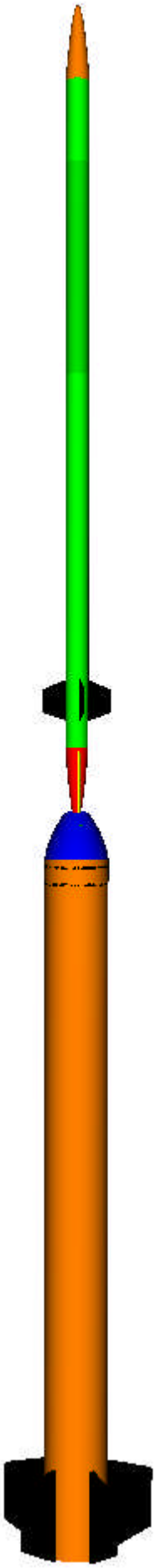


The Desert Dart Project

By Christine Rial
TRA# 7529 L3 TAP

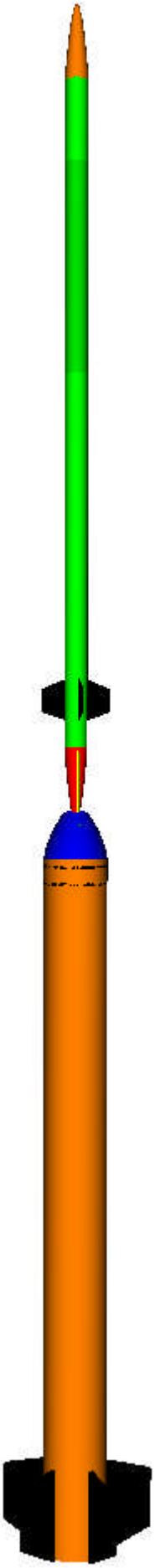
To Be Flown At:
Black Rock Desert
Gerlach, NV
Balls Sept, 2005

Goals:

