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NEWSLETTER

Feature Article:

How To Add A Launch Lug Standoff In RockSim v9

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ISSUE 251 DECEMBER 29, 2009

Adding A Launch Lug Standoff In RockSim v9

By Tim Van Milligan

Here's a common question that I'm often asked: *"How do you add a launch lug on a standoff to a design in RockSim v9?"*

This is a good question, and fortunately, the process is actually easier than you might think. But before going through the steps, what exactly is a launch lug standoff?

In simple terms, it is a pylon that sticks out from the body tube of the rocket, to which a launch lug is glued to. If you imagine a short stubby trapezoidal shaped fin with a launch lug glued on the tip edge, you're understanding this perfectly.

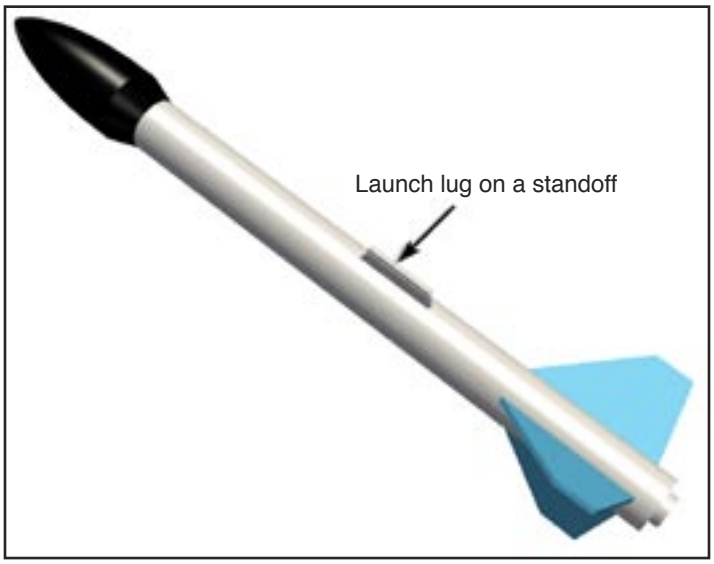

Figure 1: A launch lug standoff is needed when the nose would interfere with the launch rod.

When would you need to use a launch lug standoff? Whenever your rocket's nose cone is bigger than the diameter of the main tube of the rocket. An example would be an egglofting rocket, like the Quest Courier (www.ApogeeRockets.com/quest_courier.asp). It is needed because a the launch rod would interfere with the nose cone if the lug was just glued to the side of the rocket. In other words, the lug has to "stand off" from the side of the rocket so that it can be placed on a launch rod.

Since the standoff pylon has the same shape as a fin, you can expect it to behave like a fin. It will cause lift and drag and change the trajectory of the rocket. That is why adding it to the RockSim design file is a good idea.

RockSim is unique among rocket design software. It is the only program that allows you to create a single fin, which be used at the pylon for the launch lug. To my knowledge, all the other programs force you to create a set of fins, with three fins being the minimum number. RockSim allows you to add one fin at a time if you so desire.

A single fin does affect the CP location on the rocket, as well as the drag. If the CP moves too far forward with the addition of the added fin, then the rocket could possibly go unstable. That would be bad, and why I recommend using a design software like RockSim.

In previous versions of RockSim, it was not possible to attach the lug to the standoff in the design file. It could add the single fin, but not the launch lug tube to the pylon fin. To do this, you'll need to use the new "pod" feature that only RockSim v9 has.

Start by creating a single fin in RockSim. This is easy to do, and I won't go through the steps. The only thing you need to do is make sure the span distance will put the lug away from the tube more than the maximum diameter of the nose cone (see Figure 2). If you want to be exact about it, you can calculate the minimum span of the standoff fin

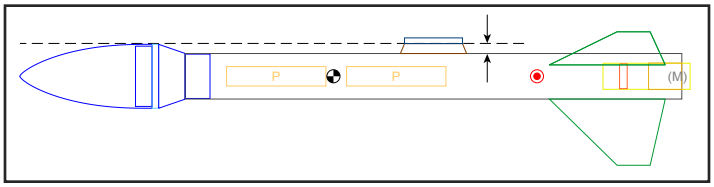

Figure 2: When designing the standoff, make sure the launch rod will clear the nose cone.

by subtracting the diameter of the tube from the maximum diameter of the nose cone. Then divide that number by two. The result is the minimum span height of the stand-off fin.

