PEAK OF FLIGHT NEWSLETTER

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APOGEE COMPONENTS

PEAK OF FLIGHT

The New Features of RockSim V10

By Bobby Potter and Tim Van Milligan

RockSim 10 is out! Get the free trial at: https://www.apogeerockets.com/RockSim/RockSim_Trial

After more than a decade, RockSim has once again hit the ground running, and further development is a big part of our 2020 goals. It's an incredibly exciting time for RockSim as we have a new team leading the charge and a decade worth of technological advancement to incorporate.

In this issue we wanted to talk about some new features: what we did, why we did it, what it means for you as a user, and what it means for the future of RockSim.

Background Information on RockSim Since V9 was Released

To be honest, at the start of last year (2019) RockSim as a product was languishing. The last new version was released in 2009 - ten years prior. The major reason for the lack of updates was a lack of time available by the programmer, Paul Fossey. Way back in 2009, Paul got a new day job, and unfortunately his available time to work on RockSim was cut down significantly. I don't blame Paul one bit. You gotta do what you have to do in order to support your family.

But over that ten year period, a lot had changed in the rocketry landscape. One significant change was the rise of other products that competed with RockSim. They cut into the sales of RockSim. And those other programs were continuing to rip off the features we pioneered in RockSim. It was disheartening for myself and for Paul.

While we weren't selling many copies of Rocksim, we had a significant burden for user support. The one thing that we offer differently from everyone else is our ability to answer questions quickly. You don't get that from open-source applications. People even tried to get us to answer questions about how to use the other software.

After 10 years of little progress, I had to make a decision. Either phase out RockSim, or look for a way to breathe new life into it. Because we had such a loyal base of customers, I just didn't feel right to abandon them. So I worked out a buy-out deal with Paul, and took it over 100% at the beginning of December 2019.

The initial plan for RockSim after taking it in-house was to give our programmer some time to dig into it and get to know it intimately. I said to him, "tear into it, and let's see if we can get a quick update out to users in three months - by the beginning of April 2020."

We created a short list of features to add to it, and included some fixes to the things that were not working properly in V9. The bug fixes were a long list, and at some point, I had another decision to make. The number of issues from version 9 was so long, that in order to meet the April 1 deadline, we'd have to defer a lot of the things that I wanted changed.

However, we didn't make it to the April 1 deadline we gave ourselves. Version 10 wasn't released until April 20th.

When you say a "new release" is available, the first thing everyone thinks of and anticipates is a lot of significant changes. However, in order to get the release out quickly, this initial release of RockSim V10 wasn't as big as you might have hoped.

Because the number of changes isn't significant, I didn't feel right charging existing customers an upgrade fee. In the past, we normally charged an upgrade fee when we went from one version to the next - such as going from v8 to V9. In this case, going from V9 to V10 is a free upgrade because the number of significant updates were

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too few. And as long as we remain in version 10, you won't have any other upgrade fees (such as going from V10.0 to V10.1).

Incidentally, to claim your free upgrade if have you purchased V9 in the past, go to: https://www.apogeerockets.com/blog/RockSim-10-Now-Available

While there aren't a lot of noticable changes in the initial release of V10, more additions are coming in the future, and I'll talk about them towards the end of this article.

Change #1: The Look of RockSim

First, we needed to address some ease-of-use issues. RockSim is a capable and complicated program, but at its core, it's designed for learning about rocketry. Its best quality is to answer "what if?" questions. What if I changed this part of the rocket, what would happen to the flight? Those are the kinds of questions that teach you rocketry in an in-depth way that would take decades to learn by doing real trial-and-error experiments. How can we allow you to ask and answer those questions even faster than before? That's where the user interface comes in, and why it is so important.

Over the years we have fielded an uncountable number of calls asking how to do relatively simple things. Based on that, we've looked for ways to make it easier to use for first-time rocket designers.

A lot of confusion was coming from motor selection, particularly when selecting the ejection delays on the rocket motors. It wasn't easy to understand that the delay called "none" was actually a plugged motor that doesn't have a delay. Calling it "plugged" is something that we hope will be more intuitive. We also got rid of the delay choice called "all." Even we had a tough time explaining it to people. It just wasn't doing what we originally hoped, because rarely do people look at the flight graphs after running a simulation.

Furthermore, most people didn't even know that you could actually type in a specific delay value in the box. So we added a new delay choice called "Custom." And to make it really intuitive, when you select it, you now get a new screen in your face which is intuitive that forces you to pick a delay value by integer. And…. You also have the old ability to type in a decimal value into the delay field if you want. So you can still have a delay value of 10.1 seconds if that is what you want.

We also tweaked the graphics. We re-designed the look and feel of several sections of the RockSim interface. For example, we automatically made the trackball-mode of

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moving the rocket in 3D the default method since it is easier to get the rocket oriented the way you want to see it. We also updated the icons on the buttons to make them more intuitive, so you will know what they do with a quick glance at them.

