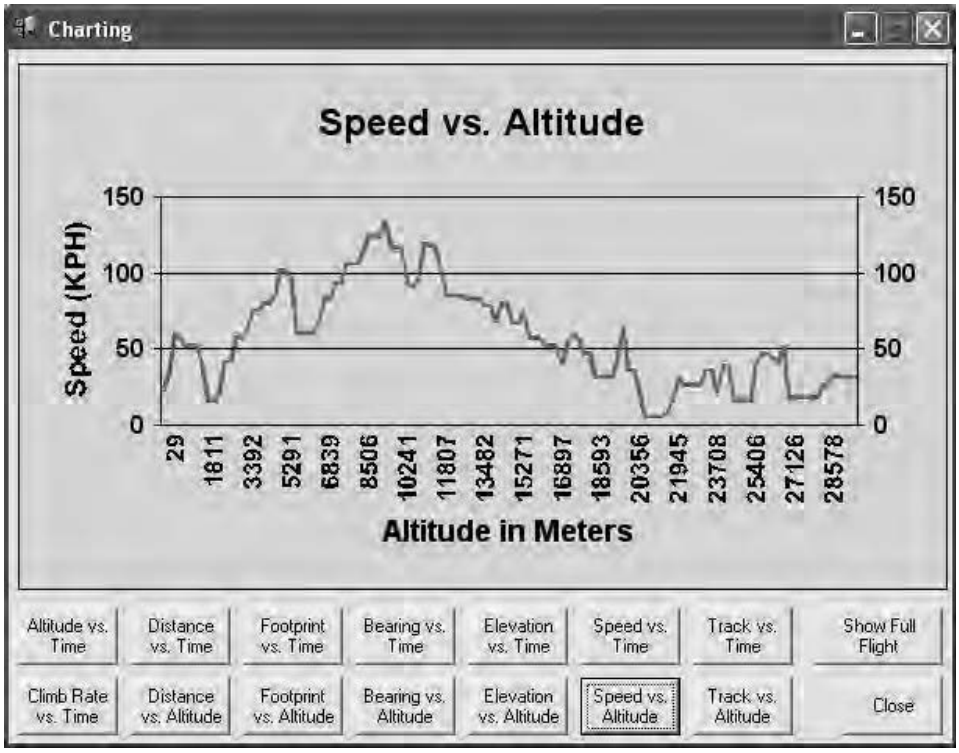
At various balloon launch's by Amsat-LU we found that in the range between 20,000 and 24,000 meters, wind speed diminish considerably and in some cases have no wind. (Same is mostly elsewhere as studied)

Additionally in this low winds band, they vary greatly in direction, not following the flight rule indicating that winds blow from around 270 degrees direction (driving balloon to the east). Following chart made through http://lu7aa.org.ar/vore.asp shows wind speed according to height on March 23-2013 'Betty' balloon which shows that the wind speed drops below 6 Km / h at stated range of 20,000 to 24,000 m.



Same is shown by Balloon Track using several days' winds



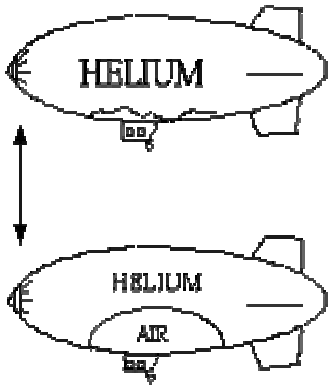
Consequently if we can control the flying height on our balloon, we could maintain height and even steer the balloon in the desired direction, knowing the direction of winds at different heights as well as to perform descent or ascent at will.

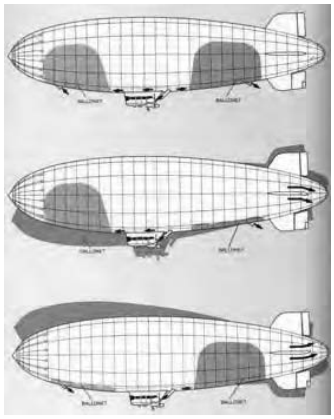
Now, how we can control height?. One way would be to release helium to drag down and throw ballasts to make it up. But this way we would be running out of resources.

Submarines do this up and down through a chamber between the outer hull and internal structure, chamber which if filled with water will make it to descend or filling with air to rise.

In the air or atmosphere, same can be done, in which external air can be used as ballast to raise or lower balloon, providing we have an internal air chamber inside outer balloon.

This inner balloon system is known as 'ballonet', method used in balloons during first and second world wars, including blimps as the Graf Zeppelin and Hindenburg.





Ballonette (French term): One of several small auxiliary gasbags placed inside a balloon or a non rigid airship that can be inflated or deflated during flight to control and maintain shape and buoyancy

Now, if we can place a ballonet inside our balloon how can be possibly control it?