Of course, you can make the standoff taller than the minimum height. But remember that doing so will increase the drag of the rocket, and will have a more profound

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impact on the CP position. Personally, I recommend making the span length the minimum length that you calculate using the formula above.

At this point, the next part you'll add to the design is a "pod." A pod is just a collection of parts that are attached externally to the rocket. You'll attach the pod to the standoff fin; which will tell RockSim where you want the parts that are in the pod attached.

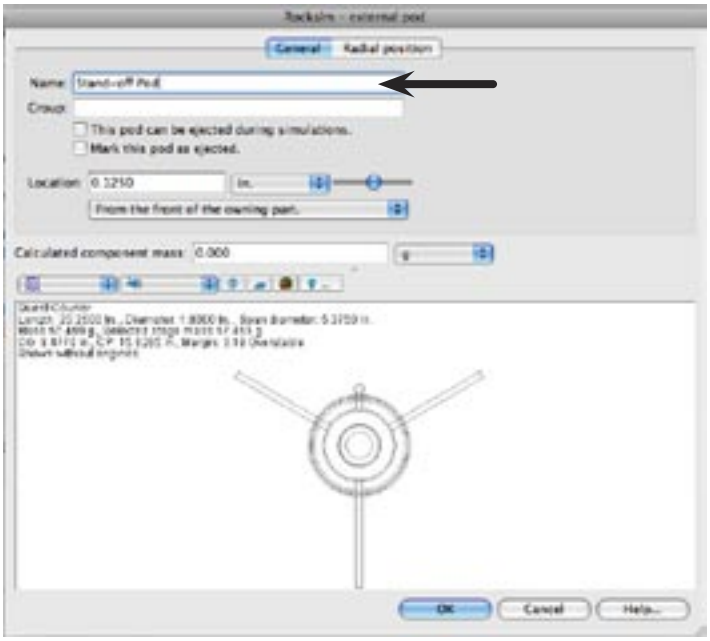

Figure 3: The first time the pod design screen opens, just change the name. You will tweak the other parameters after you've added parts to the pod.

When you first attach a pod to a part, you'll get the pod design screen. I usually just provide a name for the pod (see Figure 3), and then close the pod design screen window.

At this point, when you go to the parts tree and highlight the pod, you'll notice that the launch lug button is greyed out. That means you can't attach a launch lug directly to a pod. But think about this for just a second... What exactly is a launch lug? It is just a very small tube. And the

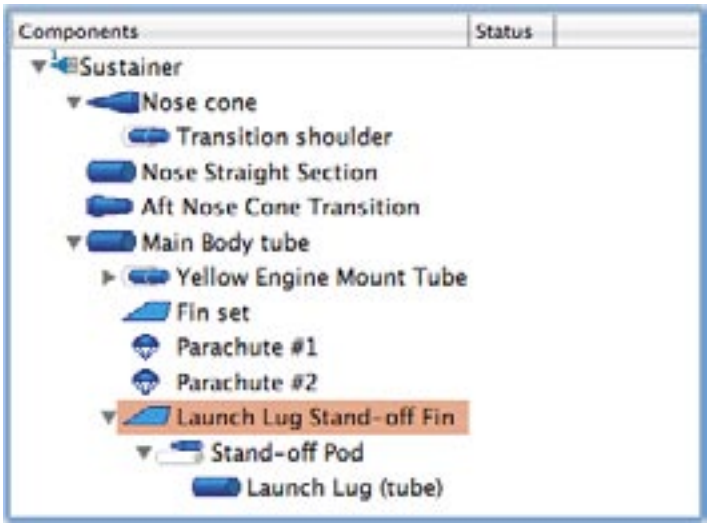

Figure 4: The bottom three parts in this image of the parts tree is the launch lug stand-off.

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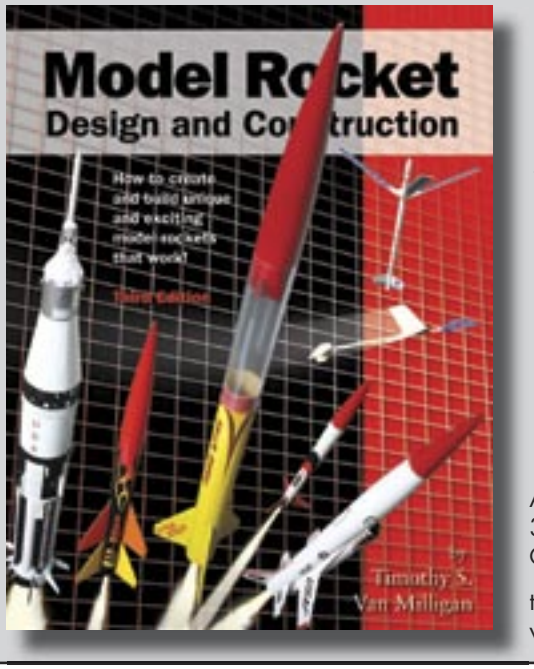

