High-altitude ballooning summer 2013 workshop – Materials List

Basic materials for building payload shells possible supplier

* 1” thick (pink) Styrofoam sheet Home Depot
* OR 1/8” thick foamcore (AKA foam board) sheet Michaels
* PLUS ½” thick (black) polyurethane foam sheet McMaster-Carr
* Mason line Home Depot
* Plastic tubing (for plumbing refrigerator ice-makers) Home Depot
* Key rings Michaels
* Strapping tape (for holding payload together) Ax-Man Surplus
* AND/OR epoxy (but avoid hot glue – too brittle when cold) Home Depot
* (Black) duct tape (for thermal absorption) Home Depot
* Electrical tape Home Depot
* Zip ties (purchase indoor/outdoor ones – stronger) Home Depot

Parachute

* 8-ft diameter for a full 12-lb payload (smaller for lighter ones) Rocketman Enterprises

Siren

* 102 dB Piezo siren (model: 273-079) Radio Shack

Cameras to consider

* Canon PowerShot A570 IS (programmable) (no longer produced) buy used, e.g. E-Bay
* Flip video (get 2-hour recording time but some only do 1 hour takes) buy used, e.g. Amazon
* Contour helmetcam with GPS found ours at REI
* GoPro video camera (very wide angle lens, other lenses sold sep.) REI or on-line

Heater circuit (soldered-together version)

* 5-Ohm ceramic resistors Digikey
* Rocker switch Ax-Man Surplus
* 9-volt battery snaps (also need for Arduinos below, heavy duty ones) Radio Shack
* Perf board Radio Shack

HOBO data loggers and sensors (requires data cables and HOBOware software)

* U12-013 HOBO temp/RH/2 ext channel data logger Onset Computers
* TMC1-HD Air/Water/Soil temp sensor (1’ cable) Onset Computers
* 2.5-STEREO (raw) Voltage Input Cable Onset Computers
* UA-004-64 HOBO Pendant G Data Logger Onset Computers
* SP1.5-50-3 solar panel (stay below 2.5 volts for use with HOBOs) Plastecs Solar

Cosmic radiation (needs to be attached to a microcontroller, not a HOBO)

* RM-60 Geiger Counter Aware Electronics

Arduino stacks (use lithium batteries when you can – pricey, but better at low temperatures)

* Arduino Uno microcontroller DEV-11021 Sparkfun
* Arduino Mega microcontroller DEV-11061 Sparkfun
* 9V to barrel jack adapter PRT-09518 Sparkfun
* Protoshield kit DEV-07914 Sparkfun
* “Tiny” breadboard (part 64) Adafruit
* SD card shield DEV-09082 Sparkfun
* Real Time Clock Breakout board BOB-00099: DS1307 Sparkfun
* SD Shield with Real Time Clock Adafruit
* TruStability Silicon Absolute Pressure Sensor SSC Series 480-3600-ND Digikey
* Analog Humidity Sensor: HIH-4030, SEN-09569 Sparkfun
* Analog 3-axis Accelerometer: MMA7361, SEN-09652 Sparkfun
* Analog Temperature Sensor: TMP36, SEN-10988 Sparkfun
* Digital 3-axis accelerometer: ADXL345, SEN-09836 Sparkfun
* Digital Temperature Sensor: DS18B20, SEN-00245 Sparkfun
* Triple Axis Magnetometer: MicroMag, MAG3110, SEN-10619 Sparkfun
* Ultimate GPS Breakout (part 746) Adafruit
* GPS antenna (optional) (part 960) Adafruit
* SMA to UFL Adapter Cable (if you buy a sep. antenna) (part 851) Adafruit
* Also need to purchase SD (or micro-SD) cards for data storage

Aprs flight radios we use

* 2 meter BeeLine GPS (high-power version, mobile configuration) Big Red Bee
* RTrak-HAB with analog data channel telemetry (currently unavailable) RPC Electronics
* TU-401 unit (but he doesn’t like to sell these separately) StratoStar

Aprs ground tracking

* Will need ham radios plus a TNC (in radio or bought separately), our best (in-car) radio with a built-in TNC is a Kenwood D710 Radio City
* Will want a car-top magnetic mount antennas (watch adapter cable) Radio City
* Will need software – we use “AprsPoint” plus “MapPoint” libraries online

900 MHz system with zigbee radios and data telemetry

* StratoSAT (Elite, Standard, or Basic) system (need to call for a quote) StratoStar
* (Zigbee) Interface Module – might want extras incl. Geiger compatible StratoStar
* Sensor suite (also pricey, but goes well with the Interface Modules) StratoStar

PocketFinder tracker (cell-phone technology)

* Note – this is useful as a “finder” but not really a full-flight tracker

because it won’t maintain its GPS lock and/or it cell tower contact

above about 30,000 ft. Regains contact on descent (usually). Tells

you where it has landed only if it has cell phone coverage there. PocketFinder

Balloons

* We fly 600-gram, 1200-gram, and 1500-gram balloon, usually Kaymont
* The “new kid” on the block is Howee – good quality but more expensive not sure vendor

Helium

* We get helium through Minneapolis Oxygen company – expect to go through about one 580 CGA (size k) tank per 1000-gram of balloon to achieve about 1000 ft/min ascent rate.