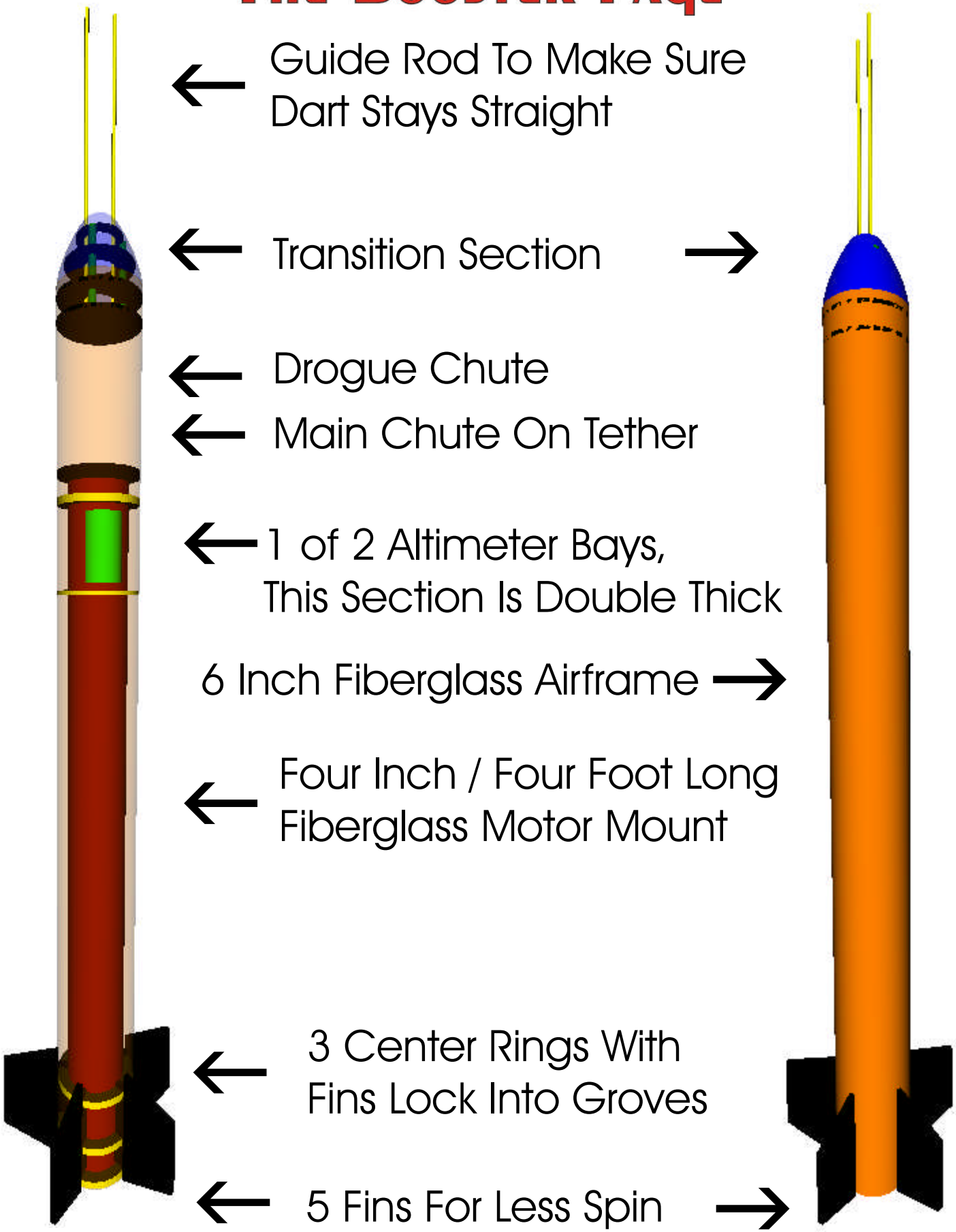
1. To Reach 30K Altitude
2. To Design A Fiberglass Rocket
3. To Have Live Video Downlink
4. To Have Live Telemetry Downlink
5. To Fly A Boosted Dart
6. Have A Dart Separation Device
7. Be Able To View The Booster Fall Away

Attempts:

1. To Reach 50,000 Feet
2. Fly an 4 Inch Motor
3. Fly an "N" Size Motor
4. Have A Successful Recovery From 9 Miles High
5. Transmit Live Video From 9 Miles High



The Booster Page



Guide Rod To Make Sure Dart Stays Straight

Transition Section

Drogue Chute

Main Chute On Tether

1 of 2 Altimeter Bays, This Section Is Double Thick

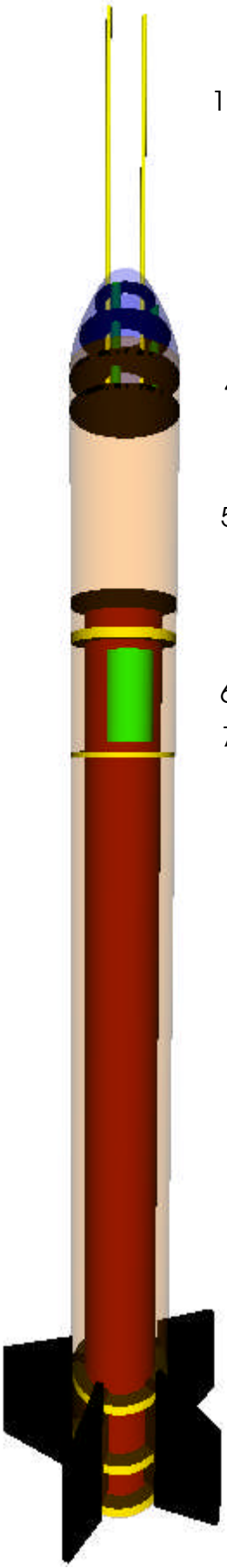
6 Inch Fiberglass Airframe

Four Inch / Four Foot Long Fiberglass Motor Mount

3 Center Rings With Fins Lock Into Groves

5 Fins For Less Spin

Booster
Design Notes



1. The Guide Rods are two metal rod one inside the other. The inner one act as a piston and the Co2 cartridge pressurize the outer tube pushing the Dart off the booster

2. A mold of the tail cone will be taken, that is inserted into the top of the transition section acting as a cradle for the Dart. The forces of the weight of the Dart is transfer to the booster airframe with centering rings and trust rods.