Model Rocket Design and Construction

By Timothy S. Van Milligan

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This new 328 page guidebook for serious rocket designers contains the most up-to-date information on creating unique and exciting models that really work. With 566 illustrations and 175 photos, it is the ultimate resource if you want to make rockets that will push the edge of the performance envelope. Because of the number of pictures, it is also a great gift to give to beginners to start them on their rocketry future.

For more information, and to order this hefty book, visit the Apogee web site at: www.ApogeeRockets.com/design_book.asp

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"tube" button is active, so you can attach a tube if you want.

Is there any disadvantage of using a "tube" instead of a "launch lug?" Nope. To RockSim, it is all the same. So go ahead and use a tube! The only disadvantage is that the launch lug dimensions are not in the tube database.

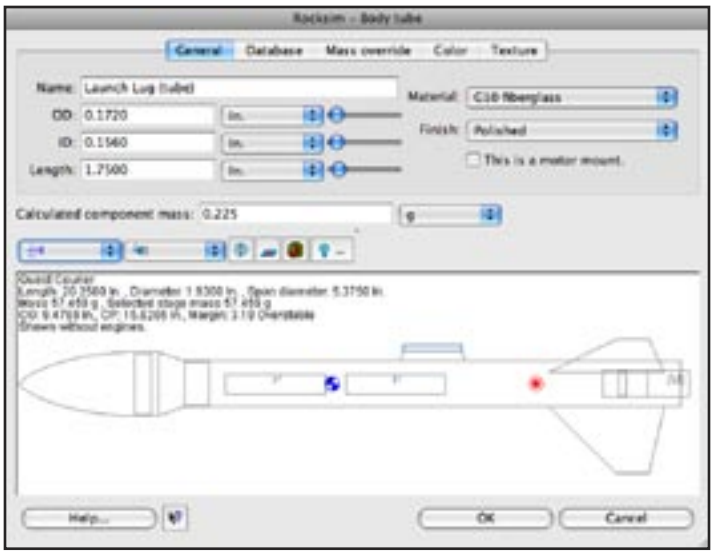

Figure 5: The lug itself is actually a tube. The standard 1/8" launch lug has an OD of 0.172 inches and an I.D. of 0.156 inches.

But that isn't an obstacle for you, is it? You can dig into the launch lug database and find the dimensions of the tubes, can't you? You're a smart rocket designer, so I'm sure you can do it.

So at this point, you select the tube to attach it to the pod. Then all you need to do is to specify the material, provide the outer diameter and the inner diameter of the launch lug tube, and give it a length.

Tweak the Pod Location

The only tweaking you may have to do is go back to the pod design screen and move the position of the pod to position the launch lug right over the standoff. You do this by clicking on the General tab of the pod and adjusting the position.

The launch lug standoff design is now done. But you should check two more things before saying everything is perfect. First, look at the base view of the rocket. Is the standoff clear of the fins so that you can put a launch rod through the lug without a fin getting in the way? If not, go back and edit the standoff fin. Just change the radial position as necessary. Since the lug tube is attached to the standoff fin, when you change the radial position, everything attached to it will move too.

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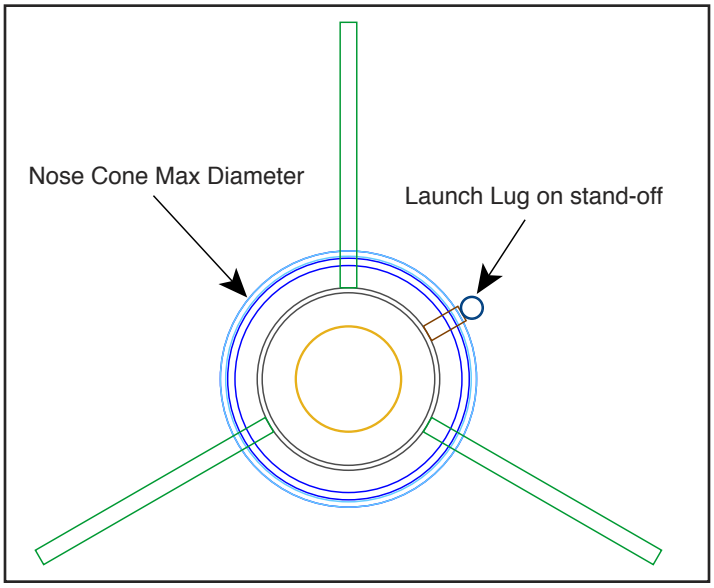

Figure 6: Base view of rocket. Make sure the fins don't interfere with the launch rod going through the lug.

