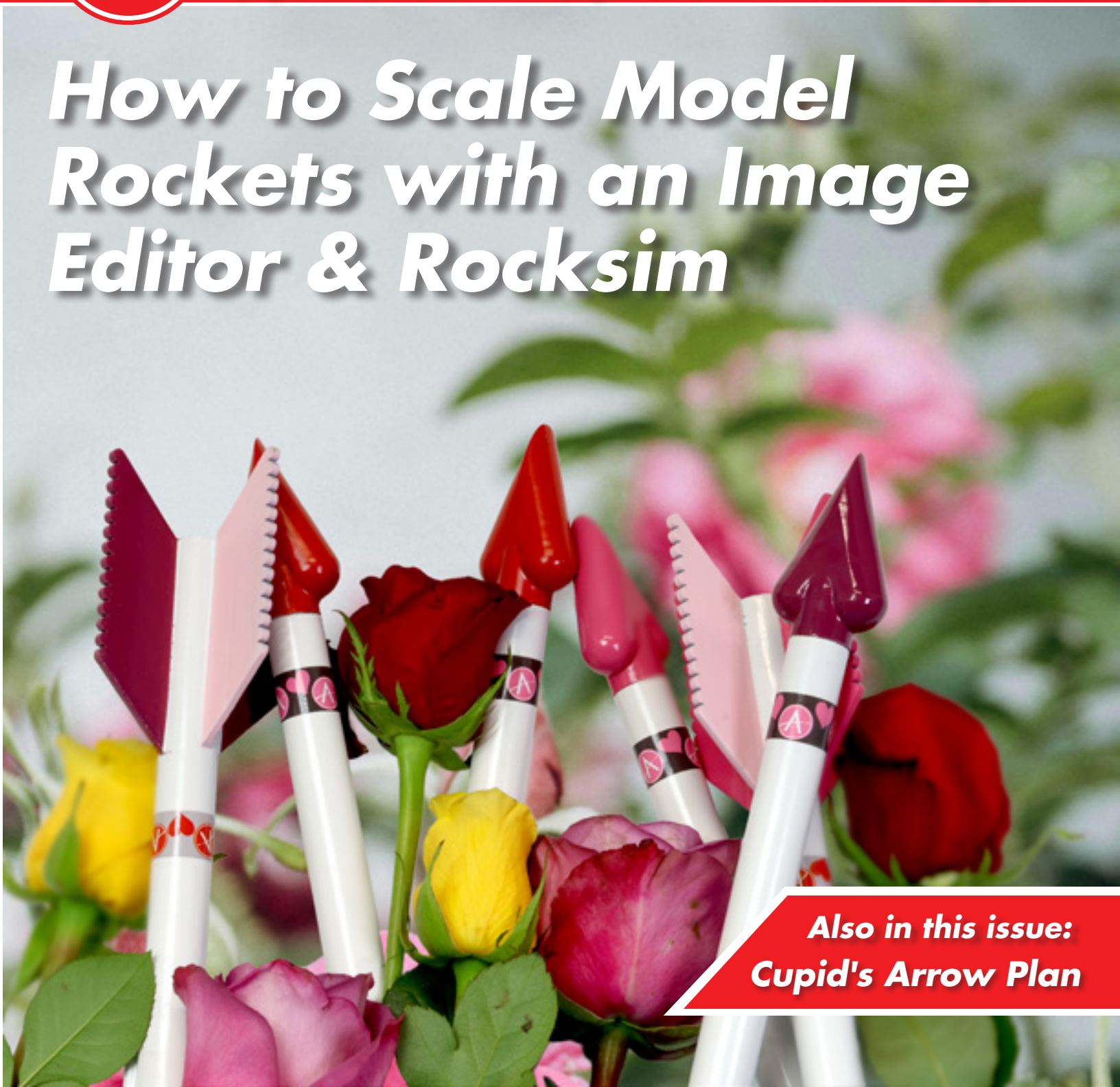
Issue 645 / February 11th, 2025

PEAK OF FLIGHT NEWSLETTER

Apogee Components, Inc. / ApogeeRockets.com / Colorado Springs, CO

How to Scale Model Rockets with an Image Editor & Rocksim



Also in this issue:
Cupid's Arrow Plan

PEAK OF FLIGHT NEWSLETTER

Issue 645/ February 11th, 2025

COVER PHOTO



Flower Boquet of Cupid's Arrow Rockets

FEATURED ARTICLES



How to Scale Model Rockets with an Image Editor & Rocksim

by Rob Goring

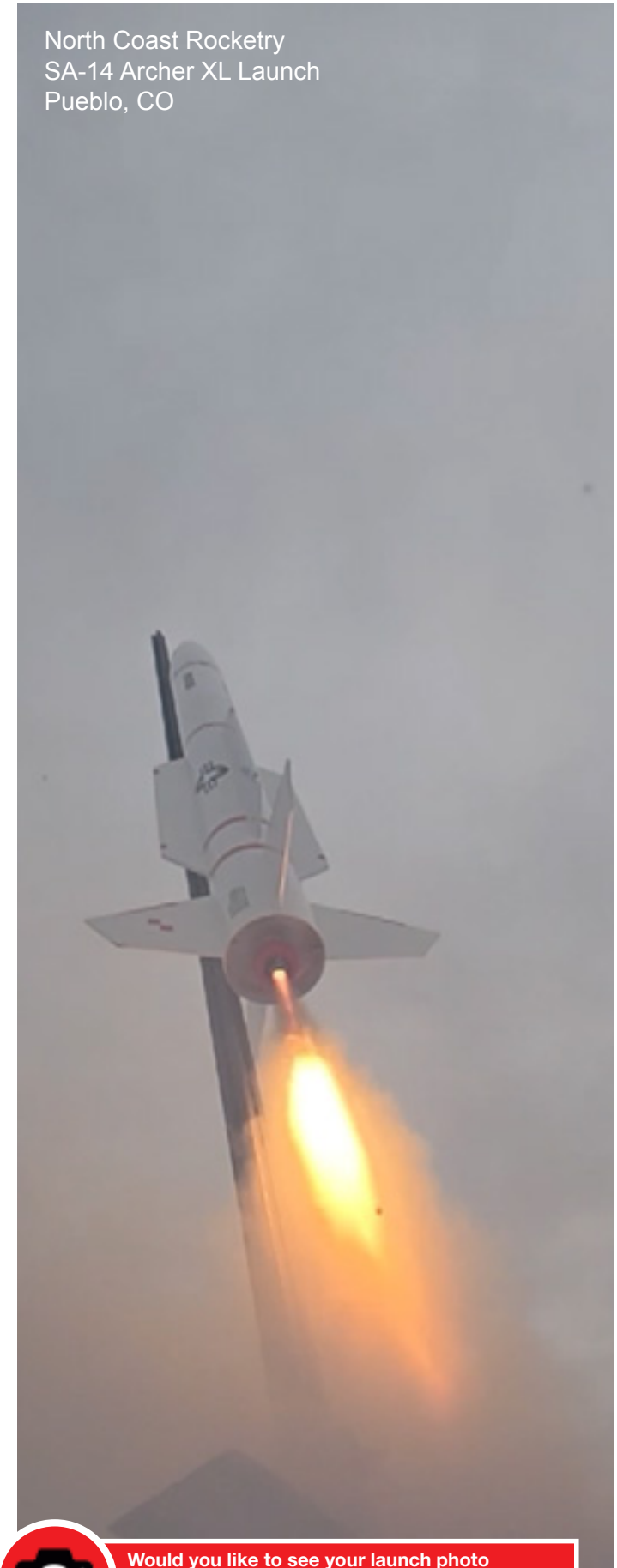
Have you ever seen a rocket photo online, and wished you could create a small, model version easily? Well, you can!

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About this Newsletter

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North Coast Rocketry
SA-14 Archer XL Launch
Pueblo, CO

Would you like to see your launch photo featured in the *Peak-of-Flight* newsletter? Submit your photo at apogeerockets.com.

