HIGH ALTITUDE BALLOON FLIGHT

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HIGH ALTITUDE BALLOON FLIGHT (HAB)

- Introduction to EARS
- Flight preparations
- Launch day
- Aftermath
WHO ARE EARS?

- Electronics and Amateur Radio Society at the University of Surrey
- Established ?? - earliest date found so far is 1963
- Predates the University - goes back to Battersea Technical College
WHY THE BALLOON?

- EARS charity event
- Test-flying hardware in support of VR2Space
- Experiment with ballooning as an outreach platform
HAB FLIGHT BASICS

- Balloon filled with lifting gas
- As it rises in altitude, outside air pressure drops and balloon expands
- At apogee, balloon cannot stretch any more and bursts
- As the payload starts to fall, parachute inflates
- Parachute fully inflated soon after apogee, but is ineffective until lower altitudes due to lack of air density
PAYLOAD HOUSING

- Payload housed on cardboard shelving system contained within a thick-walled polystyrene box
- Polystyrene provides both thermal insulation, and shock protection on landing
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PAYLOAD ELECTRONICS

- DIY Flight Computer (breadboard Arduino microcontroller, uBLOX MAX-7 GPS receiver, Radiometrix NTX2 434mHz transmitter and SD card logging)
- Sensors (air pressure, interior and exterior temperature)
- Cameras (GoPro pointed horizontally and smartphone pointed downwards)
- SpotGen3 satellite GPS tracker

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DATA TELEMETRY

- Flight computer transmits a telemetry string every 30s
- Transmitted using 50 baud RTTY on 434.650mHz licence-free frequency
- Telemetry string contains GPS lat/long, GPS altitude, temperature and pressure sensor readings
GROUND SETUP

- Chase car used Kenwood TS-790E (bottom) as primary receiver
- Ancient Icom (top) as a backup
- Audio out from Kenwood went into laptop running dl-fldigi
- dl-fldigi automatically decodes RTTY, parses telemetry data, and uploads to online tracking webpage via 3g connection
LAUNCH DAY

- Two chase cars
- Trip from Guildford, Surrey to Elsworth, Cambridgeshire
- Launch preparations and launch
- Balloon chase
DATA RETRIEVED
MEDIA AND FUNDRAISING

- High resolution images and flight video released
- Press release
- BBC Cambridgeshire interview and The Surrey Advertiser front page
- eBay fundraiser
STEVIE STAG SOLD FOR £205

Donated to Mind, the mental health charity
HOW YOU CAN GET INVOLVED

- Balloon tracking by connecting station to spacenear.us through dl-fldigi
- Effective and affordable station through RTL dongle
- Build your own balloon
PROJECT FUTURE/OUTREACH

- Construct an improved flight computer
- Fly outreach events with school children
- Fly regular missions for testing scientific payloads
USEFUL RESOURCES

- EARS Wiki Space - http://wiki.surreyears.co.uk
- UK High Altitude Society - http://ukhas.org.uk/
- Space Near Us Tracker - http://spacenear.us/tracker
- Steve Randall (Supplies) - http://randomengineering.co.uk/
“I see Earth! It is so beautiful.”

–Yuri Gagarin