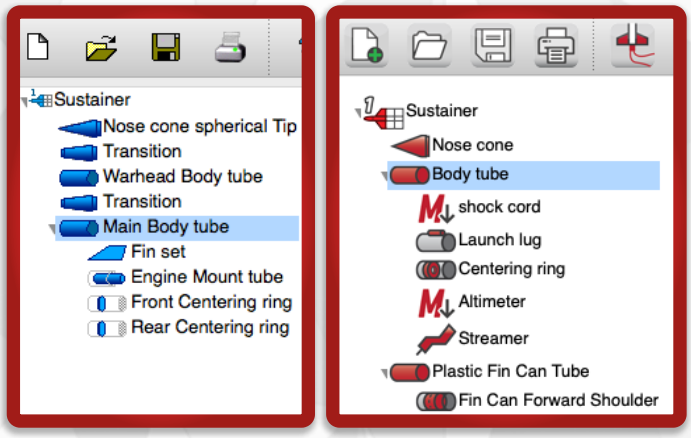

FIGURE 1 & 2: SOME OF THE ROCKSIM GRAPHICS, OLD AND NEW

We've also added some visual fixes for our 3D rendering. This includes anti-aliasing, and should make your rockets look more real and more appealing than ever.

Change #2 - Updated Databases

Another update, core to our ease-of-use goals, was the RockSim databases. It's been ten years, and the industry has changed more than you might think. There are so many parts and components that didn't exist when we released RockSim V9 and there are about as many components that did exist that just don't anymore. This left people with a parts database filled with components they couldn't buy, and when they bought a component they would have to input it manually (a feature we hope you only need now when you create a custom component).

	Mfg	Part No.	Description	ID in.	OD in.	Material
207	Balsa Machining	T80-34	2.600x2.558x.021'x34in long (white)	2.560	2.600	Paper
208	Balsa Machining	T5-9	.544x.518 x.013 x9 Plain Kraft	0.520	0.540	Paper
209	Balsa Machining	T20-18	.736 x.710 x.013 x18 Estes BT20	0.710	0.740	Paper
210	Balsa Machining	T38-34	1.635x1.525x.055x34 38mm Motor Mount size	1.530	1.640	Paper
211	Balsa Machining	T188-34	1.880x1.800x.040x34inch long (Aerotech size)	1.800	1.880	Paper
212	Balsa Machining	T70H-34	2.245x2.175x.035x34in long (white Heavy wall)	2.180	2.250	Paper
213	Balsa Machining	T80H-34	2.640x2.558x.041'x34in long (white Heavy wall)	2.560	2.640	Paper
214	Balsa Machining	T908-34	.908x.865x.022x34 Centuri ST-8 (white)	0.870	0.910	Paper
215	Balsa Machining	T52H-34	1.210x1.140x.035x34 29mm Motor Mount size	1.140	1.210	Paper
216	Balsa Machining	T50-34	.976x.950x.013x34 24mm (white)	0.950	0.980	Paper
217	Balsa Machining	T5-9	.544x.518 x.013 x9 Plain Kraft	0.520	0.540	Paper
218	Balsa Machining	T20-18	.736 x.710 x.013 x18 Estes BT20	0.710	0.740	Paper
219	Balsa Machining	T188-34	1.880x1.800x.040x34inch long (Aerotech size)	1.800	1.880	Paper
220	Balsa Machining	T52H-34	1.210x1.140x.035x34 29mm Motor Mount size	1.140	1.210	Paper
221	Balsa Machining	T55-34	1.325x1.283x.021 (white)	1.280	1.330	Paper
222	Balsa Machining	T20-EMT	.736x.710x.013x2.75 Motor Tube	0.710	0.740	Paper
223	Apogee	10139	40mm x 9.5ft Body Tube	1.580	1.600	Paper
224	Apogee	10205	38mm Motor Mount	1.530	1.640	Paper
225	Apogee	10134	"33mm x 18"" Clear Airframe"	1.280	1.330	Polycarbonate
226	Apogee	10102	24mm x 6ft Clear Airframe	0.950	0.980	Polycarbonate
227	Apogee	10064	18mm x 2.75ft Motor Mount	0.710	0.740	Paper
228	Apogee	10131	33mm x 18ft Body Tube	1.280	1.320	Paper
229	Apogee	10110	29mm x 10ft Motor Mount	1.140	1.180	Paper
230	Apogee	10063	13 mm	0.520	0.540	Paper
231	Apogee	10066	18 mm	0.710	0.740	Paper
232	Apogee	10022	54mm x 14ft Motor Mount	2.140	2.260	Paper
233	Apogee	10002	74mm x 18ft Body Tube	2.930	3.000	Paper
234	Apogee	10190	"66mm x 18"" Clear Airframe"	2.560	2.600	Polycarbonate
235	Apogee	10158	66mm x 18ft Body Tube	2.560	2.600	Paper
236	Apogee	10164	56mm x 18ft Body Tube	2.180	2.220	Paper
237	Apogee	10165	56mm x 10ft Clear Airframe	2.180	2.210	Polycarbonate
238	Apogee	10100	24 mm	0.950	0.980	Paper
239	Apogee	10144	41.6mm x 18ft Clear Airframe	1.600	1.640	Polycarbonate
240	Apogee	10141	41.6mm x 18ft Body Tube	1.600	1.640	Paper

FIGURE 3: NEW BODY TUBE DATABASE - 250 TUBES!

We needed to clean this up, and I think we've knocked it out of the park. We went through, item by item, everything available on Apogeerockets.com. If you are familiar with us, you know we carry a giant selection of items that are related to rocketry. This took a long time, but the result is a database that contains just about every motor, body tube, centering ring, e-bays, fins, retainers, rocket kits and more that you can buy from Apogee. All of it organized by a common nomenclature and linked to product numbers for easy sourcing.

This should make a big difference for every user. For beginners, inputting complex components into RockSim can be a nightmare filled with googling terms, taking manual measurements, and praying you did it all correctly. For the more advanced users, having that database at your

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fingertips should drastically reduce the time it takes you to design a rocket, source your components, and build the final product.