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How to Scale Model Rockets With an Image Editor & RockSim

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Create Custom Model Rockets Using RockSim Software

(Ed.) Ever stared at a rocket photo and wondered, “How do I turn this into a flyable design?” When blueprints don’t exist, RockSim is here to help! Our new article, “How to Scale Rockets Using an Image Editor & RockSim” equips you with pro techniques to:

- Scale any image into accurate RockSim dimensions
- Import custom fin shapes, nose cones, and graphics
- Add custom decals directly into RockSim for your Rockets.
- Simulate stability, altitude, & recovery for flawless flights.

RockSim isn’t just software—it’s a rocketeer’s superpower.

> “I do rely on RockSim to design my rockets… I actually like to buy parts and build my own designs. When I started building rockets back in the 70s, all I had was the library for reference. I built some nice rockets back then, but not all were safe for ‘local launch… Now, RockSim lets me test ideas before they hit the pad."
>
> -Mike Giese

RockSim lets you test your ideas before they hit the pad.

Whether you're custom rocket project may be, image editing paired with RockSim turns “What if?” into “Watch this!”

How to Scale Model Rockets with an Image Editor & Rocksim

by Rob Goring

Introduction

So you saw a picture of a really cool rocket online and wondered, “How can I get this into Rocksim?” If it’s a real-world rocket, the first thing to do is search the internet for scale drawings or blueprints. If all you found was a regular photograph, you ‘could’ print it out and use a ruler, then apply a scaling ratio to each of your measurements.

But there’s another way involving the use of a photo editor. It’s especially useful for Sci-Fi rockets because dimensional data is usually non-existent. Another big advantage is that you can take measurements of any graphics on the rocket and accurately reproduce them in the editor and print your own decals.

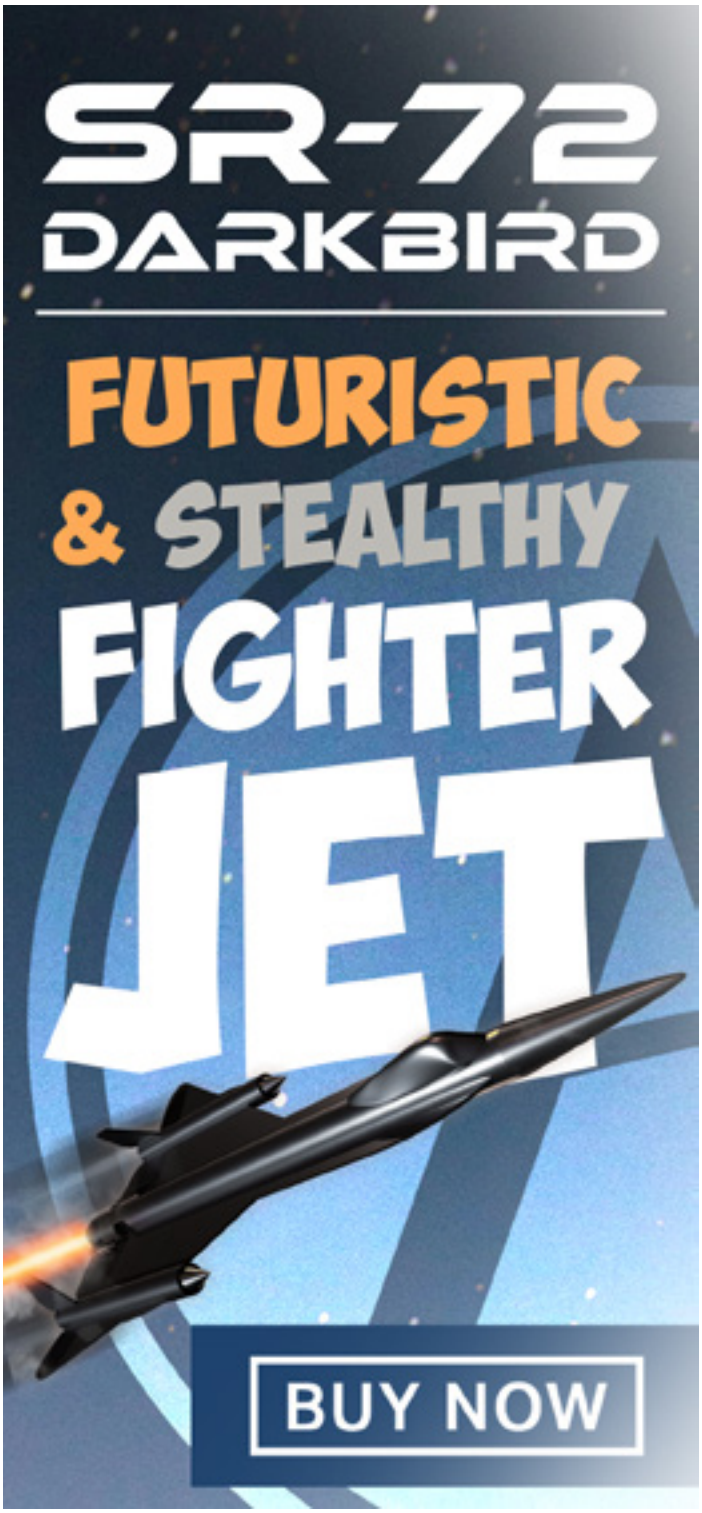
The following contains computer basics and detailed instructions geared for people starting out with Rocksim or image editing. Feel free to skip over what you don’t need. If you regularly use an image editor, you’re ahead of the game, go ahead and use that one. I’ll be using Paint.net which does everything I want it to do with Rocksim. Best of all, it’s free to use and can be downloaded from “Get paint.net”.

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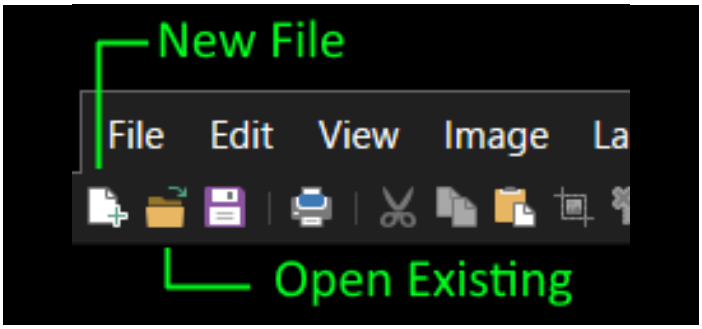
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Finding Your Rocket Image

When you start looking for more pictures of the rocket you want to build, try to find one where it's near vertical and close to straight on. There will always be some (usually small) issues with perspective, whether it's slightly above eye-level or rolled a bit. For example, if a fin in the picture is rolled away from you, it's going to look shorter than it is in real life. The same thing will happen with the height of the rocket if it's arcing away from you.

A good practice is to look for more pictures to have on hand and compare them. They can give you an idea of any little changes you might want to make to your design in Rocksim to compensate for perspective. It's also helpful to make a folder and store all the pictures you found.



Paint.net Buttons to Create a Project or Open an Existing One

Editing Your Photo

Now that you've found an image you want to use, let's get it into Paint.net. Start by right-clicking on your chosen rocket image and then click on "Copy image".

Open Paint.net and click the "New" file button.

When the sizing window opens, click "OK". Don't touch anything else in the program just yet, simply hold your CTRL key down, then click your V key. Paint.net will automatically set the "canvas" to the same size as the image on your clipboard. You should now see the image with no added canvas. Paint.net will start you out with the "Move selected pixels" tool, which looks like a four-pointed cross.

If the rocket isn't straight up, you'll have to rotate it. Position the Move tool near any corner until you see the "Rotate" tool- it's looks like an arc with arrows. If you accidentally move the whole image, stop and do a CTRL+ Z to undo the change. (You can use this shortcut to reverse ANY unwanted changes you make to the photo.) Click and hold your left mouse button, then drag your mouse left or right until the rocket is vertical. In the rare case the rotate cuts off part of the rocket, click the "Image" tab and expand the

"canvas size", then spin the image inside the larger background.

When you're done rotating it, you'll notice some white or transparent background showing around the edges. Transparent backgrounds look like a gray checkerboard. Don't worry about it because it's not going to matter- you'll end up cropping it out anyway.

When you're satisfied it's vertical, crop it by selecting the "Rectangle Select" tool. Then, hold the left mouse button down and drag the mouse to draw a rectangle around the part you want to save. Draw it fairly close to the rocket, then click the "Crop" button.