3. I might do away with the mirror and instead go with a second side facing camera. Then I would use a simple switch to select between side and bottom views. Doing it this way would make a stronger transition section since there will be no need for a window. This is important due to the booster flying at mach plus speeds after the Dart separates.

4. I might move my the Co2 Dart ejection system to the booster just to make more room for the electronics in the Dart. The Co2 ejection system is activated at motor burn and is used to guarantee the Dart separates from the booster.

5. There will be a small drogue chute and a larger main chute. The main will be held in position until lower altitudes by a tether. So that both chutes will be out the top deployment.

6. These two centering rings seal off the boosters electronics bay. The top one is also the mounting plate for the recovery harness.

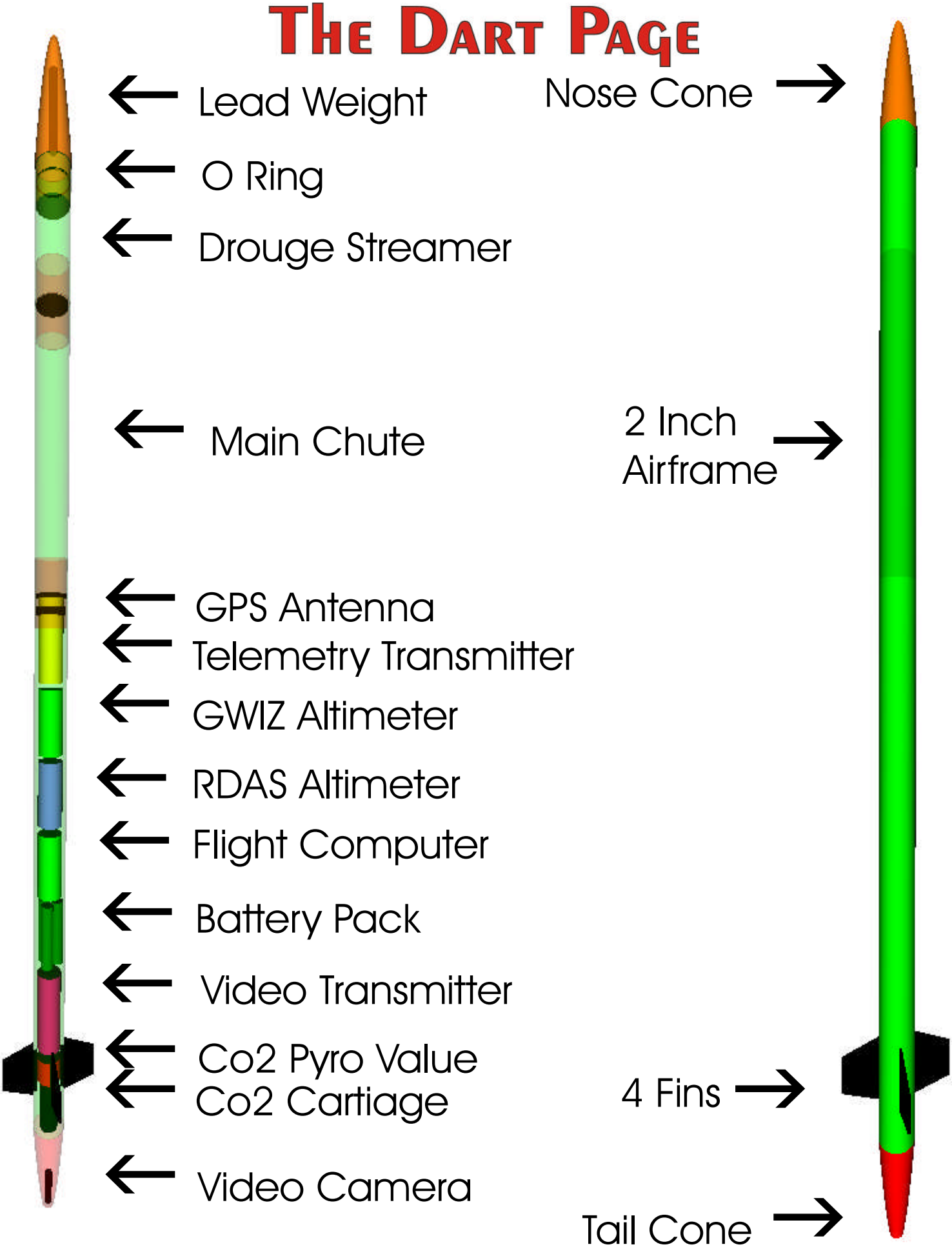
7. There is a double layer of fiberglass here to reenforce the bay. There will be two doors one at the 90 and 270 degree locations. The doors will also have switches to arm the electronics. Most likely this bay will house a GWIZ for staging and recovery use. And a Perfect Flight as a backup recovery. Also located there will be a 433 Mhz recovery beacon.