Change #3 - Weathercocking Cone

People ask us all the time if their rocket is weathercocking too much because the rocket is overstable. The answer to that question is found in Apogee Technical Publication #28 (https://www.apogeerockets.com/Rocket_Books_Videos/Pamphlets_Reports/Tech_Pub_28). What we did in RockSim V10 is to perform this weathercocking calculation for you, so you can tell if your overstable rocket is too overstable. You'll see the new weathercocking cone show up in the 2D flight profile screen. It is an imaginary cone of 40° projected up vertically from the launch pad. As long as the "apogee point" of the flight stays within that cone, the weathercocking of the rocket is acceptable. If the apogee point is outside the cone, the rocket has weathercocked (arc over) too far, and the rocket shouldn't be flown with the motor or the weather conditions listed.

FIGURE 4: FAILED WEATHERCOCKING TEST IN WINDY CONDITIONS. THE RED DASHES INDICATE THE SAFE WEATHERCOCKING CONE. AN APOGEE OUTSIDE OF THAT CONE INDICATES UNSAFE A FLIGHT CONDITIONS.

Change #4 - Over-the-Wire Updates

Over the V9 decade, a core functionality of RockSim broke. This functionality was designed to make it easy for us to update RockSim with bug fixes, functionality improvements, database changes and more. The loss of this functionality made small improvements nearly impossible, as only some people would take the time and effort to download those updates manually and as a result, everyone would be working with slightly different versions of RockSim V9. This would've made our role as expert support an impossible task, and is in large part responsible for the lack of fixes and improvements.

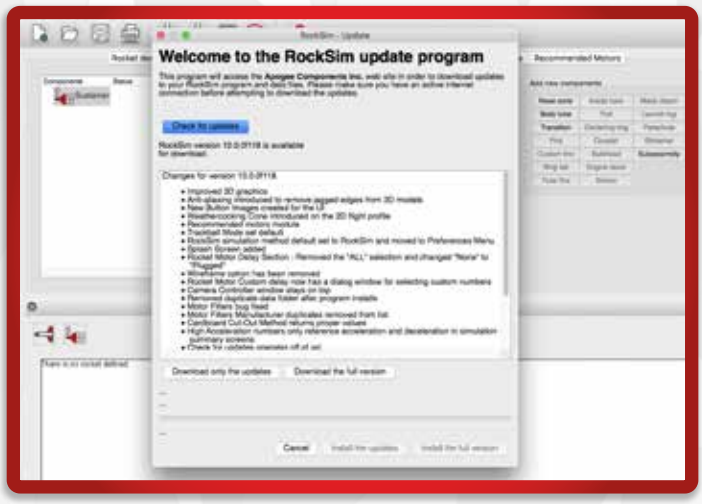

FIGURE 5: THE ROCKSIM UPDATE PROGRAM

That's fixed now. Each time RockSim V10 is loaded, it will check for updates through us. If one should be available, it will notify you directly on the screen and guide you through the process.

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This is way more important than it seems. This allows us to support RockSim the way it should be supported, and you will never again have to wait 10 years to see problems addressed and fixes implemented. We promise.

Change #5 - Recommended Motors

We're not just talking about updating the motor database here. Yes. We did that too. We went through the current NAR/TRA/CAR certified motor list, and added them all to Rocksim V10. We added hundreds of new motors that were released over the last decade by manufacturers like Aerotech, Quest, Estes, and Cesaroni.

We're describing something new and different here when discussing the new "Recommended Motors" feature. It's definitely one of the most notable improvements from a user's perspective, and will probably be on the swipe list that other programs will steal from RockSim in the future. With just a couple clicks of your mouse, the recommended motors feature allows you to quickly generate a list of compatible motors for any given rocket and environmental conditions.

We knew this was badly needed because we experience it every day. If you take a look at any rocket kit on Apogee's website, you'll notice we provide a comprehensive list of compatible motors. Historically, just like you, we would input the conditions and simulate each motor individually. We know exactly how long it takes to check all of your motor options, and it wasn't a short amount of time. From experience, a full day of simulating motors was common-place around here. Using RockSim V10, the last rocket I updated took me about an hour, and it had a 29mm motor mount. Of that hour of time, 59 minutes of it was retyping the motors into the right place on our website.

	ABOUT	REC. MOTORS	ROCKSIM FILE	TOOLS	FAQS	REVIEWS	RELATED PRO
A3-4 #05690	Quest Single Use	Fast Black Jack		242 ft (74 m)		See Motor	$9.41 2 pack
A8-3 #05747	Estes Single Use	--		236 ft (72 m)		See Motor	$11.45 3 pack
B4-4 #05749	Estes Single Use	--		603 ft (184 m)		See Motor	$12.01 3 pack
B4-6 #05693	Quest Single Use	Fast Black Jack		711 ft (217 m)		See Motor	$10.58 2 pack
B6-6 #05752	Estes Single Use	--		636 ft (194 m)		See Motor	$12.01 3 pack
C12-8 #05702	Quest Single Use	Fast Black Jack		1565 ft (477 m)		See Motor	$11.76 2 pack
C6-7 #05600	Estes Single Use	--		1440 ft (439 m)		See Motor	$13.12 3 pack
A3-4 #05690	Quest Single Use	Fast Black Jack		242 ft (74 m)		See Motor	$9.41 2 pack
A8-3 #05747	Estes Single Use	--		236 ft (72 m)		See Motor	$11.45 3 pack
B4-4 #05749	Estes Single Use	--		603 ft (184 m)		See Motor	$12.01 3 pack
B4-6 #05693	Quest Single Use	Fast Black Jack		711 ft (217 m)		See Motor	$10.58 2 pack
B6-6 #05752	Estes Single Use	--		636 ft (194 m)		See Motor	$12.01 3 pack
C12-8 #05702	Quest Single Use	Fast Black Jack		1565 ft (477 m)		See Motor	$11.76 2 pack

FIGURE 6: A SMALL COMPATIBLE MOTOR LIST FROM APOGEEROCKETS.COM

Change #6 - Help Improvements and Expert Support

True to the Apogee mission, we are committed to supporting you in all of your rocketry endeavours. This includes RockSim.