Now that the rocket is pointing straight up, open the "Image" tab and rotate it counterclockwise 90 degrees. Rotating it will place the length along the X axis. You could have left it upright and taken your measurements from the top down, but I think it's easier working left to right, and that's how you see it in Rocksim.

The last step is to crop it once more at the tip of the nose. This will put the tip directly at the "0" mark on the X axis. Afterwards, you'll notice that if you move the cursor past the left side of the image, the X position becomes negative. Y positions will be negative anywhere above the image.

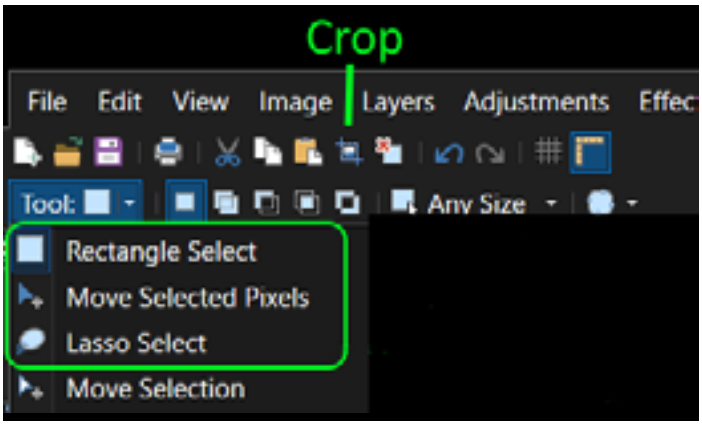


Figure 1: Use One of the Following Selection Tools to Select the Part of your Image you wish to Save, then Click Crop



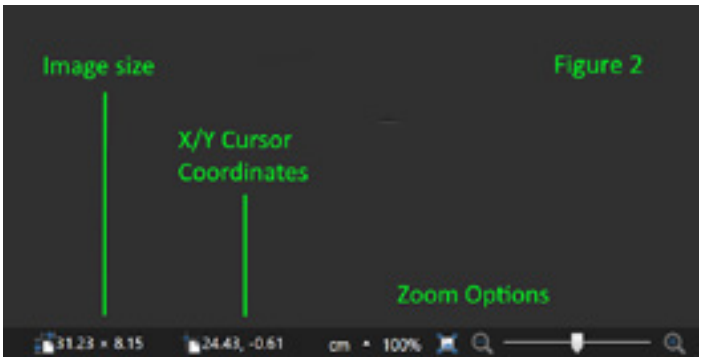


Figure 2: Tool Bar at the bottom of the Paint.net Software

Creating the Rocket

Now that you have a picture you can work with, the first question is, how big of a rocket do you want to make? Since commercially available bodytubes come in specific diameters, that's the place to start. When you're done, all the parts of the rocket in the image will be scaled to the bodytube you chose. In this example, we'll use an Estes BT-60 airframe to make the SM-2 Block IIIB Navy surface-to-air missile.

Let's get a little more familiar with Paint.net. At the bottom right of the screen, you'll see two sets of numbers. One set displays the image size, and this won't change unless you resize the image. The other set shows the X and Y coordinates of the cursor, giving you its exact position. Move your mouse cursor around and watch how the numbers change.

Lets see how to use the tools **(Figure 1)** to bring the image to scale. Again, I'm going to use the SM-2 rocket as an example and outline the steps.

Click on the "Lasso Select" tool. This will give you a simple crosshairs which is easier to see.

Let's measure the body diameter in the image. First, move the crosshairs with your mouse close to the lower bodyline. If you feel the need to, use the zoom tools to enlarge the image. In this example, I zoomed to 400%. You can zoom as much as you want to, but the higher the zoom, the blurrier the line will be.

Once you're close to the bottom bodyline, start single-clicking the arrow keys to move the cursor in increments of only 0.03 mm. This helps you to take more precise measurements. When you get the cursor where you want it, write down the Y coordinate.

With the image I'm working with, the lower bodyline is at 5.53 centimeters. Now let's move the crosshairs up and position them at the upper edge of the body. It measures 3.39 cm. Make sure to write down this Y coordinate.

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Finally, subtract the first number from the second. This gives the diameter of the rocket body in the photo, & with this image it's: **5.53 cm - 3.39 cm = 2.14 cm.**

Now we need to increase the image size so the diameter of the body in the picture matches the diameter of the BT you'll be using. BT-60 has an outside diameter of 4.16 cm. Divide 4.16 cm by 2.14 cm and we get 1.94. We need to almost double the image size. It goes without saying if the rocket body in the picture has a larger diameter, you'll have to reduce the image size.

Let's see how to resize the image so it's in scale.

• Click on the "Image" tab, then click "Resize".

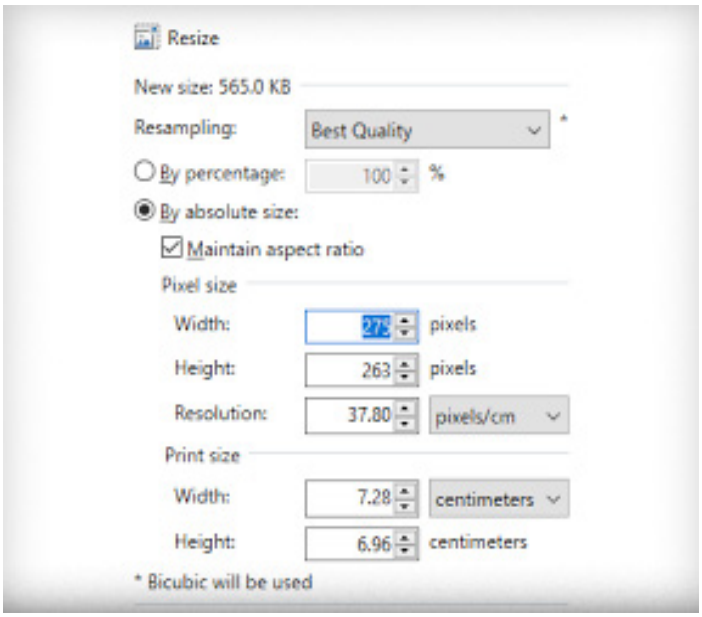
• Make sure the "Maintain aspect ratio" box is checked. This ensures the photo will be stretched in both directions by the same percentage, without distorting the image.

• The way I cropped it, the resulting image height is 8.15 cm. Our multiplication factor is 1.94.

Multiply 8.15 cm x 1.94 and you get 15.81 cm. Enter this new number in the "Height" box and click OK.

The lower bodyline is now 16.95 cm and the upper is 12.79 cm. Subtract the two, and you get 4.16 cm, exactly what we wanted. Paint.net has just done all the scaling for you!

You can now take dimensions directly from the image and input them into Rocksim.



