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NEWSLETTER

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Comparing A Cluster of Two Parachutes Versus One Parachute

Ashley Van Milligan

R&D Event, NARAM-56

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Comparing A Cluster of Two Parachutes Versus One

By Ashley Van Milligan

The objectives of the work

To find out the size of 2 parachutes that will give me the same descent rate as one parachute. The reason I did this is it was the TARC challenge was to use 2 parachutes instead of one and two parachutes have to have the same descent as one parachutes.

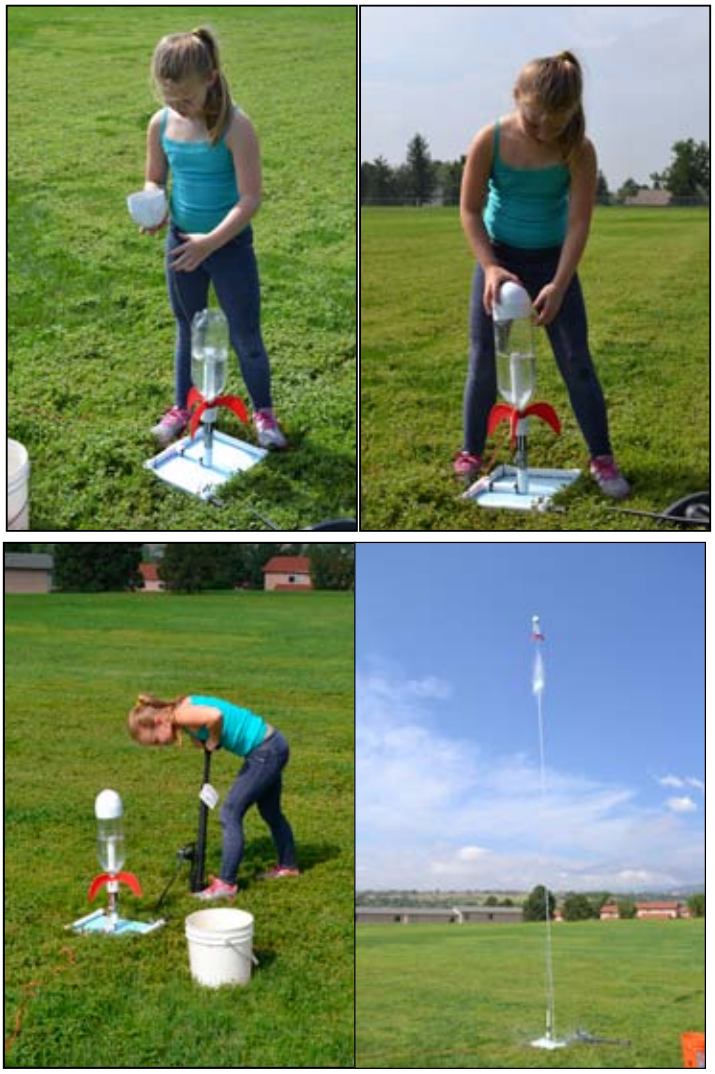
The approach taken

First I found the area of an 18 inch parachute with my dad's help. Then I found the area of two 12.72 parachutes. Two 12.72 area parachutes has the same area as an 18 inch parachute. Next I numbered each parachute 1, 2, and 3. I weighed them.

Parachute Construction

The first parachute weighed 5.6 grams. The second and third weighed 7.3 grams. So I added clay to the first parachute.

We went to the park and we launched the first parachute out of a water rocket. We had to use a water rocket because it is cheaper than a model rocket, and there was more room inside for parachutes and the altimeter.



Water Rocket Prep and Flight

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Two Cluster vs Single Parachute, cont.

We put an AltimeterThree in the rocket's nose cone. We flew the rocket two times with each parachute size. We didn't care about the peak altitude, we only cared about the descent rate.

Then we flew the second and third parachute together to equal the weight of one parachute. We flew this out of water rocket. We only got data on 2 flights for each size, because the rocket kept crashing, since it didn't have an ejection charge like a model rocket motor. The nose cone had to fall off, and it didn't, so the rocket kept crashing. The altimeter was OK, but sometimes the nose cone broke and had to be replaced. Then we looked at the data and found out that the 12 inch parachute wasn't falling slow enough, so later we made an 14 inch parachute and repeated the experiment.