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To this end, we thought it was important to refresh most of our video content that we use for training on how to use RockSim. We've linked that new content inside the RockSim interface to make it easy to find. If you want to check out all our new content, just go to your help tab in RockSim and click "Tutorial Videos". More new content and refreshed material is coming out every day.

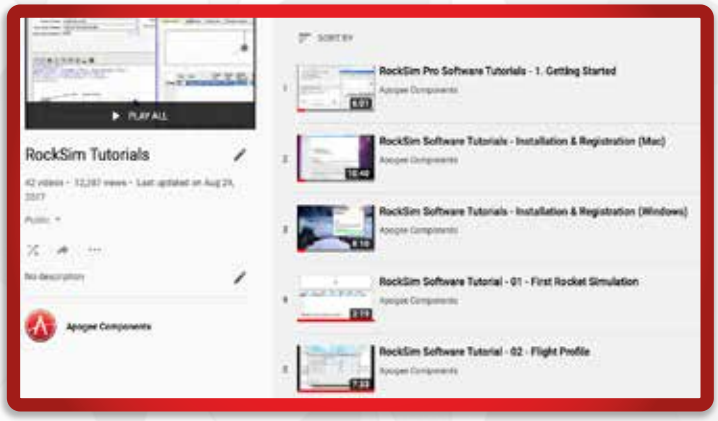

FIGURE 7: OVER 40 TUTORIALS RELEASED TO DATE - ALL DONE BY THE ROCKET MAN HIMSELF!

Change #7 - Factory Resets

Okay, maybe we overlooked this in V9… and V8… and… well, you get it.

With a software as diverse as RockSim, and all the different fields, preferences and settings available for customization, people get lost and make unintended adjustments that they can't figure out how to undo. So we added the ultimate reset button.

Check out our Facebook page
www.facebook.com/ApogeeRockets

When would you use the reset button? Normally you wouldn't ever need it. But what happens is that there are so many "options" in RockSim that are set by the user, that people often forget which ones they flipped from "off" to "on." They go to run a simulation, and the results don't match what they had in a previous simulation. And then they panic.

The method we used to fix it in the past was to have the customer send in their rocket design file to us at Apogee, and we would analyze it to see which option they had changed. Everyone (and we mean "everyone") tells us when they send in the file, that there must be some sort of NEW bug in RockSim. But with V9, that was exceedingly rare; about the same chance as getting hit by a meteor. It was always some variable in the design file that was changed, but the user couldn't find it.

So in V10, we have the reset switch to turn everything back to factory conditions with a click of a button. Now if your simulations don't seem to match up, you don't need to call us and get embarrassed to find out it was something simple like changing the simulation end point to being "at apogee" instead of "when it returns to the ground." Just click the button and there is a good chance that the simulations will look normal again.

We've already found that our technical support issues have started to go down because of this.

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Changes #8 to #80 - Bug fixes

There were so many things that we fixed that were bugs in version 9. Things that annoyed me personally were high on the list. For example, I didn't like it that the optimal delay value was wrong in version 9 if the rocket didn't deploy past apogee on the way down. You may notice while running simulations in V10 that there are many times when it runs them twice. That second time is actually doing it again to make sure it got the optimum delay time for the rocket engine correct.

I also got tired of answering the question of why some flights were reporting enormous accelerations. The reason why was because they were seeing a massive deceleration when the parachute came out at high speeds. RockSim was technically correct -- it was a high acceleration. But it wasn't occuring during the thrust phase of the flight where the user wanted to see it.

Then there was the cardboard cut-out method for finding the CP that was totally screwed up.This was actually a harder fix to make. But we found it.

The camera controller used to orient the rocket in 3D view wasn't staying on the top of the screen like it should have, and why did we still need a wire-frame view of the rocket? We only had it in the past because computers couldn't render the rocket fast enough when it was rotated. So we nixed it from V10.

However, as mentioned in the beginning of this article, there are still many bugs from V9 that aren't yet fixed in the initial release of V10. This is the most disappointing part to users, and we've already got an earful of 'let-down' from customers. I don't blame them for feeling that way. Did I mention that this was a free upgrade from version 9? That is the other reason we didn't feel right about charging for this upgrade. It's not perfect, and if you are paying for it, you should be entitled to a better product.

We will be having more free updates in V10 as we make additional corrections to the application. The big one that is highest on our priority list is an upgrade to the underlying graphical interface of the software. It controls how the information is displayed on the computer screen. We know for a fact that users with ultra-high definition monitor screens are experiencing tables that appear squished and scrunched up. We want to fix this as quickly as possible.

What's Coming In the Future?

Now that we've made the decision to invest into the future of RockSim and to give it new life, the juices in my brain have been overflowing with cool ideas.