Resize menu screen in Paint.net

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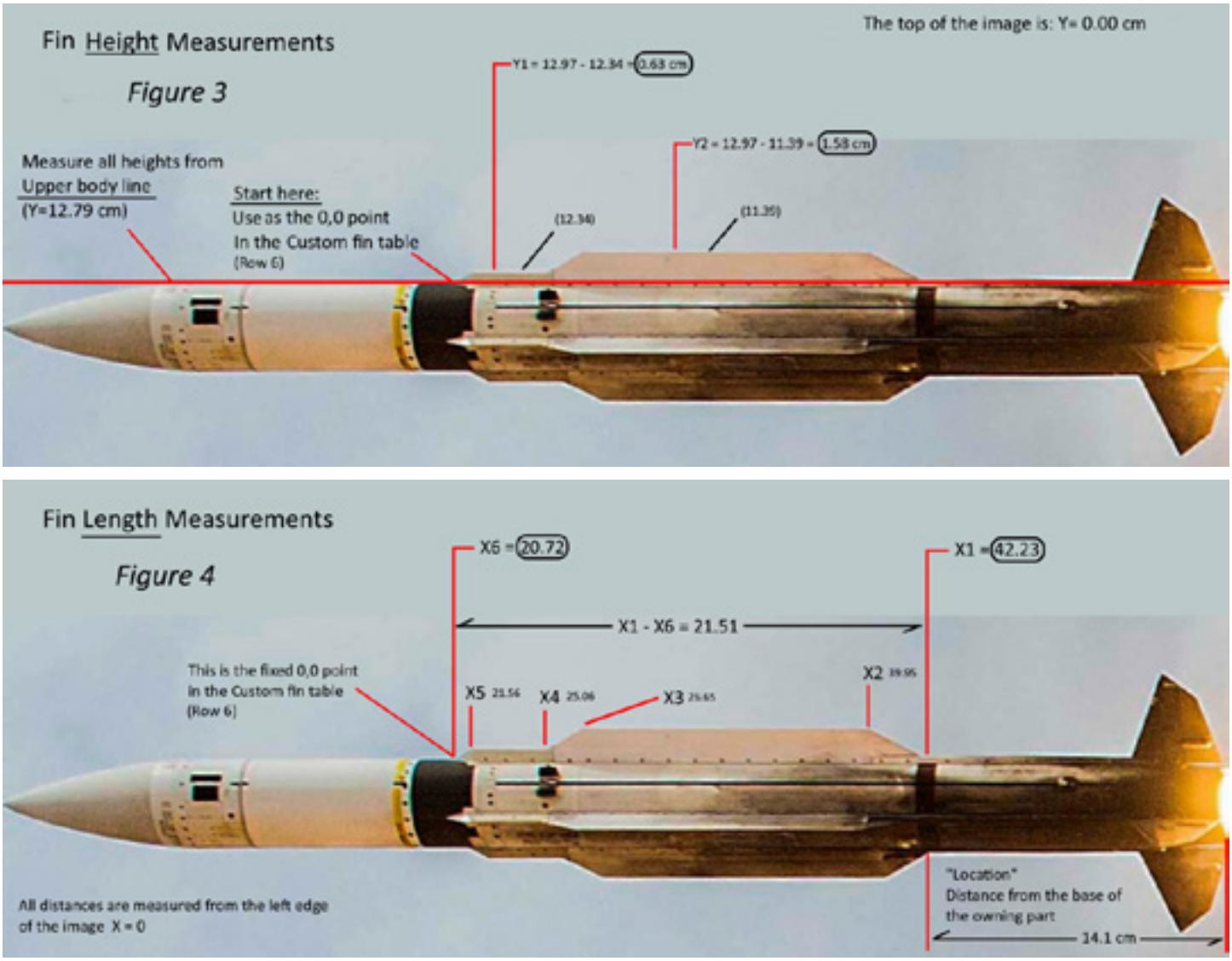


Figure 3 & 4: How to take Fin Length and Height Measurements for your Rocket Image

Importing to Rocksim

You can study Figures 3 and 4 to see how to take the measurements, or walk through the example with me to learn how to get the fin coordinates into Rocksim. We'll use the SM-2 again. The Figures may look a little complicated but they're not. The X's and Y's are only point labels and the math is just subtraction.

Since you're using Rocksim, I'll assume you've completed at least one design. Open a new file and add a bodytube so you can follow along.

Add a "Custom fin" set to the design. Rocksim will give you a 3 fin, trapezoidal, "starter set" located at the very back of the rocket. Its position is measured from the front of the bodytube to the front of the fin.

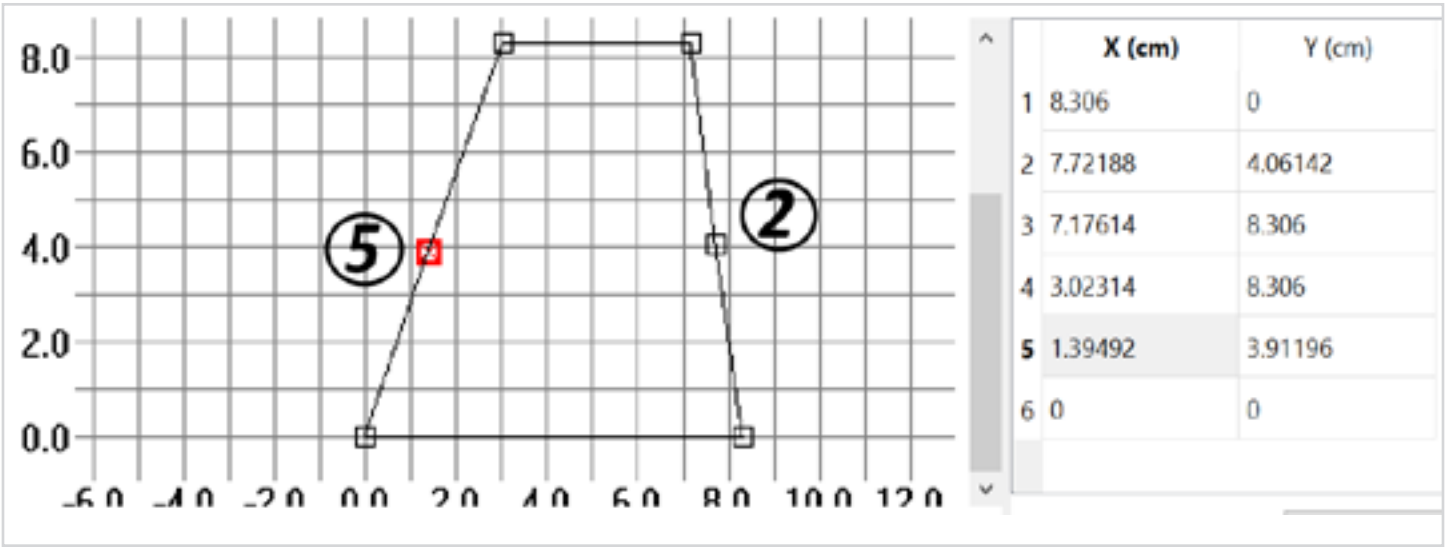
Start by choosing the number of fins for your design and then set the fin "Location". We can see from Figure 4 that the forward fins sit 14.1 cm from the back of the rocket. Enter 14.1 cm in the location box and then change the position to "From the base of the owning part" (the bodytube).

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	X (cm)	Y (cm)
1	8.306	0
2	7.72188	4.06142
3	7.17614	8.306
4	3.02314	8.306
5	1.39492	3.91196
6	0	0

Adding Starter Points to Your Rocket Design in RockSim

Open the “Plan points” tab and look at the fin X/Y table. We’ll need to add two more points: add one behind the front and one ahead of the back. Just click on the graph to add the points.