Finding The Descend Speed

On the graphs (shown on the next page) I drew a straight line in the part where the parachute was coming down. This evened out all the bumps in the descent. You can also see that the parachute was falling nice and steady.

Now I picked two points on the line. I subtracted the first two numbers and wrote the time down. Next I subtracted the second two to numbers and wrote down the altitude between them. After that, I divided the altitude from by the time. This is the descent rate of the rocket.

- The descent rate of the first flight of the single 18 inch parachute was 15.25 ft/sec
- The descent rate of the second flight of the single 18 inch parachute was 13.66 ft/sec
- The descent rate of the first flight of the cluster 12.72 inch was 15 ft/sec
- The descent rate of the second flight of the cluster 12.72 inch was 16 ft/sec
- The descent rate of the first flight of the cluster 14 inch was 11.66 ft/sec
- The descent rate of the second flight of the cluster 14 inch was 13 ft/sec

LEFT: These are pictures of the nose cone, and how the altimeterThree was mounted into it. The AltimeterThree talks to a smart phone using Bluetooth.

In the top-left photo, you can see how clay was added to make all the rockets the same weight.

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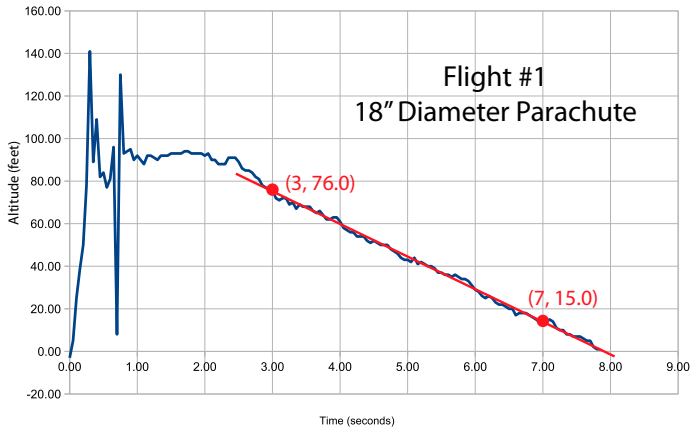
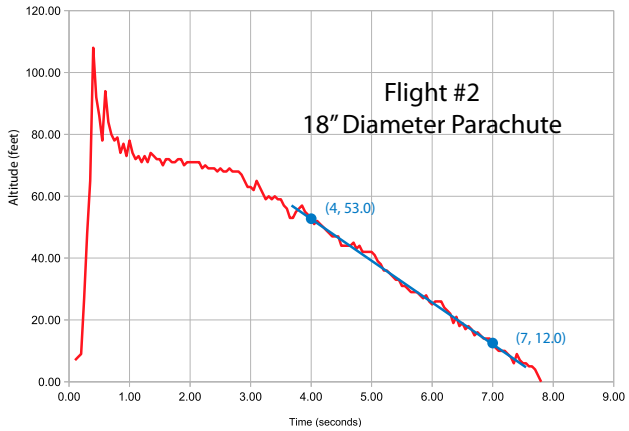
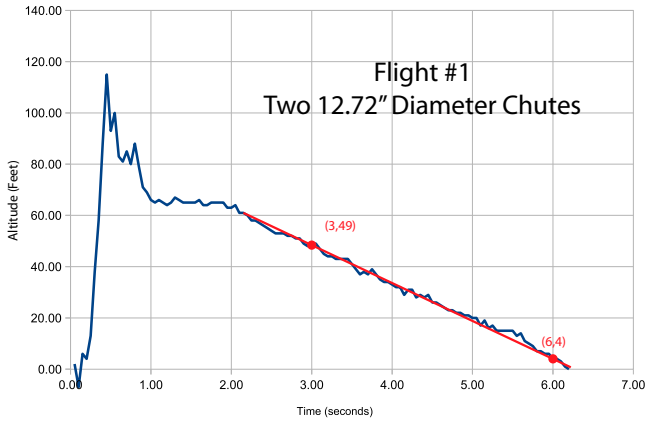
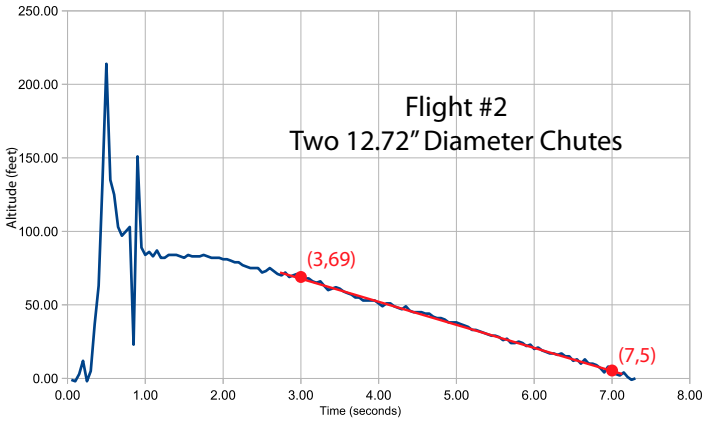
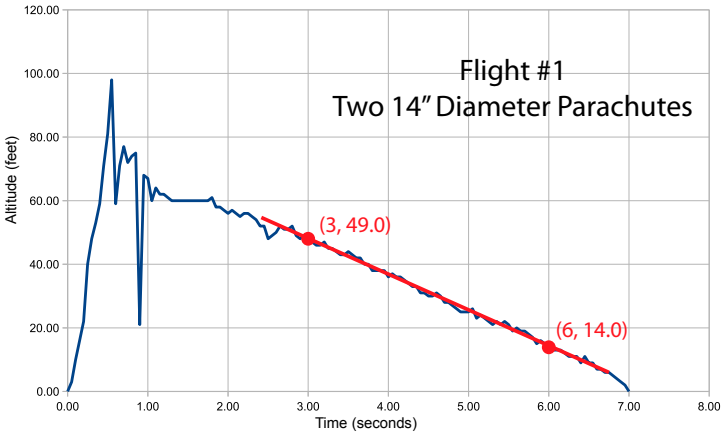
Two Cluster vs Single Parachute, cont.