8. There are five fins to help cut down on the spin. Great care will have to be taken to make sure that the fins are straight.

9. The fins are notch to lock the fins in place. Also the fins are though the wall to the motor mount. And they will be fiberglass to the motor mount tube and also to the airframe.

10. I am going to try to have a metal trust plate made to help reinforce the motor mount and to protect it against hot gasses.

The Dart Page



The Dart
Design Notes

1. The lead weight will be determine after construction when the final center gravity will be known.

2. The drogue compartment will be seal by a O-Ring to make the compartment air tight. So that the drogue compartment stay at ground level pressure. This will let the black power can go off at normal air pressure.

3. The drogue chute bay will be held together by nylon screw shear pins. These will be above the O-Ring. The Main Chute bay will have extra shear pins to make sure it doesn't deploy when the drogue comes out.

4. The main chute bay will be vented. But the vent holes will be though the coupler section so that when the charge goes off the vents will be closed at first movement of the coupler.

5. The telemetry antenna will be incorporated into the outside off the airframe for better transmission strength.

6. Altimeter selection is not finalized. I will be using a RDAS, and I might use the RDAS GPS and 900 Mhz transmitter. Or I might use the GPS Flightsystems transmitter. Since the Dart will go out of sight there will have to be some sort of tracking on board. I will also have a backup433 Mhz tracking transmiter on board.

7. The airframe will be painted with high temperature paints. This will hopefully help keep the paint from melting and fusing the airframes together.

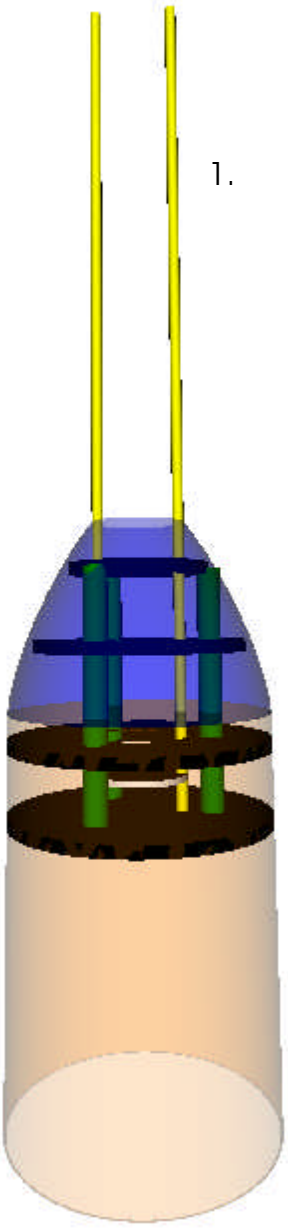
8. The video transmitter battery pack will be made up of Ni-MH "AA" batteries to get the voltage up to 9.6 Volts

9. The video transmitter might be a higher frequence like 1.2 Ghz or 2.4 Ghz. I will like to use the fins as antennas.

10. The fins are held in place by notching them into centering rings. There will be internal fillets and reinforce with fiberglass to the airframe.