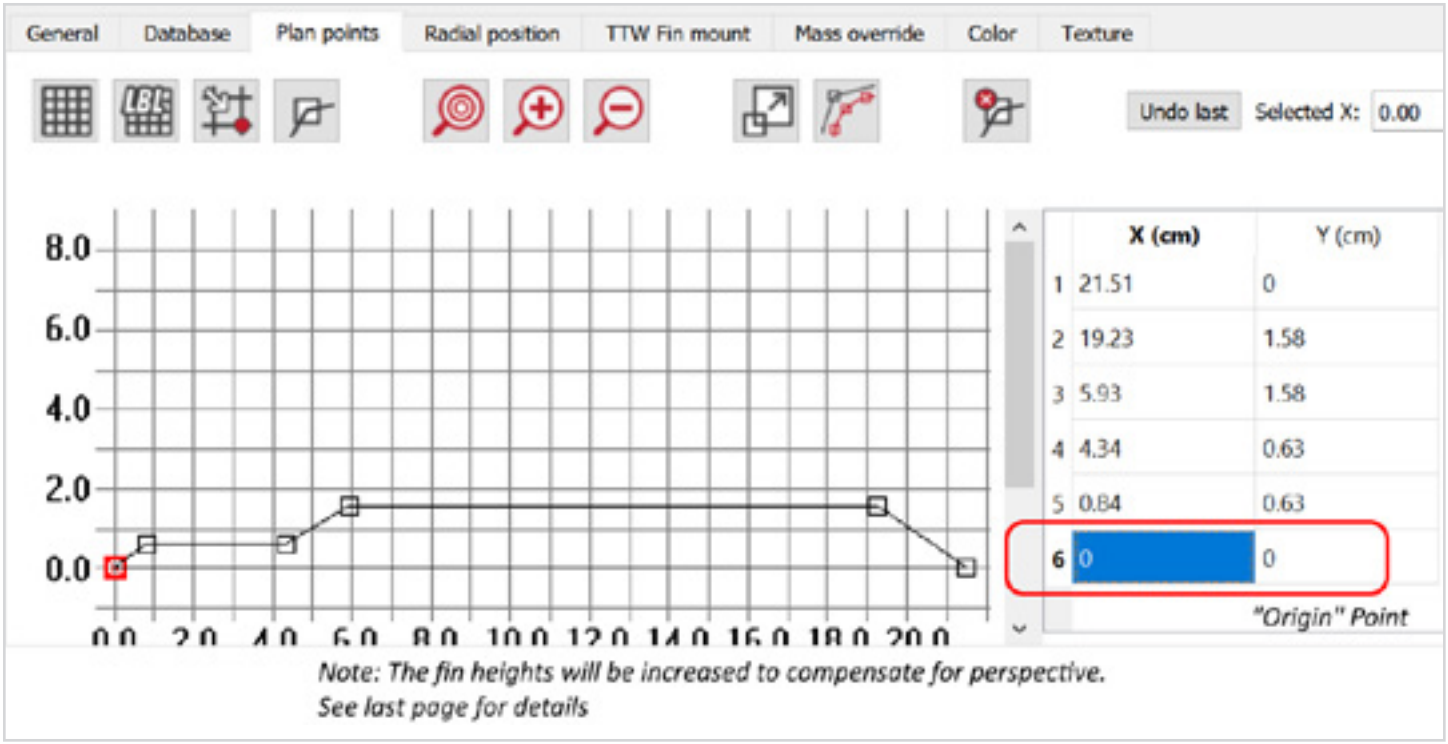


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Now let's look at how the SM-2 fins were done in Rocksim.

The "0,0" on the bottom of the table is the origin point and can't be changed. All the other points are measured from this one. It's also the front of the root edge.

Next, look at row 1. This point is the back of the root edge, and in this case, it's also the total length of the fin. In Figure 4, it's labeled "X1".

(If you ever get confused about which point you're looking at, just click on the X or Y value in the table, the point will become highlighted in red on the graph.)

In Figure 4, X6 will become the origin point. In the photo, it's 20.72 cm from the tip of the nose.

Now look across to X1, the end of the fin. X1 is at 42.23 cm. Subtract X6 from X1 and you'll get the length: 21.5 cm. This goes into the X column of row 1.

From Figure 3, the height at X6 is "0". The height at X5 is: Y = 12.97 cm - 12.34 cm = 0.63 cm. This goes in the Y column of row 1. Now that you've entered the first point, let's keep going and figure the remaining X and Y values.

After following these steps, you should now be able to create fins for your own design in Rocksim. The whole measuring process doesn't get more complicated than figuring and inputting the Custom fin coordinates. You've done the hardest part. You now

How SM-2 Fins were Designed in RockSim



	X (cm)	Y (cm)
1	21.51	0
2	19.23	1.58
3	5.93	1.58
4	4.34	0.63
5	0.84	0.63
6	0	0

X Values

X1-X6= 42.23-20.72 = 21.5 cm

X2-X6= 39.95-20.72 = 19.23 cm

X3-X6= 26.65-20.72 = 5.93 cm

X4-X6= 25.06-20.72 = 4.34 cm

X5-X6= 21.56-20.72 = 0.84 cm

"0" The origin point

have the tools for taking any measurements you need. You should feel confident to lay out any graphics, for example, the width of the SM-2's gold stripe, and the diameter and spacing of the solid black circles below it.

One last thing before you go. In the beginning I said there will be some small errors due to perspective. Let's talk about those in the image I chose.

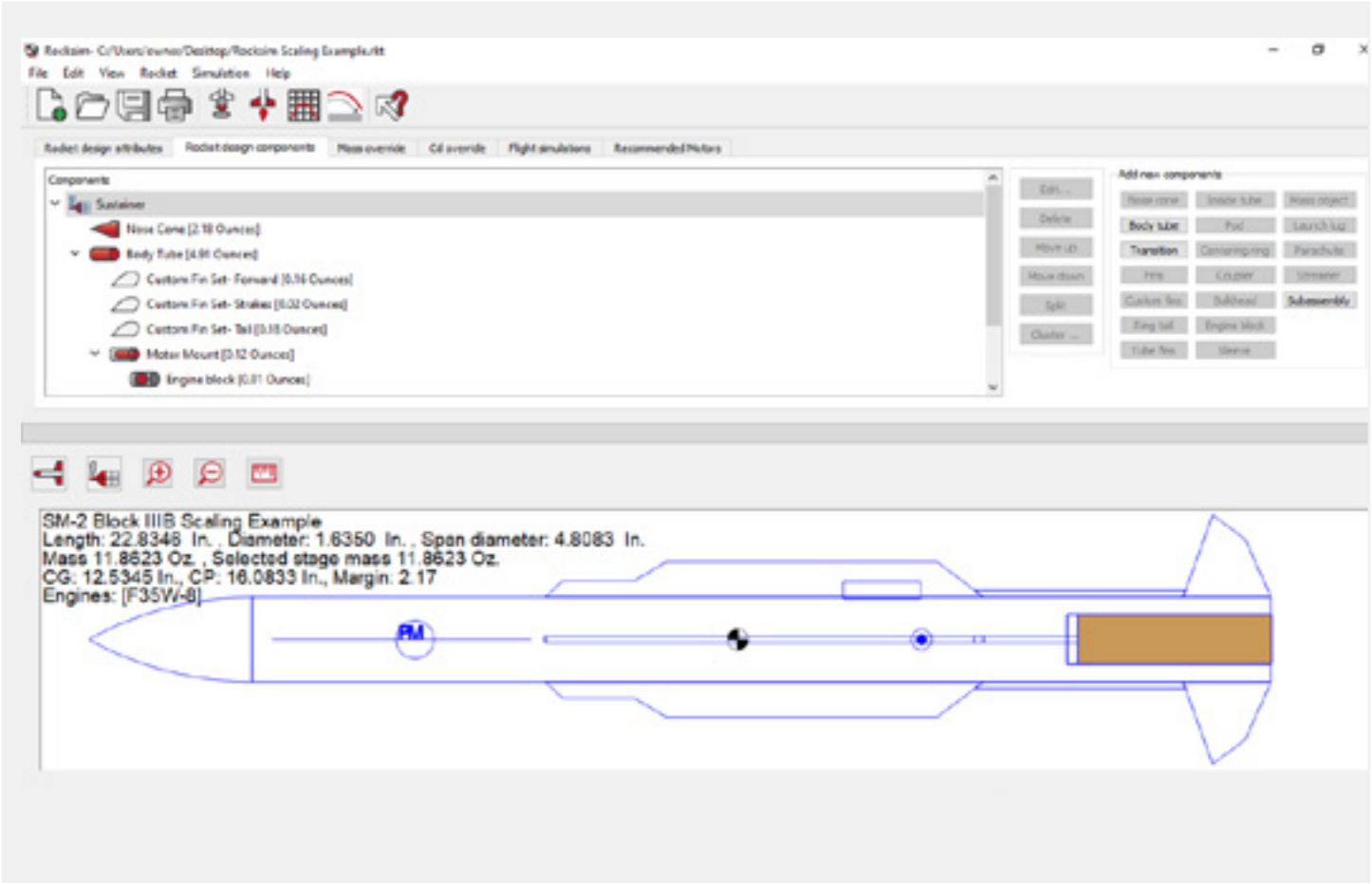
Perspective Errors

With the SM-2 example image, the fins are rolled towards us a little. We know this makes them look shorter than they actually are. I looked at all the photos I had saved in the project folder, and sure enough, the fins needed to be a "little" taller. If you opt to just increase the height, this will change the angles on the leading and trailing edges. We could make the fins a little longer to get around this, but the difference in the edge angles is negligible. At

Y (cm)	This 'Y' is the upper body line
0	
1.58	Y-Y2= 12.97-11.39= 1.58 cm
1.58	"
0.63	Y-Y1= 12.97-12.34= 0.63 cm
0.63	"
0	"0" The origin point

X and Y Values from Designing the Example Rocket





this point, you're more of an artist than an engineer. Choose what looks right to you. I simply started by adding a little height until the fins looked right to me. The additional height ended up 0.15 cm higher than my original measurements, roughly 10%. I also added 1 cm to the nosecone because it better matched the look in some of the other photos.