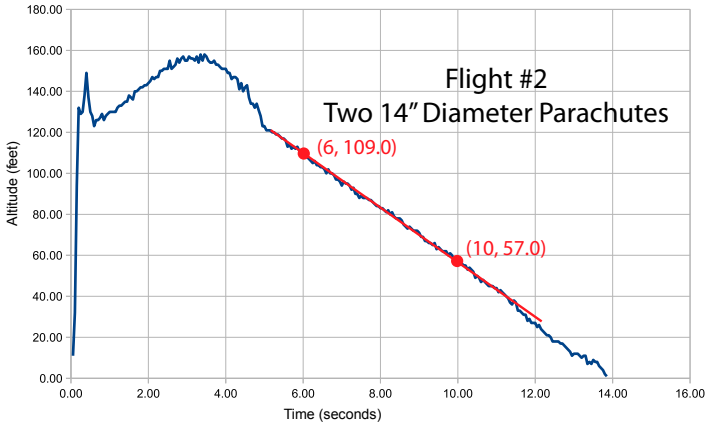












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Two Cluster vs Single Parachute, cont.

Then I averaged the descent rates.

- The average descent rate of the single 18 inch chute was 14.56 ft/sec
- The average descent rate of the cluster of 12.72 inch chutes was 15.5 ft/sec
- The average descent rate of the cluster of 14 inch chutes was 12.33 ft/sec

Conclusion:

- The two 12.72 parachutes fell too fast and the 14 inch parachute fell too slow.
- So a 13 inch chute would probably match the 18 inch chute the best.

List of any related R & D Reports previously entered by the author, if any, with brief summaries:

No previous reports submitted.

References to previous work done on the subject, found in research preparatory to this report

"Comparison Of The Number Of Parachutes Versus Descent Rate" by Allison Van Milligan. NARAM-52 R&D Project. July 2010

Model Rocket Design and Construction, 3rd Edition, by Timothy S. Van Milligan. Copyright 2008.