11. The camera will be a lipstick type color camera. If I have a second sized facing camera it will be a pin hole size camera board. There would be a micro switch tied into the guide rods to select between the two cameras.

The Transition Page



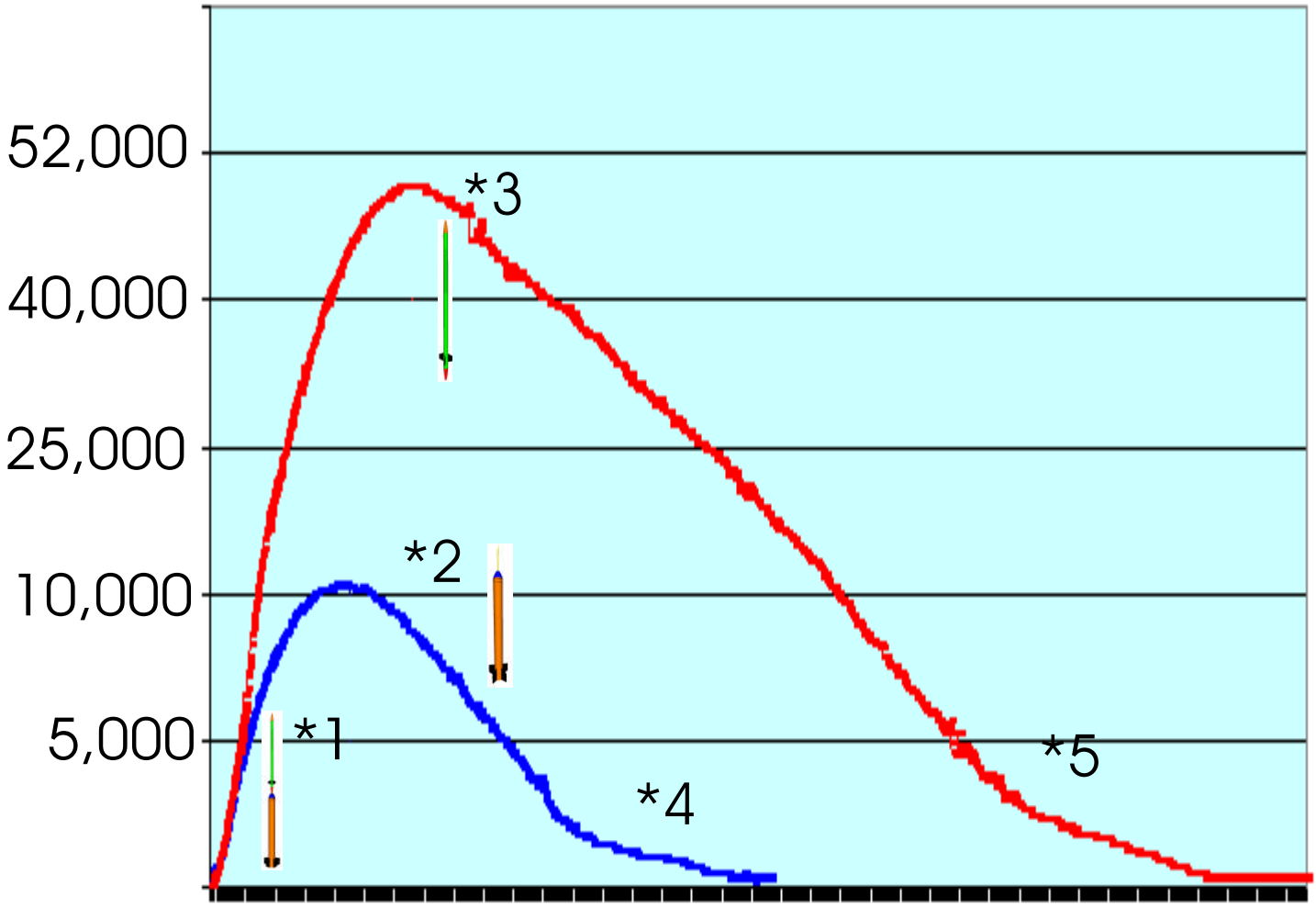
1. The guide rods help keep the dart straight during boost and help act as pistons to make sure the dart sperates from the booster at burn out.

