The Decision Points in an L3 Rocket Design

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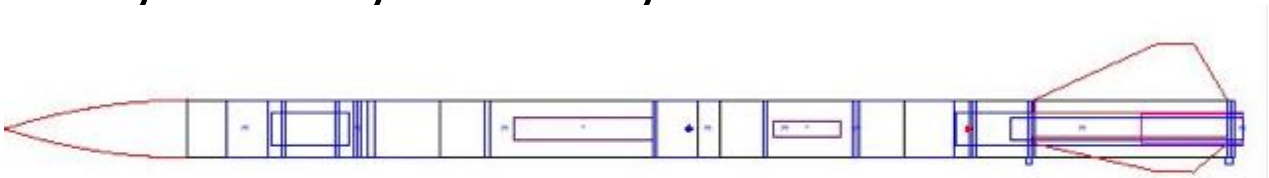
Who Am I?

- Ph.D. Physics, Stanford 1966
- Professor at UT Austin – Physics
- MRI-Intel Information Science
- Ham Radio Operator since 1954
- Developed tracking system for student rockets, SystemsGo 2010
- Easier to build my own rockets than find rides on others
- Investigated a 900 MHz Beacon's Doppler shift to track
- Using BRB900 and ham radio APRS tracking software
- Certification L1, L2 and L3

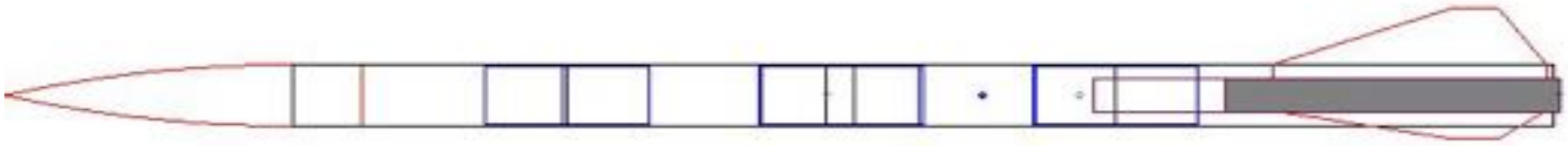
How we started in 2010

1. How high? – How big?

- L2 rocket was LOC Precision Fantom 4
- Next - Always Ready Rocketry Basic Blues 4



- This with 75mm smallest M motor was 14000’ and Mach 1.2
- Too high for our home launch field
- Scaled up to 5.5” Blue Tube with larger payload bay
- Two independent Dual Deploy altimeters from different mfg.



Simulations

Preliminary length	113.5”	Final length	125.9”
Preliminary mass	36.6 lb.	Final mass	41.4 lb.
Preliminary altitude	9750’	Final altitude	9020’
Preliminary motor	M1230	Final motor	M1665

Actual altitude
7150’
7284’
Should have used Cd = 0.70 instead of “Polished”