The big idea I want to accomplish is to incorporate the features of RockSim-Pro into RockSim. We had to discontinue RS-PRO temporarily to work on RockSim. But we definitely intend to bring it back, and even better than before. It was always my goal to do that, and now I think we're in a position to do it. And if they are all in one software, then we'll be better able to support customers and help them out with complex projects.

The other big issue I want to finally put behind us is the problems we have with installing the software on your computer. It is more of a nightmare for us than it is for you. And we totally hear your frustration as you try to get it installed. Both Windows and Mac users have their own set of issues getting it installed. My dream is to make it a cloud based application that runs in a web browser. It may require you to

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be connected to the internet, but it alleviates the problems that Microsoft and Apple Computer heap on application developers like us.

I know that you probably have ideas of your own for what you want to see in a future version of RockSim. So if you want to jot them down and send them in, I would love that. I can't promise we'll be able to incorporate all your ideas into the software, but we'll certainly consider them. Just use our contact form on our website or our chatbot to send them in. We read both channels of communication every day.

If you haven't tried RockSim, we do have that free 30-day trial version. We hope you'll consider it in the future.

About the Author:

Tim Van Milligan (a.k.a. "Mr. Rocket") is a real rocket scientist who likes helping out other rocketeers. He is an avid rocketry competitor and is Level 3 high power certified. He is often asked what is the biggest rocket he's ever launched. His answer is that before he started writing articles and books about rocketry, he worked on the Delta II rocket that launched satellites into orbit. He has a B.S. in Aeronautical Engineering from Embry-Riddle Aeronautical University in Daytona Beach, Florida, and has worked toward an M.S. in Space Technology from the Florida Institute of Technology in Melbourne, Florida. Currently, he is the owner of Apogee Components (http://www.apogeerockets.com) and also the author of the books: Model Rocket Design and Construction, 69 Simple Science Fair Projects with Model Rockets: Aeronautics and publisher of the "Peak-of-Flight" newsletter, a FREE ezine newsletter about model rockets. You can email him by using the contact form at https://www.apogeerockets.com/Contact.

Ragnarocket Rocket Plan

Download the ***RockSim*** design file for the Ragnarocket at: https://www.apogeerockets.com/Peak-of-Flight-Rocket-Plans

Ragnarocket Parts List

20068 - (1) PNC-33 Nose Cone
12028 - (1) Boattail Motor Mount Kit 18-33
10131 - (1) 33mm Body Tube (15 inches long)
14099 - (1) Balsa Sheet 1/8” X 3” X 18”
30325 - (1) Kevlar Cord 100# X 8 feet
29091 - (1) 15” Printed Nylon Parachute
13052 - (2) 1/8” Launch Lug

Recommended Motors

B4-2, B6-2, C6-5, C12-4, D16-6

A Design by Tim Van Milligan

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Ragnarocket Rocket Plan

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The Roar of Odin

"Ragnar's blood runs through your veins; one day you will be king" my mother said as I closed my eyes to rest. This night, the last I would see her, was filled with celebration and tales of Valhalla. My father, Ragnar, had returned from foreign lands and he wove tales of cities with homes taller than trees and battles with gods that would rain fire from the sky, as if they had stolen the thunder from Odin himself.

Indeed his latest journey was a trying one. He returned to our shores with few spoils, and even fewer men. As he spoke, those in attendance were in awe of his bravery, but I could only hear the fear in his voice. Who but the Vikings should be blessed with the power of Odin?

Soon after I was sent to bed. I was no warrior after all, and these feasts were for my father's strongest and bravest men. Though I was skilled with the sword and stood with courage, I was small and weak and hurt easily. They called me Ivar the Boneless.

A battlehorn cut the silence of the night and I sprang awake. It sounded several more times as I made my way to the great hall where my father would surely be gathering his men. As I neared the hall, the sounds of the horn faded as thunder could be heard in the sky and felt beneath my feet.

The great hall is indeed where I found him. My brothers had beaten me there, and they stood ready to lead the still half-drunken warriors who had gathered to feast. You could hardly hear their battle cries as they rushed from the great hall toward the beaches, my father leading the charge.

As I gathered my sword and shield to join my village in battle, a hand came to rest on mine. It was my mother, eyes wide with fear and filled with tears. She came close and whispered just one word… run. And I did.

As I made my way through to the edges of our village, lightning struck and nearly knocked me from my feet. It would strike many more times as I made my way into the forest, each as loud and bright as the one before, but I continued to run. I ran until the shield became too heavy for my hands, then I dropped it and ran some more. I ran through much of the night, until I was delirious from exhaustion. I could only see the ground in front of me from the light of my village burning in the distance.

The root of a tree caught my foot and I finally collapsed. The sounds of the attack had faded in the distance and all that remained were the dim flames of my village dancing against the night sky. I began to think of my family and how they fared, and my duty to them if the worst had come. These thoughts carried me through the night until my tears had been replaced by the morning dew.

"Ragnar has fallen!" a deep voice bellowed through the forest, shaking me awake. "Ragnar has fallen!" the voice repeated, loud enough to shake the dew from the leaves.

"Ragnar has fallen!" the voice continued as I got to my feet and gripped the hilt of my sword tightly. The voice continued to repeat the claim, and my fear became replaced with a rage. My father, the great king Ragnar Lodbrok, had fallen? I would burn the world to the ground should it be true.

I began to follow the voice, ever alert, as it continued to bello the sentiment. Soon I came to a clearing, where the voice was clearly originating, but no one was around. Just a tree in the center of a large clearing, untouched by the violence of the night before.

"Welcome King Ivar, Ragnarsson" the voice bellowed, this time loud enough to cast waves through the grassy field. It seemed to originate from the tree itself, and I approached slowly, sword in hand.