2. I will be making a mold of the tail cone of the dart. This mold will be then mounted in several centering rings and trust rods to help transfer the weight of the dart to the booster airframe.

3. The transitions section has to be extra strong due to the fact at severation the top of the booster will be open to mach plus speeds.

4. If I do go with the mirror, the mirror will be lower so that it will will look out the side of the booster airframe and not on the angle section of the transition section.

Flight Profiles



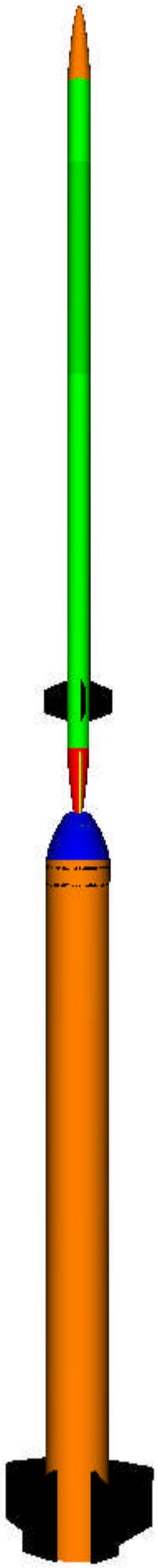
1. At ~5000 feet the motor burns out and the Co2 cartridge pushes the dart off the booster. Both parts now coast to apogee.

2. At ~9000 feet the Booster drogue charge goes off and deploys the drogue chute.

3. At ~50,000 feet the Darts streamer comes out of its airtight seal compartment.

4. The Boosters tether fires at 1,200 feet deploying the Skyangle Cert 3 chute.

5. The main chute charge fires on the Dart at about 1,200 feet and a 48" Loc chute is deployed.



Why This Document

1. With Rocsim I can design the rocket before I built it, that way I can make sure everything fits before the rocket even fly's. And with the transparent effect that Rocsim has I can also check for internal fits before I cut out any pieces.

2. Then after I put the layout onto paper I stare at it for hours. Double checking each section and making sure I didn't leave any thing out. I also imagine the rocket in flight. And what would the forces be on each section of the airframe and internal structures. So I fly this rocket several hundred times before it ever gets built.

3. Its important to go over every peice of this rocket due to the fact if just one part fails then the rocket could have a very bad flight. And as you can see even in a rocket this size there are hundreds of separate peices. And it just takes one to go bad.

Special Thanks

Francis Graham: My chief researcher. With just one email to Francis he has sent me three separate packages full of historical and technical information of boosted darts.

Les Derkovitz: My chief motor maker. Les will be mixing up my motor for me. He has already told me that he might mix up a special motor to give the rocket an extra kick and with a quick shutdown.

Jerry McKinlay: During last year Balls Launch we spent a hour in his truck during the height of a dust storm going over boosted darts and a way to guarantee the dart separating from the booster. I have seen several darts that didn't separate from the booster and I don't want that to happen here.

NASSA: Special thanks here for helping me every year with all the ground support equipment. When you travel 1900 mile just to fly a rocket, it is nice to know that you have a support structure there.

Tripoli Pittsburgh: My home club! I wouldn't be reaching for the stars if it wasn't for the support from my local group of guys.