This is a good place to make one small confession. I was looking over the illustrations and noticed I didn't get the rocket perfectly level. It's sloped upward 3 mm on the nosecone side. The problem is, the Rotate tool can be a bit fussy to use. I've only recently found that you can gain fine control of the tool by holding the left mouse button down and using the arrow keys to rotate the image.

So if you're a stickler for accuracy, after you make the flip to horizontal, measure up from the bottom of the image to the lower bodyline on each side to see just how accurate you were. It takes only a little more effort to get it right. I'll be doing this extra step from now on.

Final Rocksim Design from a Real Rocket Photograph

Just remember, you're still working against the perspective inherent in all photographs, and perfection isn't possible, but you can get close to it.

Well, that's it. I hope you found this guide helpful, and it sets you on the path to bringing more media rockets into reality. This method has worked for me, & I'm confident it will work for you too.

Download the RockSim file for this rocket at:

www.ApogeeRockets.com/downloads/rocksim_files/SM-2_Block_111B.rkt



Unlock Precision with RockSim

(Ed.) Designing rockets from photographs—from real-life marvels or sci-fi spectacles—is no longer a guessing game. Using image editors like getPaint.net with RockSim, you've now mastered the art of scaling dimensions, extracting fin profiles, & crafting decals with surgical accuracy. But the true magic happens when these measurements meet RockSim's unparalleled simulation power.

Here's why RockSim is your non-negotiable tool for success:

• Eliminate Guesswork: Transform pixel-perfect measurements into stable, flight-ready designs.

• Test Before You Build: Simulate altitude, stability, and recovery before cutting a single fin.

• Customize Fearlessly: Adjust fin shapes, nose cones, and motor configurations in seconds—no glue, no regrets.

"The RockSim software has been vital to help me attain my Level 1 and 2 certifications."

-Leon Smith, Ramsey MN

Apogee Components

RockSim takes the stress out of design—you're not just building a rocket, you're engineering success.

Yes, perspective errors and artistic tweaks are part of the process (as our SM-2 missile example showed). But with RockSim, those adjustments become data-driven refinements. Whether you're resurrecting a historic rocket or launching a Star Wars-inspired build, RockSim ensures your vision flies as brilliantly as it looks.

Ready to turn pixels into performance?

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About the Author:

Rob Goring has lived in the Pacific Northwest for his entire life. He graduated from the University of Washington, but since he liked working with his hands so much, he became a shop manager, field mechanic and fabricator for a small construction company. He is Currently retired.

Rob's first flights were in 1973 with an Estes X-ray and a 3-engine cluster Cobra. He got back into rocketry In 2020 with an Estes starter kit. From there, he started scratch-building "Oddrocks" and scale rockets. He enjoys designing safe, stable model rockets as much as he likes building and flying them.

Hi power certification is next on Rob's bucket list.







Lindsey H. Holding a 'Boquet' of Cupid's Arrow Rockets

Cupid's Arrow Rocket Plan

by Ken Karbon

This year for Valentine's Day, we decided to see what interesting rocketry mischief we could get up to and after trading some insane (and likely unjustifiably irresponsible!) ideas, the idea of a simple heart-tipped arrow came to be the prevailing favorite option. Of course, we didn't want to do things by halves, so we decided to build a half-dozen of these rockets and drag race them—a quaint little quiver of low-power love bombs. Notably, since this resulted in such a simple rocket, it made for a very nice little plan. We hope that this plan brings at least a little joy. It's a super quick build and a great canvas for different fin designs (we've included three options here, but there are endless variants that could work), as well as paint schemes.

Notes on the Nosecone:

We took advantage of our fun new resin 3D printer for our internal builds to print up some custom heart-shaped arrow points. To complete the nosecone it needs a coupler installed as a shoulder and a loop of Kevlar glued inside for attachment. We are making that file available to everyone, but if you do not have access to a similar printer, the Cupid's Arrow can also be built with a PNC-18B nosecone combined with balsa edges.

Notes on the Fins:

Cupid's Arrow is deliberately designed to be highly stable to make exploration of different fin shapes not only easy, but safe. It is highly recommended, especially if one is making more than one of these models, to try at least a couple of the included fin shapes… or simply come up with your own. As long as fins are roughly the same size as the included versions, the rocket will be safely stable. Just have fun!

A PSA for Rocketeer Sanity:

As much as I feel this is a great rocket for big launches and group builds, don't be silly like me and try to build, prime, paint, & decal a half-dozen of these in two days. Sanity, I've heard, is a valuable thing. Rushing painting and masking is a great way to drive sanity away. Take your time, and actually enjoy your hobby.

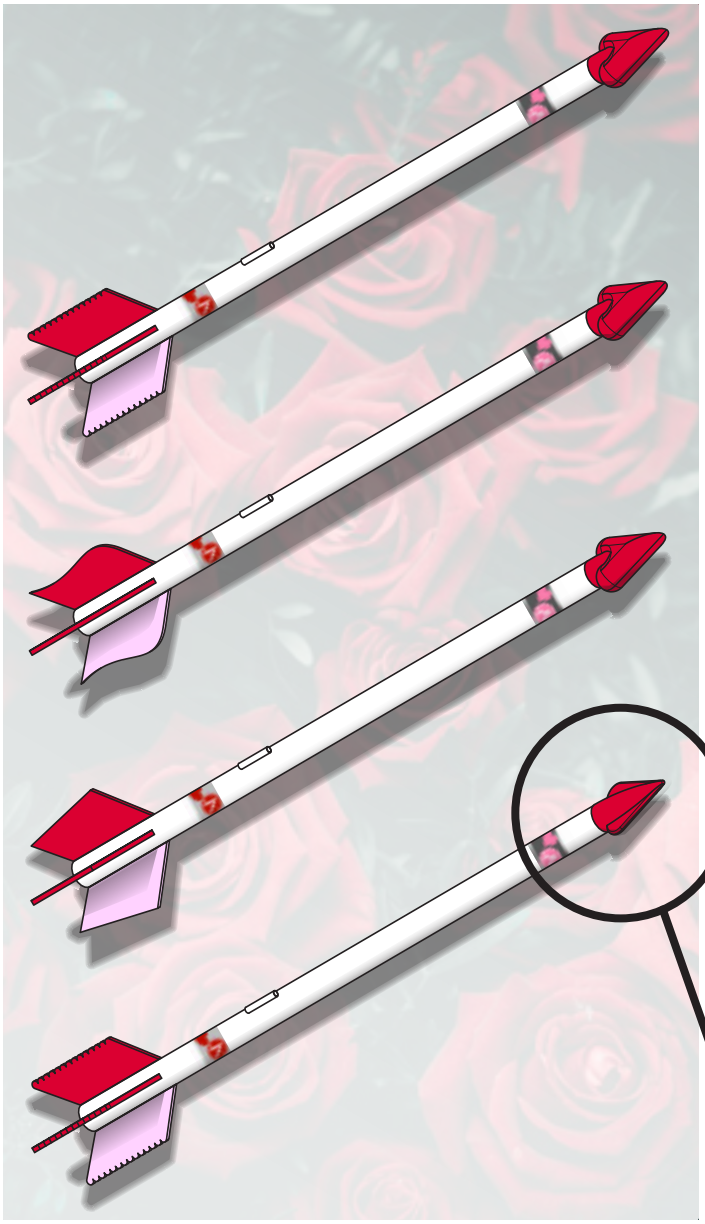
Part Number	Description	Order Quantity
10086	1 x AT-18/18" Tube	1 (6 in Package)
13015	1 x AC-18/1.5" Coupler (Shoulder for 3d Printed Nosecone)	1 (3 in Package)
13028	1 x CR-13/18	1 (6 in Package)
13052	1 x 1/8" x 1" Launch Lug	1 (6 in Package)
14097	3/32" x 3" x 9" Balsa Wood	1 (18" Total)
30305	1 x 4" x 56" Mylar Streamer	1 (2 in Package)
30325	5' 100# Kevlar	10 (Order Minimum)
3d Printed*	3d Printed Heart-SHaped Arrow Point	1 (3 in Package)
19801*	1 x PNC-18B	.stl on Apogee Website
n/a	Copy Paper for Templates	Self Gathered
n/a	Self-Adhesive Paper of Waterslide Paper for Decals	Self Gathered