Finally, where should the standoff go on the rocket? If you have just one lug and standoff, then the position on the rocket should be so that the lug spans the Center -of-Gravity. Remember to put a motor in the design so you know where the lift-off CG is before you start moving the location of the standoff fin.

That's it. It wasn't so hard was it? To review, you just add a single fin, attach a pod to it, and then attach a small tube to the pod.

If you have any other questions about using RockSim, you're welcome to send me an email. But before you do, please check the frequently asked questions on our web site. Most of the common questions are answered there, and it will save you a lot of time by checking there first.

About The Author:

Tim Van Milligan (a.k.a. "Mr. Rocket") is a real rocket scientist who likes helping out other rocketeers. 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 a 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 the curator of the rocketry education web site: http://www.apogeerockets.com/education/. He is also the author of the books: *"Model Rocket Design and Construction," "69 Simple Science Fair Projects with Model Rockets: Aeronautics"* and publisher of a FREE e-zine newsletter about model rockets. You can subscribe to the e-zine at the Apogee Components web site or by sending an e-mail to: ezine@apogeerockets.com with "SUBSCRIBE" as the subject line of the message.

2009 Year End Review: What's Up With Apogee?

By Tim Van Milligan

It has been a really long time since I wrote about the things happening internally at Apogee Components. I don't usually write these types of articles because they don't fit well with the "how-to" nature of this newsletter. I'm sure you'd rather read about stuff that would make you a better modeler and to learn more about how rockets work. I suspect that is the kind of stuff you care about most, right?

But occasionally, I have to jot down a little bit of history of Apogee Components for my own personal reasons. I have such a short memory, and if I don't write them down in a place that is easy for me to find stuff, then I'll lose that history. Some day, when Apogee Components is under new ownership (I hope I live a long time yet...), I suspect that someone might care what happened in the past that caused the company to get to where it is. That is the reason for this article.

What happened in 2009 at Apogee?

Overall, I'd say it was a good year, especially when considering the national economy is still limping along. I've got quite a few local friends that were laid off this year, and most of them are still without jobs. On our street here in Colorado Springs, there are a lot of vacant office buildings where there used to be thriving businesses. All of that puts things into perspective for me as I write this.

Photo 1: Our warehouse became fuller in 2009. But we still have a lot of room for expansion.

With that in mind, sales were better for Apogee Components than they were in 2008, and we made a lot of progress in getting prepared for the future.

We finished off the year 2008 by releasing the 9th version of the RockSim software. A new version of RockSim is always a cool thing, and starting off the year with a big

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release set the tone for how I wanted 2009 to go.

When I last updated you on the company financial situation in October of 2008, I mentioned that Apogee was whittling down the debt that I incurred because of our big move to our current facility in March of 2007. The good news is that by the end of February of this year, we paid off the last penny on the debt, and we've remained debt free since then. The extra money was invested back into the company to make it better for you and our other customers.

Photo 2: The fun part about running Apogee is that I get to launch a lot of rockets. Here I am launching a Quasar One Orion Star rocket kit on December 19.

One of my first investments was a new computer and a couple of inexpensive video cameras. I wanted a newer computer with a bit more horsepower to do some video editing for a new project I started in January. That project was a bi-weekly video tutorial that teaches modelers some tricks and techniques to build better rockets. We did 26 videos in 2009, and met the goal of one every other week, alternating with this regular newsletter. Looking back, it was a lot of work. But the video tutorials that are posted on YouTube have been a lot of fun to make, and I think I'll continue to make them as long as I have time, energy, and ideas for new topics.

The regular newsletter actually takes longer to produce than the videos. Because of the poor economy, I hesitated on hiring extra help to get the newsletter created. But I'm now in the position to offload some of the work to others. In fact, I'm in the process of looking for people that want to write articles and get paid for it. I'm offering up to $350 for a new and good article. If you're interested in making some cash in your free time, drop me a note and I'll send you some guidelines on what kind of things I'm looking for.