2. What size motor and what motor?

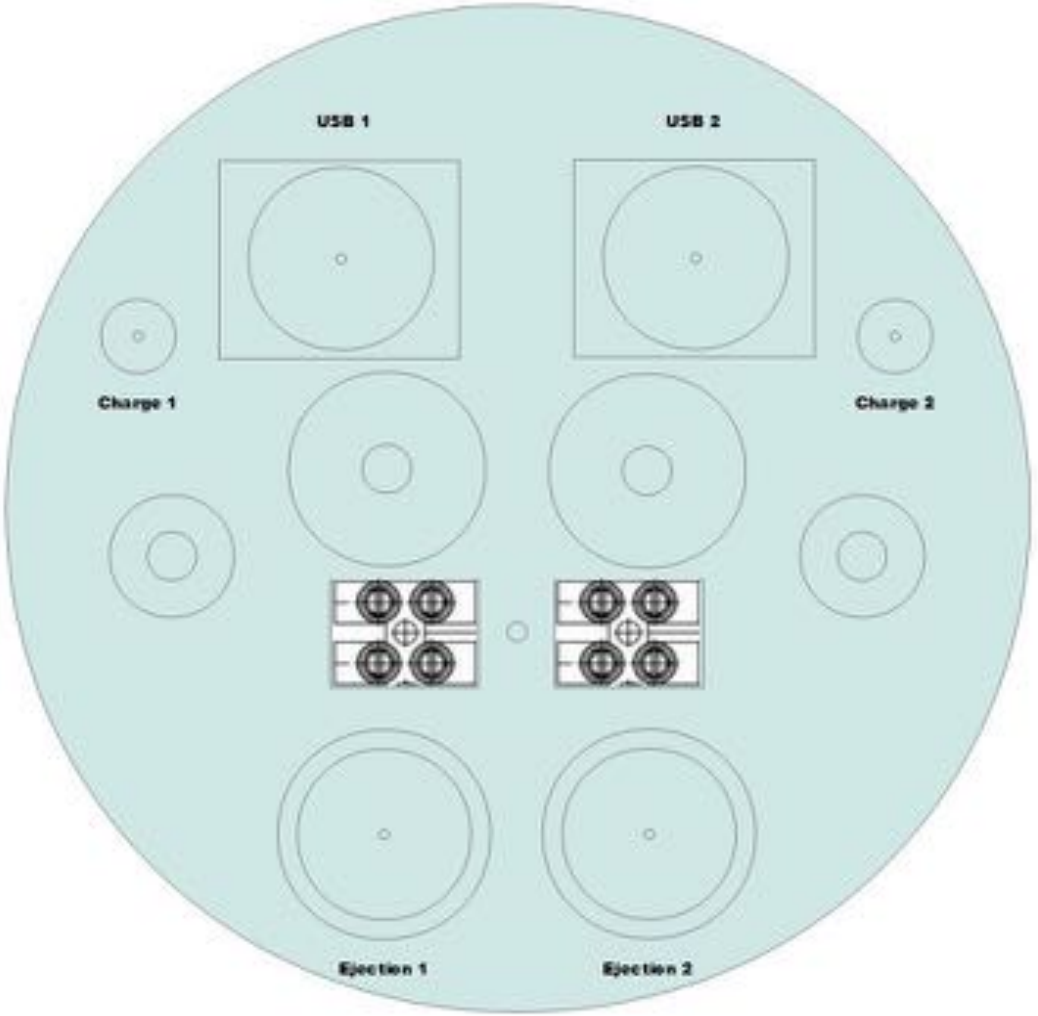
- One of my TAPs made this easy
- He offered to lend me a motor tube for Gorilla M1665
- Enuf said!

3. Fin size/shape and stability?

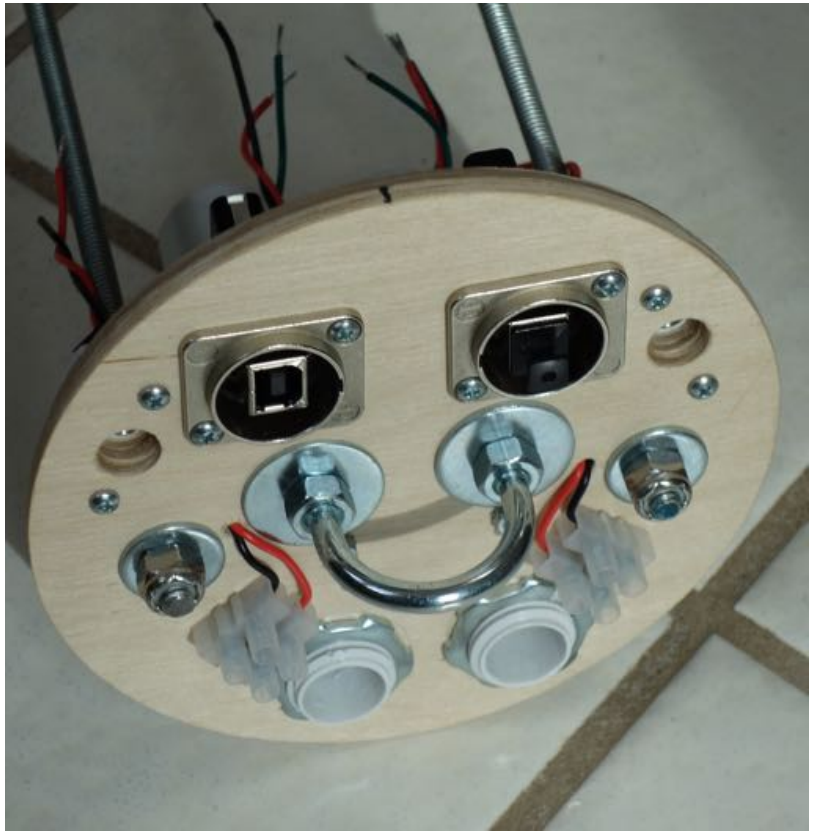
- Fin Flutter has been investigated using finflutter.xls
- 1/4” Aircraft plywood material
- Thru-wall attachment to motor tube
- Fin flutter speed well in excess of expected max speed