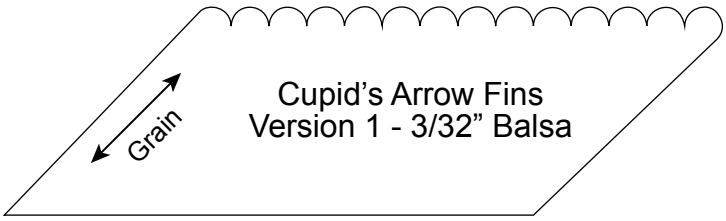
Alternate Fin Designs & Printable Templates

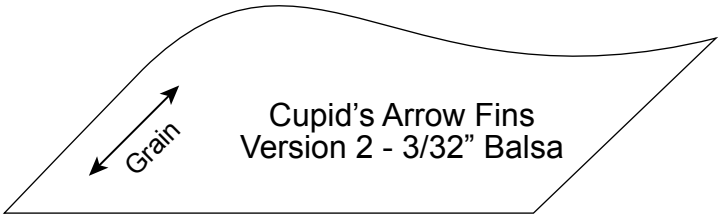
Here's the cool thing about the Cupid's Arrows—You have options! We've provided 4 fin design options here, but we encourage you to let your creativity flow and go wild!

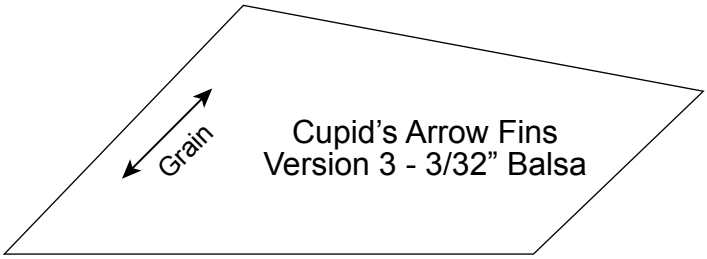
3d Printed Nosecone .STL can be found on our website in the Newsletter section:
https://www.apogeerockets.com/Peak-of-Flight-Rocket-Plans

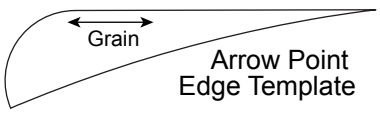


*Please Print the fin guides and arrow point edge template to scale (8.5x11" paper)









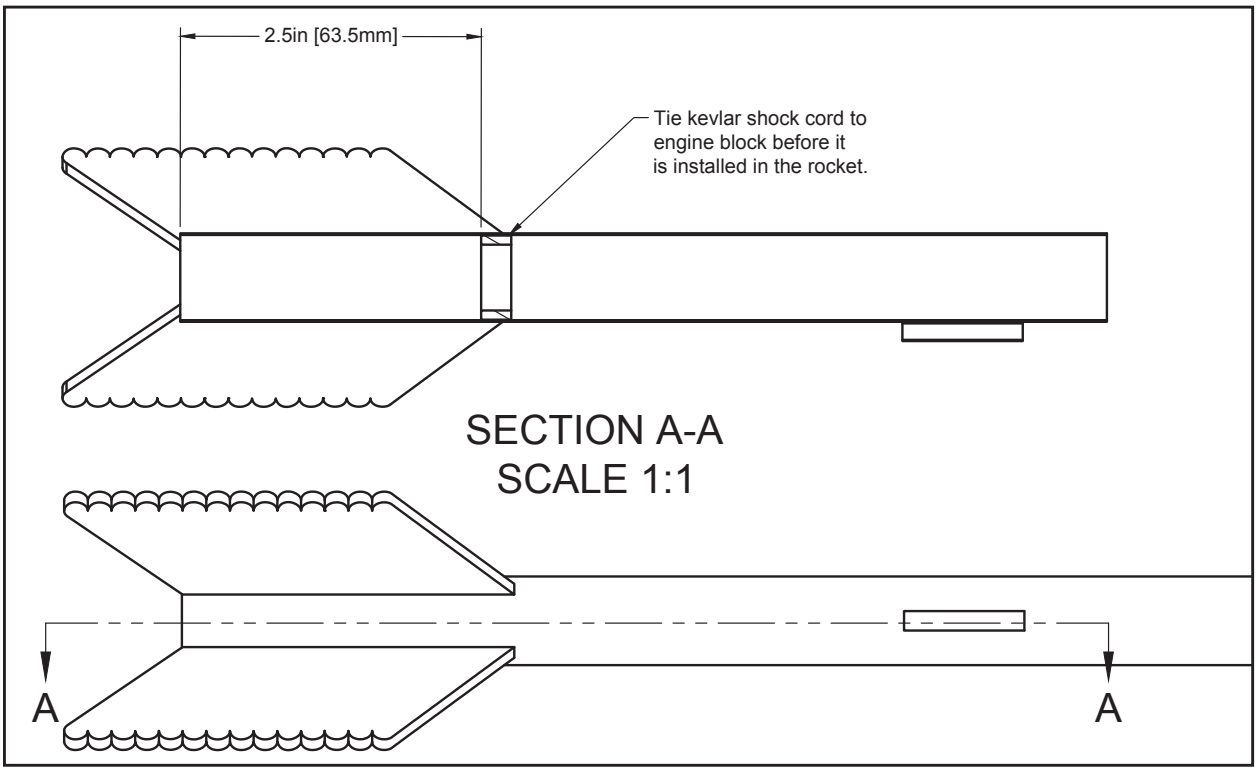
Don't want to 3d print your nosecone? We have included an option for making your own nosecone by hand if either you don't like the 3d printed one, or do not have access to a 3d printer!

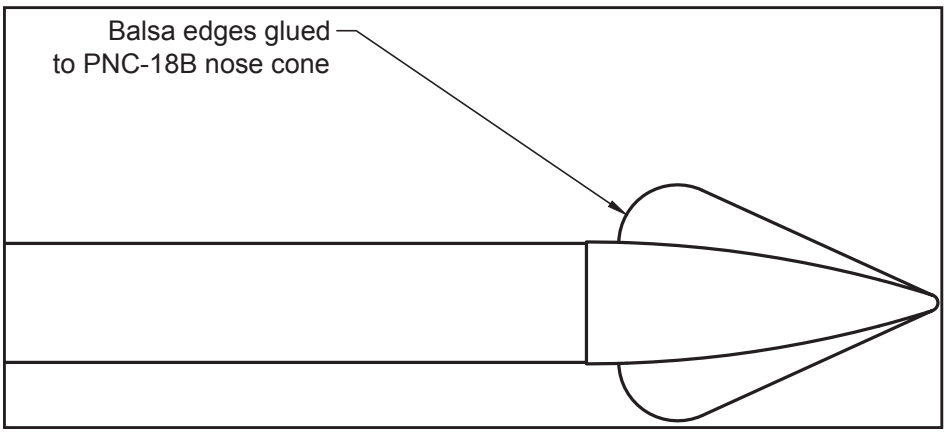
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Cupid's Arrow Rocket Plan

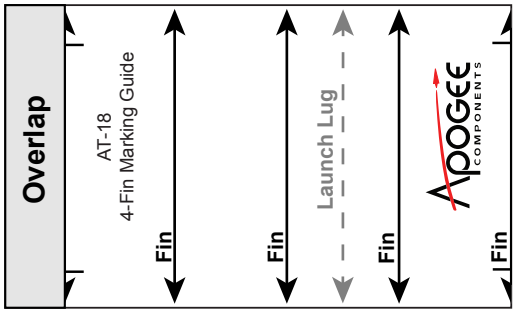


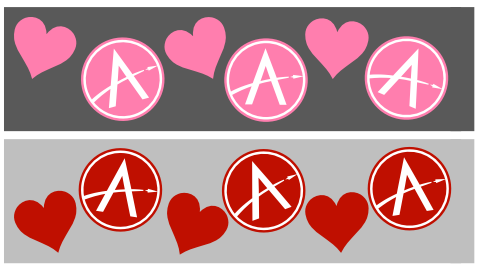


This diagram only pertains to the hand-made nosecone, NOT the 3d Printed version.

.STL aand RockSim Files Found Here!