The other investment I made was to continue our expansion of offering different rocketry products. The benefit for you is more rocket kits and accessories to choose from. I want Apogee to become your one-stop source for the rocketry products that will move you toward whatever rocketry goals you're working on.

This past year we expanded our selection to include rocket kits from Aerotech, Quasar One, Always Ready Rocketry, Pemberton Technologies, Starlight Model Rockets and most recently, LOC-Precision. We also finally got the unique kits from Noris Rocketry back in stock. Besides the new kits from these vendors and several other new kits from vendors we were carrying prior to 2009, we added a couple of our own rocket kits too. In April, we added the

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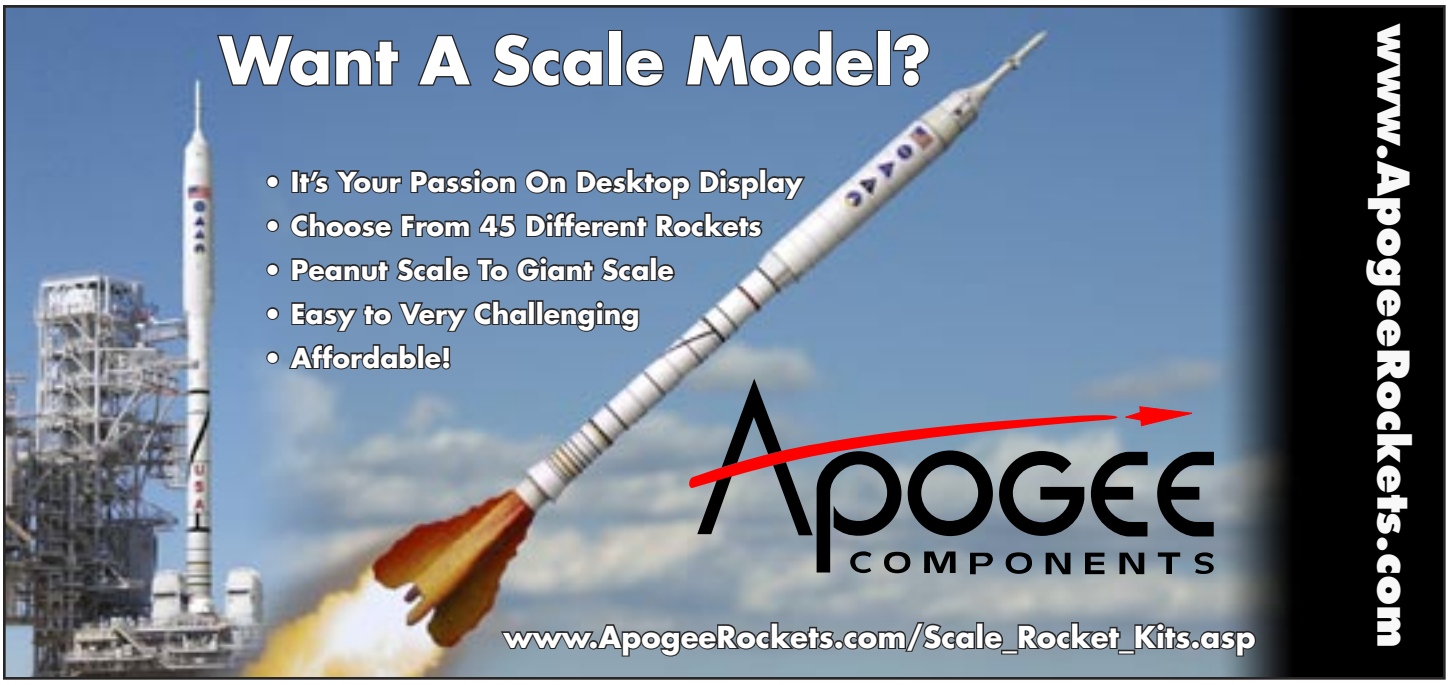

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Photo 3: Michelle is our Office Manager and has been with Apogee Components for over 10 years. Go ahead and test her knowledge of rocketry when you talk to her on the phone.

DynaStar LexxJet, and in November, we released the Apogee Nemsar rocket kit. At this current time, we have 176 different rocket kits for you to choose from! You can see them all for yourself at: http://www.apogeerockets.com/All_rocket_kits.asp

Besides kits, we've been expanding our selection of accessories like electronics and other products too. We've added a South African-produced altimeter from a company called Entacore, as well as an altimeter from Winged Shadow Systems and two flight computers from G-Wiz. In the other products category, we added Rouse-Tech reload casings and Sky Angle Parachutes.