One way will be to have some mechanism (pump or valve of low weight) capable of being handled by remote commands to place or relief air from the ballonet.

http://www.cnylktech.com/en/q_admin/z_upload/201009041935.pdf

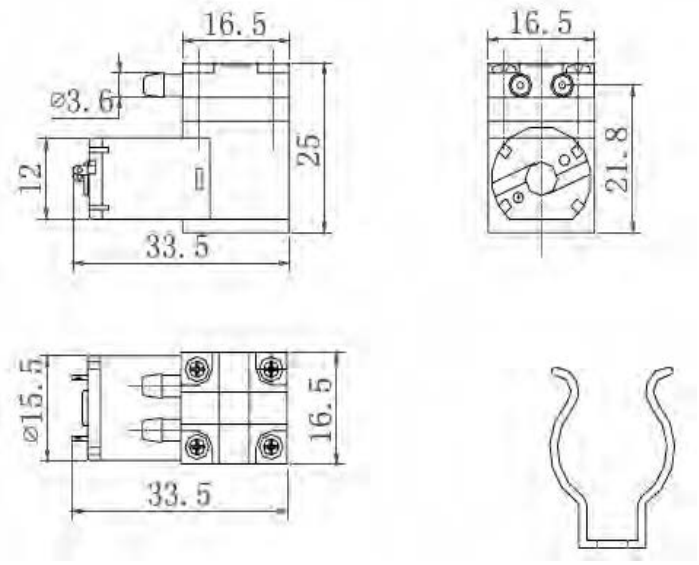
DA20SDC

技术参数 Technical Data

额定电压 Rated voltage	DC5V	DC12V
额定电流 Rated current	110mA	60mA
使用电压范围 Operating voltage range	DC3-5V	DC6-12V
空载流量 Free flowing	600mL/M	600mL/M
最大压力 Max. pressure	50KPa	50KPa
最大真空度 Max. vacuum	-40Kpa	-40KPa
使用温度 Ambient temperature	0-40 °C	0-40 °C
重量 Weight	18g	18g

These cheap 18 grams diaphragm pumps operate from 3-5 volts DC at 110 mA, and handle 0.7 liters per minute of air. Remains to be known if they operate at -50 C and at 50 mils pressure, conditions at 20,000 m
With two of these remotely controlled valves could breathe (1) or extract (2) air from the ballonet.
These pumps are commonly used for home blood pressure monitors to inflate/handle arm pressure sensor

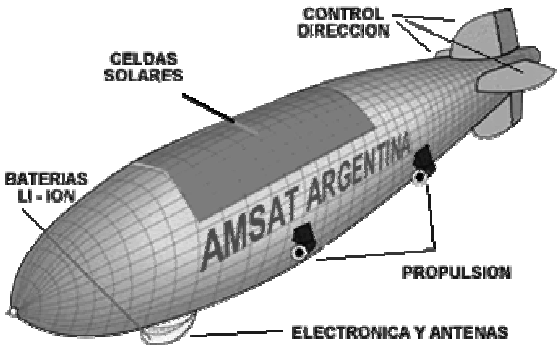
Remains to be solved how to build a mechanism or support to install these pumps on the balloon neck, and connect them thru a small and sturdy coax (as RG-316) to the lower electronic box to avoid turning and messing of the cable. The two pumps can be driven by positive voltage (to pump in) or negative (to pump out) air from the ballonet. Balloon will be initially launched with internal ballonet deflated.

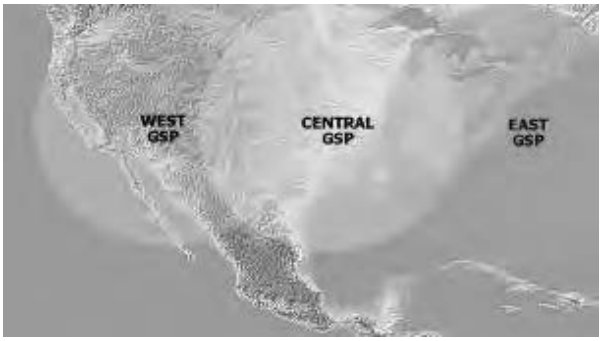


Well, this is just a proposal or idea, much remains to shape it and evaluate whether it is worthwhile and eventually devise a plan to perform some experiments.

But ultimately if possible opens an interesting scenario, in which we could control the balloon, make it last as long as we want, and possibly drawing a graph on the rise phase to tabulate direction and wind speed thus allowing us to navigate to different heights according to desired direction, therefore allowing to make balloon act as a geostationary platform. It is interesting to note that flight regulations are not prohibiting flights at above 20,000 meters.

We know that the over 300 users of 'Betty' long duration flight (12 hours) enjoyed the long duration of the experience, that's what attracts people, and why not think of using results for a future **G**eostationary **S**tratospheric **P**latform. (Kind of a local 'satellite' for those of us who do not have the $ needed to put a satellite in orbit). At 24 Km height coverage is quite wide.
So stage two of this proposal could be to plan something as the dream idea that follows:





Furthermore several of these can be placed 1000 miles apart each other to inter communicate between them thus covering a more wide area and even a whole state or country.