"Kneel great king, I have a gift from Odin", this time softer, but clearly coming from the tree. I was hesitant, and sought to peak behind the tree for the man playing jokes on me before it yelled "kneel!" so loudly it knocked me from my feet.

I stayed still and silent for many moments, just observing what was before me. "I am no king" I said after gathering the courage.

"... and I am merely a root of Yggdrasil, but I've come with a message for the new king, the boneless", an aura emanated from the tree as it spoke. "Ragnar has fallen. Ivar, the eldest son of Ragnar, will avenge his people as is our way."

The task seemed daunting. "They wield the power of Odin, I don't have the-"

"Only a Viking King can wield the power of Odin!" it erupted as the light became much brighter and it began to morph..

"Take this gift Ivar, it is true power, marked with runes of courage, good fortune and safe travels." as the voice began to fade. "From this, you will unleash the fire and thunderous roars of Odin himself."

"These are the end times Ivar… Welcome to Ragnarok"

-Written by Bobby Potter

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Ragnarocket Rocket Plan

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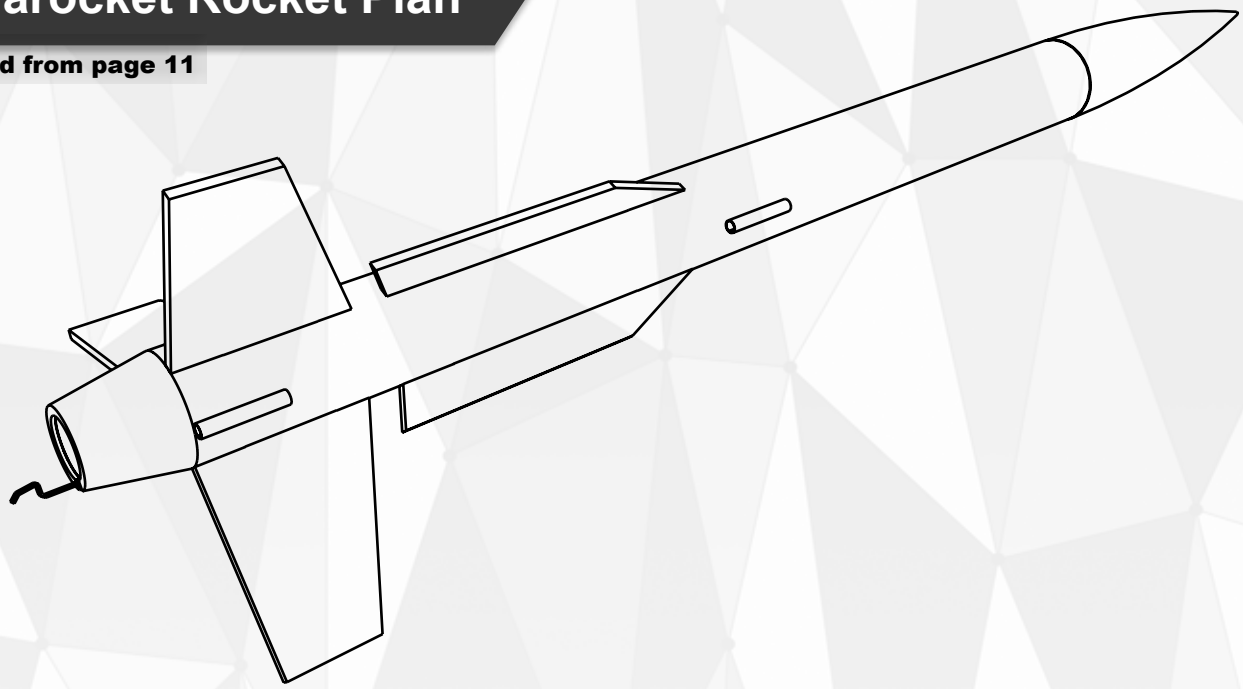