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The equipment used:

1. AltimeterThree prototype (borrowed)
2. Strato Fins
3. Bicycle pump
4. Soda bottle
5. iPhone and AltimeterThree App
6. Parachutes - custom made.
7. Custom-made plastic nose cone for the water rocket
8. Kevlar shock cord
9. Jolly Logic altimeter mount
10. Microsoft excel

The facilities used:

I did my experiments at a local park.

The money spent on the project (budget):

- Strato fins $11.76
- Snap swivels $3.00
- Parachute materials $3.00
- Total = $17.76

The data collected:

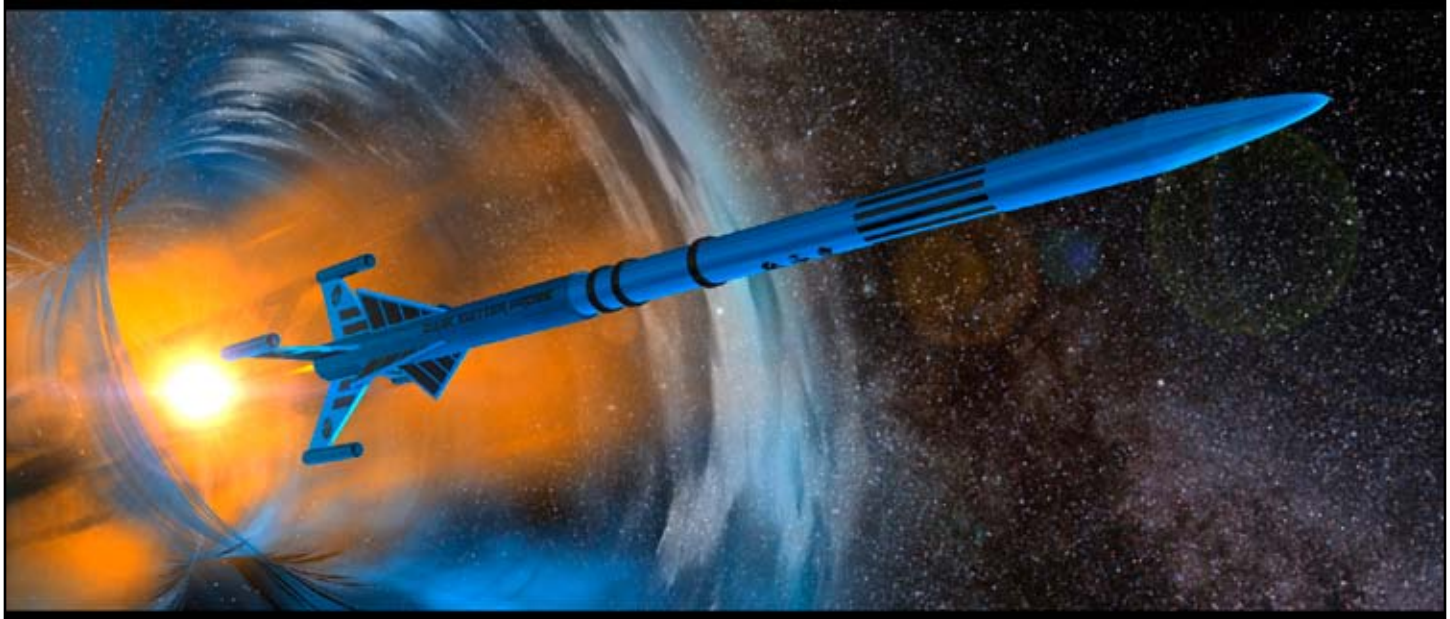
My Dad helped me to make these graphs from the data downloaded from the AltimeterThree

Further work that would clarify or extend the results obtained

I did not make a 13 inch chute to confirm that it would fall at the same descent rate as an 18 inch chute. In the future I would do that if I had time.

Shrox Plan: The "Dark Matter Probe"

By Shrox



Download the RockSim file (which includes the parts list) at:
www.ApogeeRockets.com/Downloads/DarkMatterProbe.zip