I think we're only about half-way in our expansion of different rocketry products, so in 2010 my plan is just to continue to seek out more products to fill in the gaps where I still see room for growth.

For example, this month we added a whole bunch of components from LOC Precision. We're also getting in a sampling of the LOC kits too. We just haven't had time to put them on our web site yet. As you know, we build everything we sell here at Apogee Components, so that we know what our customers will experience when they buy something from us. This product review takes a lot of time and money, which is why we get a bit back-logged. Occasionally, I seek out help from modelers to help me review new products. If you'd like to be considered for this task, you're welcome to drop me a note.

Another area where we'll be expanding in 2010 is becoming a dealer for the Cesaroni rocket motors. We have been approved by Cesaroni for this, and should be getting our first shipment of motors in during January. Stay tuned to this newsletter for the exact date of availability.

Apogee has continued our other endeavor of being the go-to company for rocketry education. This newsletter is a big part of that, but I also personally attend workshops where I teach rocketry to students and teachers. This past year, I've taught classes for the local 4H, and for the summer institutes that are conducted by the Space Foundation. I've also traveled to the Chicago area to do a workshop for Morton East High School.

This next summer, NARAM will he held here in Colorado, and I will be attending that. By the way, have you considered making plans to attend? We'd love to have you visit. If you come, stop by and say hello to us here at our world headquarters. Apogee Components was recently selected and honored by Google as a destination worth seeing. They sent us a window sticker that says "We're a Favorite Place on Google." That sticker contains a little bar code that you can scan with your cell-phone's camera, and it will then bring up our listing in Google so you can submit your own review of the company and tell others why you

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like coming here.

I'll also be on the launch field, and you can say hello there too. My 10-year old daughter is getting into the competition aspects of rocketry, and she is looking forward to the contest too. You may have seen her in the "Video Tour of Apogee Components" that she made earlier this year. If you haven't seen it yet, you'll find it on our web site at: http://www.apogeerockets.com/about.asp

2009 was also a historic year for rocketry in general. The NAR/TRA lawsuit was finally concluded in the favor of all us rocketeers! The result is that you no longer need an explosives permit to buy, own, or store AP-based rocket motors, no matter how big they may be. This is a common sense thing to us rocketeers, because we know that rocket propellant doesn't explode; it only burns slowly. It was because of this ruling that we were finally able to expand into high power rocketry products.

So that is a short wrap-up of some of the important things that happened here at Apogee Components in 2009. And while economy is still soft, I'm still excited about the future, as we're planning on being around for a long time to come. And in this article, you've gotten an idea of where we're heading in the future. In a general sense, you'll see from Apogee Components more of the same kinds of things

Photo 4: Robby runs the warehouse and makes sure your order is complete and shipped out quickly.

you saw from us in 2009. I want to continue to expand into new areas of rocketry, like more high power products and more accessories. If you're interested in getting your foot into the rocketry manufacturing pool, I'm always looking for new products. In fact, I've created a wish-list of sorts in Newsletter #234 (www.ApogeeRockets.com/education/downloads/Newsletter234.pdf). That list is still valid, and I'm still looking for many of those products. Contact me if you

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want to do some business with Apogee Components.

Closer to home, I'm still searching for a new staff member here at Apogee Components. I'm in need of a person to take on the responsibilities of producing this newsletter, and to do the daily updates to the Apogee web site. It requires a very special person, as for starters they need to be very technically proficient in rocketry. I want the Peak-of-Flight newsletter to continue to be about teaching rocketeers new cutting-edge stuff that rocketeers can use to make themselves better. That is why this newsletter editor has to be well versed in rocketry technology, and someone that has a passion to write it down on paper. And at the same time, they have to be graphics oriented, since the newsletter and the maintenance of the web site require a lot of illustrations and photos. I've found people that are good with graphics, but were lacking the rocketry expertise needed for the newsletter. But I can't afford two separate people at this time. So if you know of anyone that is meets these qualifications and may be interested in working here at Apogee Components, please tell them that I have a position that I want to fill soon.

In conclusion, I've enjoyed having you as a reader of this newsletter, and thanks for making 2009 a great year. We'll see you in 2010!

Photo 5: How's Business? It's looking UP!