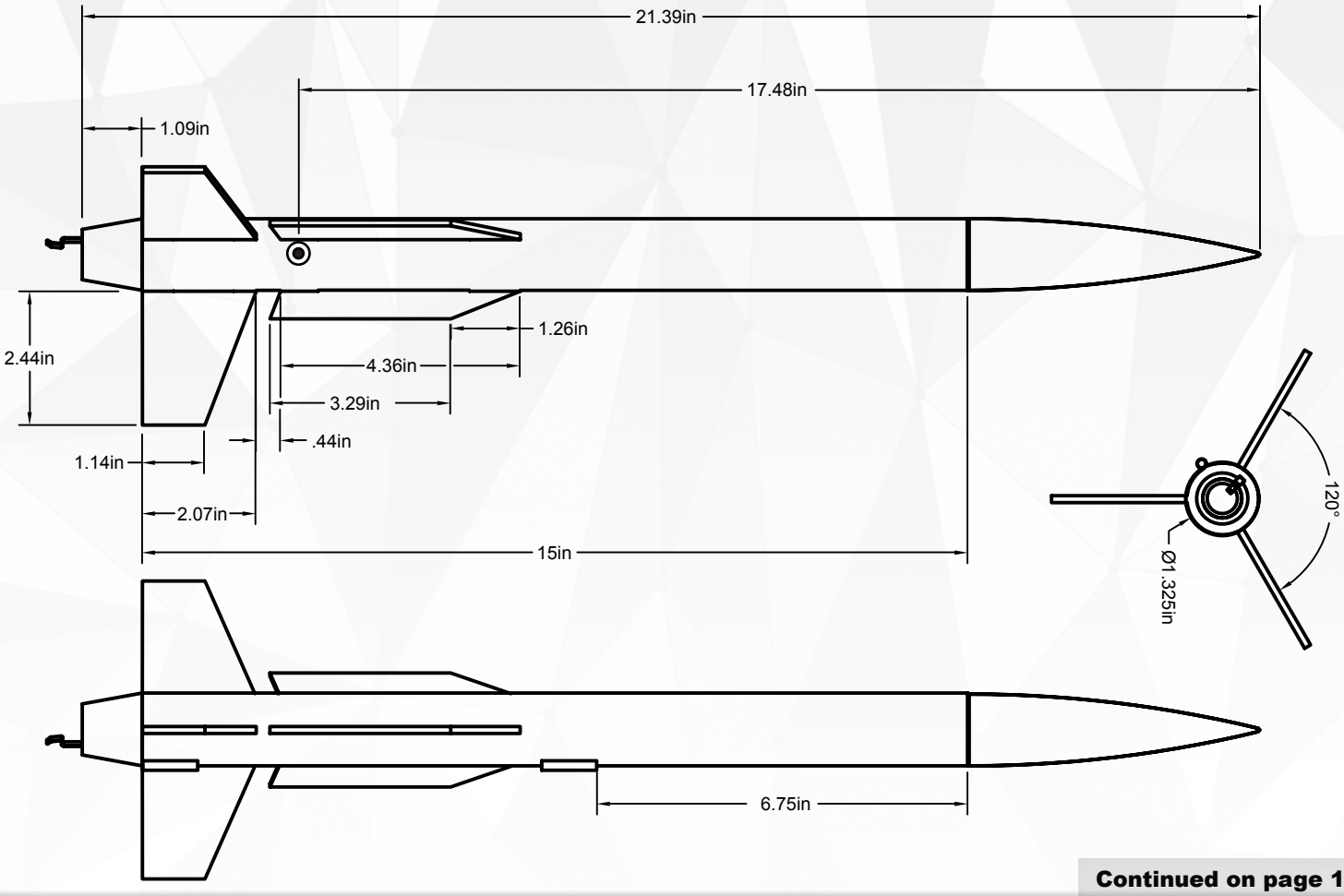

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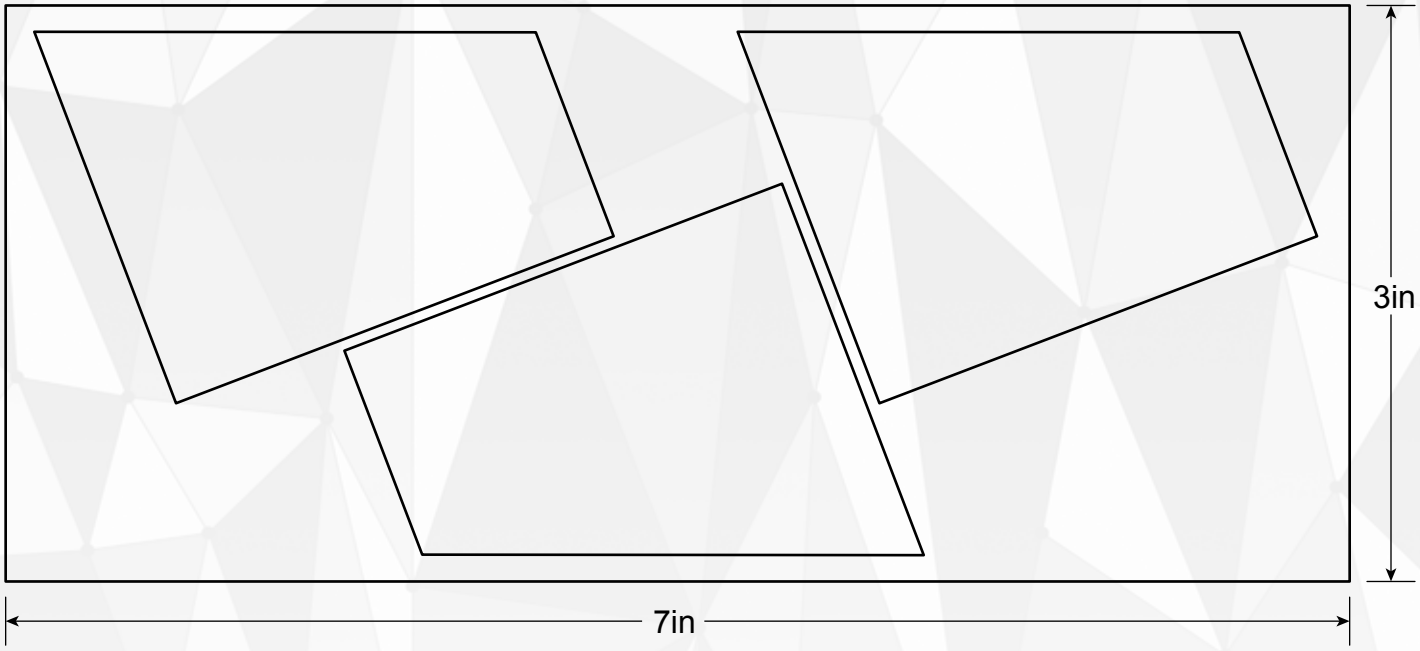
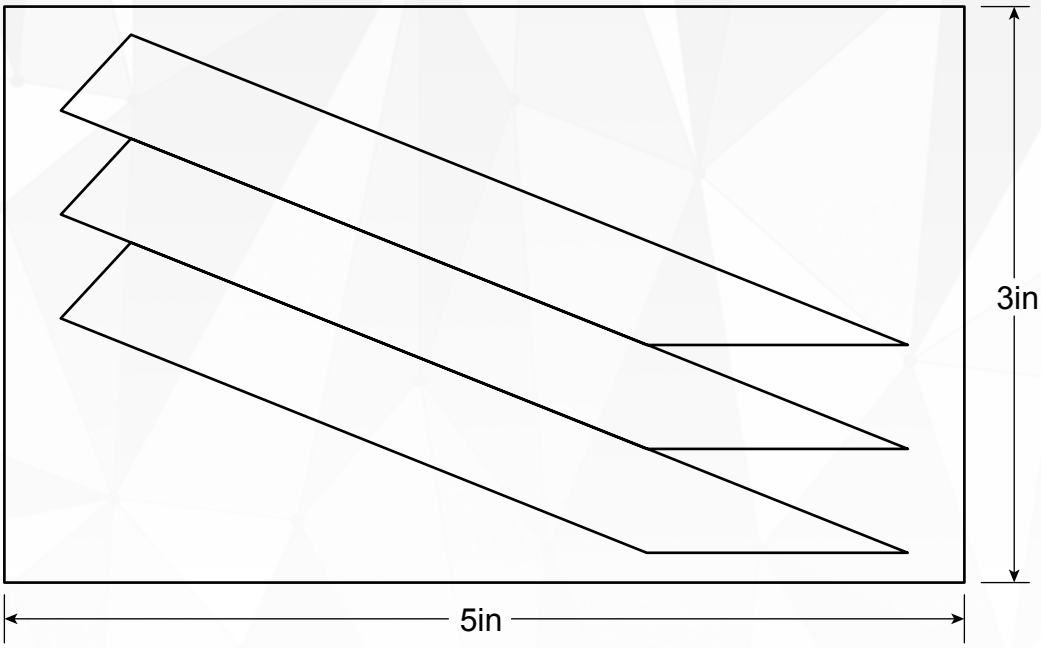
Fin Guide