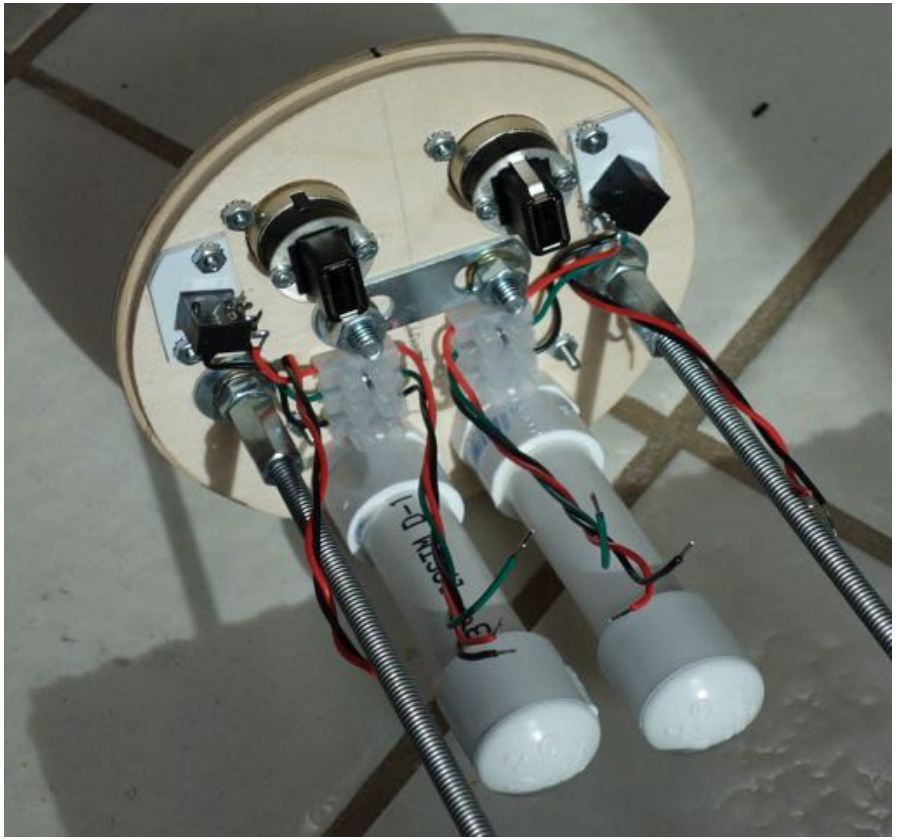
4. Dual Deploy e-bay and design

- End cap design for easy access and maintenance

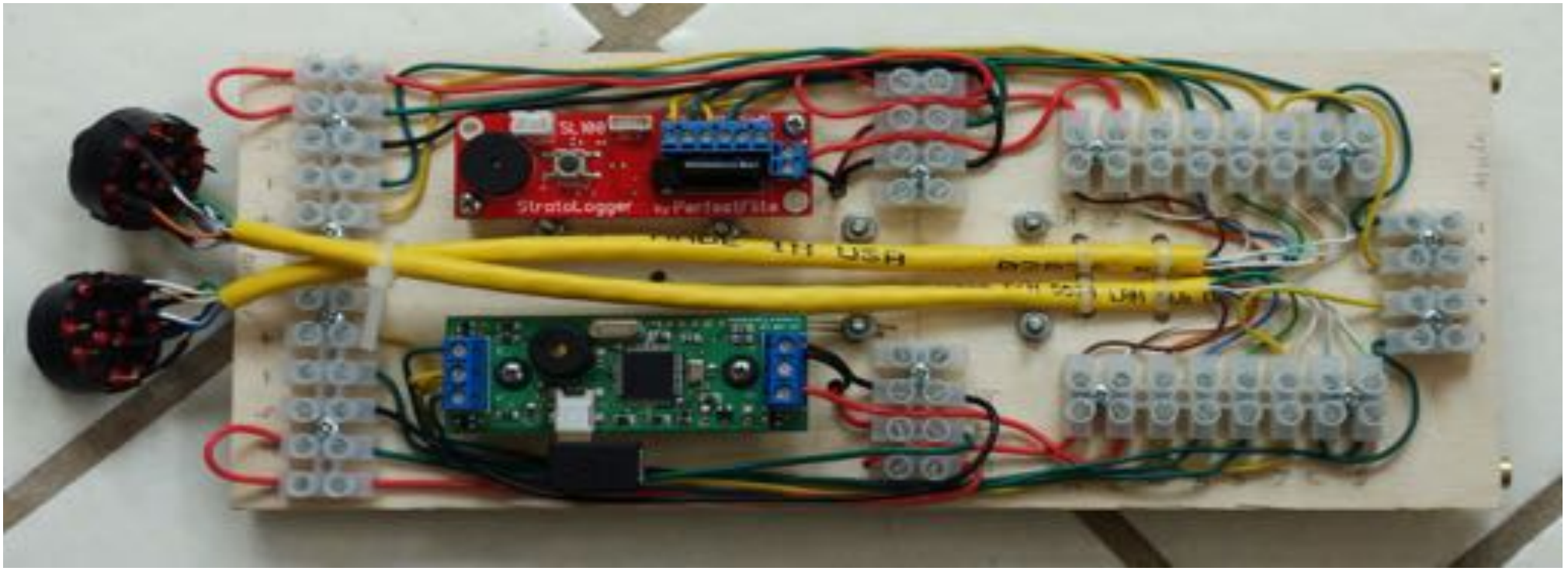


E-bay Top End Cap





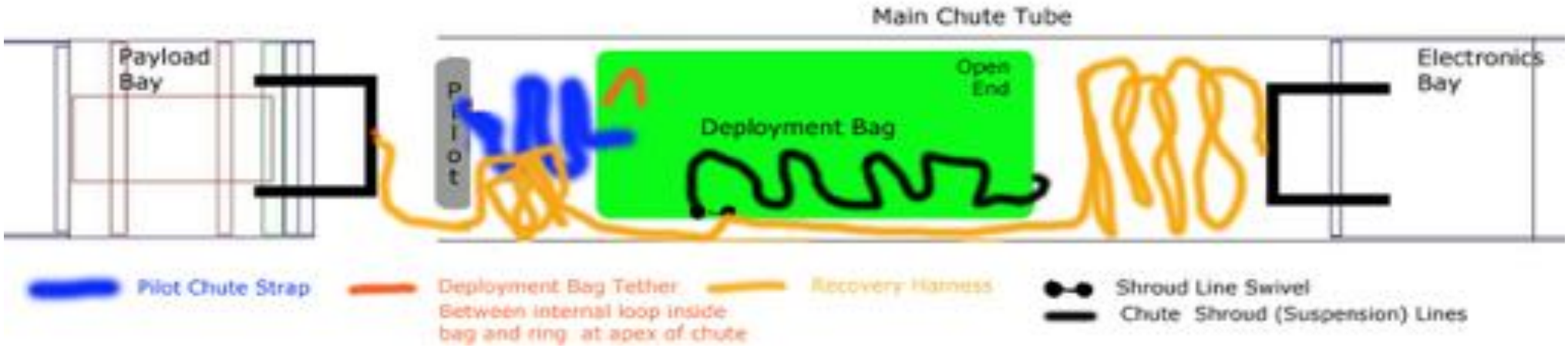
E-Bay Sled



5. Recovery – size and type of chutes

- Drogue Dual ejection charges of 2.5g of FFFF black powder
- Fired at apogee and apogee plus 3 seconds (backup)
- Main Dual ejection charges of 4.0g of FFFF black powder
- Fired at altitude and altitude plus 3 seconds (backup)

Main Chute Arrangement



6. Payload bay – size and contents

- GPS – BRB900 for tracking (no license required)
- Two High-definition movie cameras
- One camera looking out perpendicular to rocket axis
- Another camera looking into a 45° mirror to see down the rocket axis toward the fins
- An empty bay for other instruments