



# Bearcat Experiment Procedure

## Balloon Fest, 2004

Date: Saturday, April 3, 2004

We will launch a tethered meteorological balloon to 1000 ft elevation at the Tobin James Cellars, Paso Robles, CA as part of the Balloon Fest, 2004.

**Purpose:** to measure barometric pressure, relative altitude, & temperature. We hope to see if they change uniformly with altitude. We plan to specifically see if these reading have drifted from launch to recovery and then to look for patterns in the readings as compared to barometric pressure.

**Equipment:** Balloon, helium, gondola with instrumentation, stopwatch, 1000ft of nylon cord, bright orange ribbon flags.

**Payload:** Laptop computer with LabPro software, LabPro DAQ with barometer & thermometer sensors, Laser Rangefinder, & inclinometer.

**Weight:** ~1500 g

### LabPro Remote Data Setup:

1. Connect sensors to LabPro and LabPro to computer (USB).
2. Verify fresh batteries in LabPro
3. Start Logger Pro software and open saved experiment file
4. Verify that "Interface is connected"
5. Open Experiment menu, select Show Sensors:  
Ch1 =barometer (kPa), Ch2 = Surface Temp probe (°C)
6. Open Experiment menu, select Data Collection:  
Mode = Time-based, sample at time zero  
75 minutes, 60 samples/minute, oversampling (100x), samples= 4500
7. Open Experiment menu, select Remote Setup:  
Review Settings  
Select OK  
Verify that the yellow LED on LabPro is turned ON and stays on
8. Disconnect the USB cable from the LabPro. Logger Pro and the Laptop computer may be shutdown if desired.



## Flight Procedure:

1. Fill balloon with helium until it will lift at least 500 g more than the weight of the fully loaded gondola.
2. Securely tie balloon closed and attached to metal ring. Attach all rigging including the gondola, directly to the ring.
3. Start the written log. Measure and record the wind speed. As the flight continues, note all start and stop times as well as any comments or observations about the wind speed & direction or the balloon and gondola's behavior.
4. When ready to launch, Verify that the yellow LED on the LabPro is still ON.
5. Press the Start/Stop button on the LabPro ONCE and start the stopwatch and the same time.
6. Verify that the LabPro beeps once, the yellow LED goes OFF and the green LED flashes once every sample interval. If not, then reconnect to the computer and setup again.
7. Launch balloon and let it rise smoothly about 100 ft or 30 m. This first 100 ft should take about 2 minutes.
8. Stop, tie a bright ribbon flag around the line and hold at this altitude about 3 minutes.
9. Since, the balloon is low enough to still make out people and the camera is taking pictures every 30 seconds this is a perfect time to be sure we get some good pictures of our group and launch site.
10. Continue but faster: rise 100 ft (1 minute), tie a ribbon & hold altitude (1 minute) until all 1000ft of line is out. Record all actual times for any stops and starts.
11. Hold at top for 5 minutes.
12. Start smoothly bringing it down. This should take about 5 minutes.

## LabPro Remote Data Recovery:

1. Verify that the green light is still flashing on the LabPro every sample interval.
2. Press the Start/stop button to stop the collecting of data. The LabPro should beep once and all lights go out.
3. Restart Logger Pro and the Laptop computer if needed.
4. Reconnect the LabPro (USB) to the computer and verify that the "Interface is connected"



5. "Remote Data Available" window opens:  
Select "Yes"
6. "Retrieve Remote Data" window opens:  
Select "Into current file" & "Make data available for mutiple retrieval",  
"OK"
7. Once data is verified and saved:  
Open Experiment menu  
Select Reconnect Interface
8. "Remote Data Available" window opens:  
Select "NO" to erase data on LabPro

## Data Analysis Procedure:

1. Repeat the above three procedures as needed to get good data. Save each set even if not complete.
2. When all Flight tests are done:  
Be sure all data sets are saved and labeled.
3. Analyze the data in the Logger Pro program
  - a. Add a new calculated column named "Altitude"
  - b. Formula  $C * ("Barometer" - \max("Barometer"))$
  - c. If barometer is in mmHG then use  $C = -10$  for meters or  $-33$  for ft
  - d. If barometer is in kPa then use  $C = -1.33$  for meters or  $-4.4$  for ft
  - e. If barometer is in mBar then use  $C = -13.3$  for meters or  $-44$  for ft
  - f. If barometer is in psi then use  $C = -0.193$  for meters or  $-0.64$  for ft
  - g. Graph #1: Altitude vs time
  - h. Graph #2: Temperature vs time
  - i. Graph #3: Temperature vs altitude
  - j. Annotate graphs with notes from experiment log
4. Transfer graphs to PowerPoint
  - a. In LabPro, select graph window, Ctrl-C to copy the graph
  - b. Open PowerPoint Presentation, select new page, Ctrl-V to paste the graph on that page