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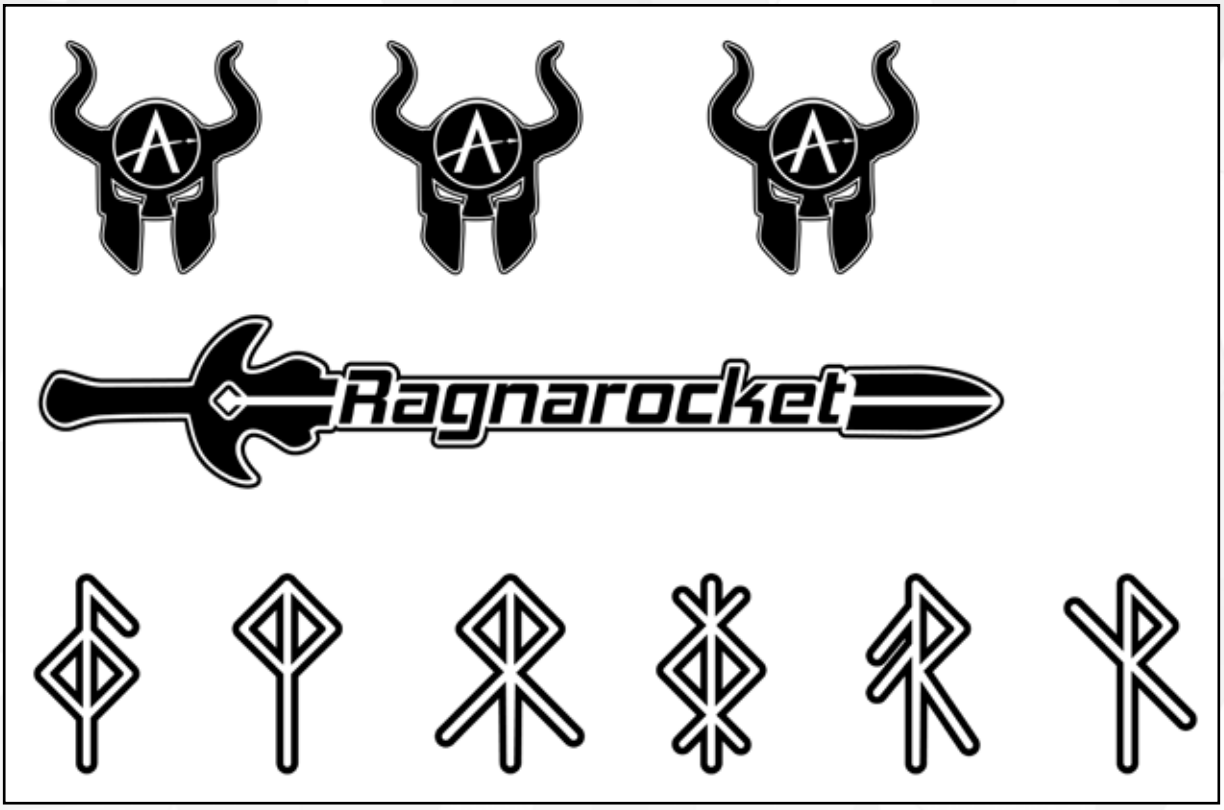
Decal Sheet
4.1" X 6.3"



(Health) *(Protection I)* *(Courage)* *(Protection II)* *(Energy)* *(Safe Travels)*