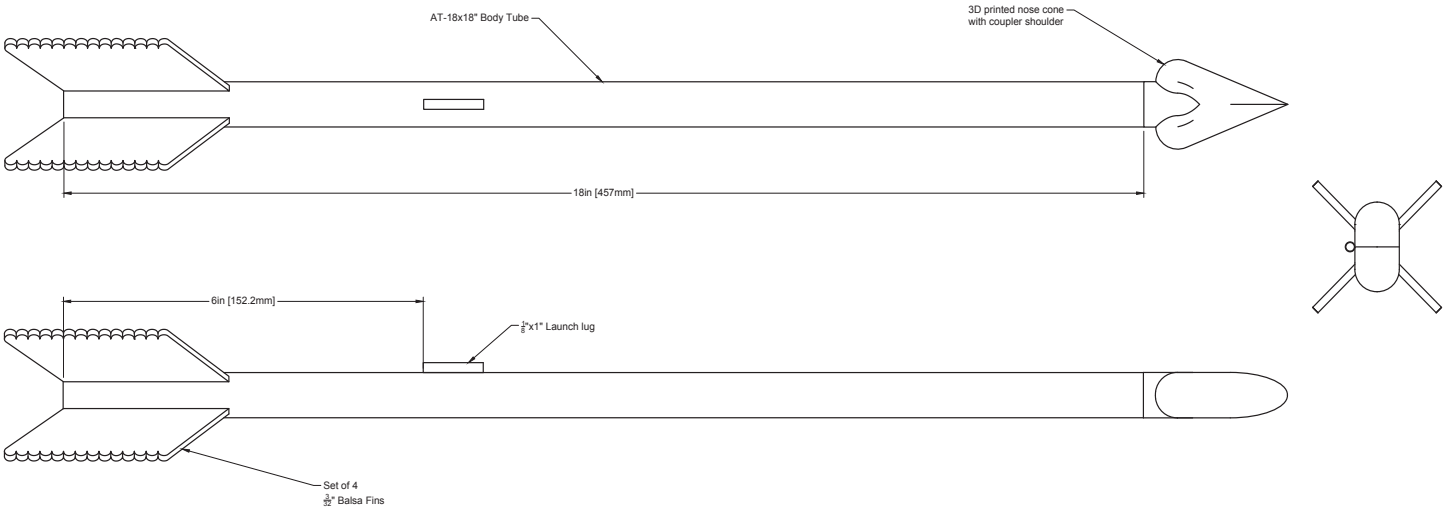
www.ApogeeRockets.com/ Peak-of-Flight-Rocket-Plans





 Please Print the decals and marking guide to scale (8.5x11" paper)

Overall Rocket Dimensions





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Article Submission Guidelines

SUBMITTING ARTICLES TO APOGEE

We are always looking for quality articles to publish in the *Peak-of-Flight* newsletter. Please submit the "idea" first before you write your article. It will need to be approved first.

When you have an idea for an article you'd like to submit, please use our contact form at **https://www.apogeerockets.com/Contact**. After review, we will be able to tell you if your article idea will be appropriate for our publication.

Always include your name, address, and contact information with all submissions. Including best contact information allows us to conduct correspondence faster. If you have questions about the current disposition of a submission, contact the editor via email or phone.

CONTENT WE ARE LOOKING FOR

We prefer articles that have at least one photo or diagram for every 500 words of text. Total article length should be between 2000-4000 words and no shorter than 1750 words. Articles of a "how-to" nature are preferred (though other types of articles will be considered) and can be on any rocketry topic: design, construction, manufacture, decoration, contest organization, etc. Both model rocket and high-power rocket articles are accepted.

CONTENT WE ARE NOT LOOKING FOR

We don't publish articles like "launch reports." They are nice to read, but if you don't learn anything new from them, then they can get boring pretty quick... Example: "Bob flew a blue rocket on a H120 motor for his certification flight." As mentioned above, we're looking for articles that have an educational component to them, which is why we like "how-to" articles.

You can see what articles and topics we've published before at: **https://www.apogeerockets.com/Peak-of-Flight?pof_list=archives&m=education**. You might use this list to give you an idea or two for your topic.

Here are some of the common articles that we reject all the time, because we've published on these topics before:

- How to get a L1, L2, or L3 Cert
- Building cheap rockets and equipment (pads & controllers)
- How to 3D print parts, or a Rocket Kit
- How to Build a cheap Rocket Kit
- Getting Back Into Rocketry After a Long Hiatus

ARTICLE & IMAGES SUBMISSION

Articles may be submitted by emailing them to the editor. Article text can be provided in any standard word processor format, or as plain-text. Graphics should be sent in either a vector format (Adobe Illustrator, SVG, etc.) or a raster format (such as jpg or png) with a width of at least 600 pixels for single column images or 1200 pixels for two-column images. It is preferable for images to be simple enough to be readable in a two-column layout, but special layouts can be used.

Send the images separately via email as well as show where they go by placing them in the word processor document.

ACCEPTANCE

Submitted articles will be evaluated against a rubric (available here on our website). All articles will be evaluated and the results will be sent to the author. In the evaluation process, our goal is to ensure the quality of the content in *Peak-of-Flight*, but we want to publish your article! Resubmission of articles that do not meet the required standard are heavily encouraged.

ORIGINALITY

All articles submitted to Peak-of-Flight must not run in another publication before inclusion in the *POF* newsletter, but it may be based on another work such as a prior article, R&D report, etc. After we have published and paid for an article, you are free to submit them to other publications.

RATES

Apogee Components offers **$300** for a quality-written article over 2,000 words in length. Payment is pro-rated for shorter articles.

WHERE WILL IT APPEAR?

These articles will mainly be published in our free newsletter, *Peak-of-Flight*. Occasionally some of the higher-quality articles could potentially appear in one of Tim Van Milligan's books that he publishes from time to time.

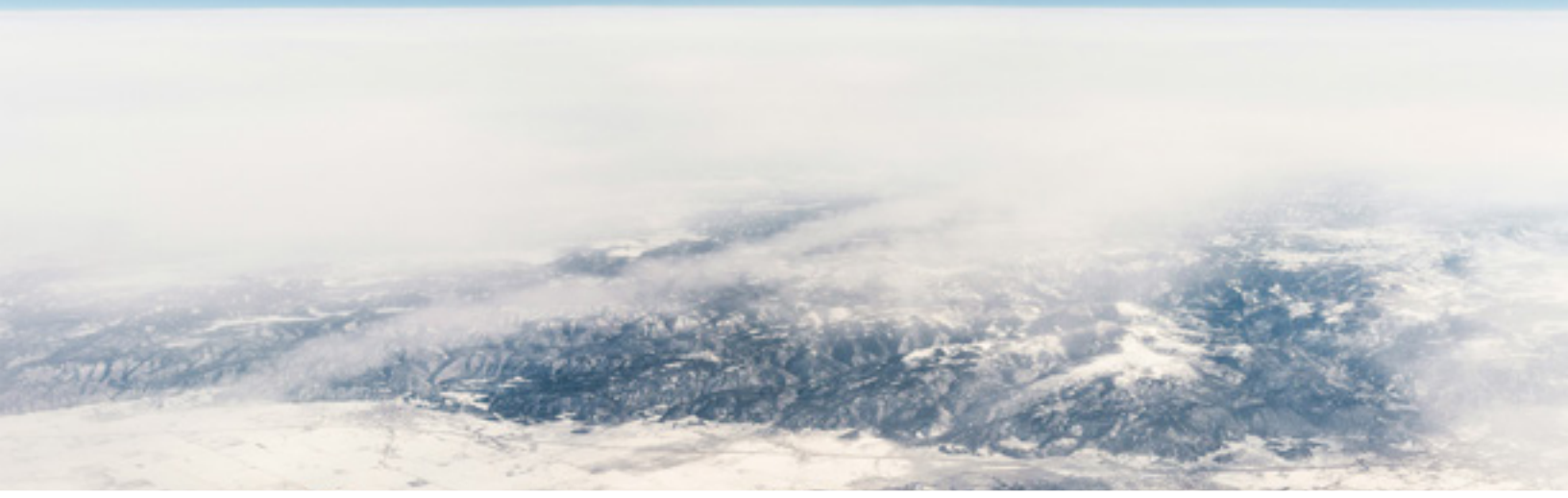



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