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APOGEE PEAK OF FLIGHT NEWSLETTER

Fin Slots Made Easy: Cutting Your Own

INSIDE:

- Making Fin Slots with a Dremel®
- Maximizing Altitude in Windy Conditions
- Web Site of the Week
- Apogee Photo Contest Results

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Fin slots Made easy

by John Manfredo

When I first started cutting my own fin slots, I used to use a hobby knife, which was quite tedious and didn't turn out that well. I know that there are more sophisticated methods and tools out there, but this is a good method to make things a little easier on you than the hobby knife method.

Getting Started

To begin, use a tube marking guide of some kind to mark the body tube for the fin locations. Below, in photo 1, I used the one that is in "Model Rocket Design and Construction". It can be found at http://www.apogeerockets.com/design_book.asp. Next, take a piece of metal or an aluminum angle so that a line can be drawn out on the body tube along the same lines as

Photo 1

you have made already. This is shown in photo 2.

Getting the Right Measurements

We will be using Rocksim computer software to perform the next few steps. This will really come in handy! This program is an investment that will save you time, money, and frustration in no time flat!

To begin, go into Rocksim and find your design file. Open up the fin component in order to view the details

Photo 2

of it. Photo 3 shows this screen. What you will be looking for is the location of the end of the fin in inches and if the reference point for this is from the front or base of the owning part.

Here we see that the location is .25" from the base of the owning part. Now go back to the body tube and, with a ruler, mark the tube on the lines that were made for the fin locations. In my case, this mark will be .25" up from the base of the tube. This is where the aft end of the fin will sit. We will call this position 1.

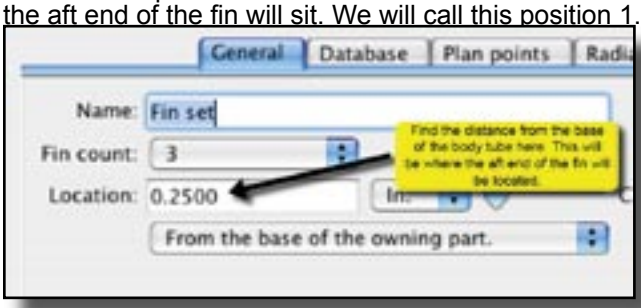

Photo 3

As seen in photo 4, go ahead and draw a line from this point forward, longer than the length of the root length of the fin (this is the edge of the fin that goes against the body tube).

What's the Point?

The next thing we need to figure out is how long the root edge is. To find this out, it will totally depend upon whether your fins are simple trapezoidal/elliptical fins or a custom free-form fin set. Mine is a free-form set;

continued on page 4

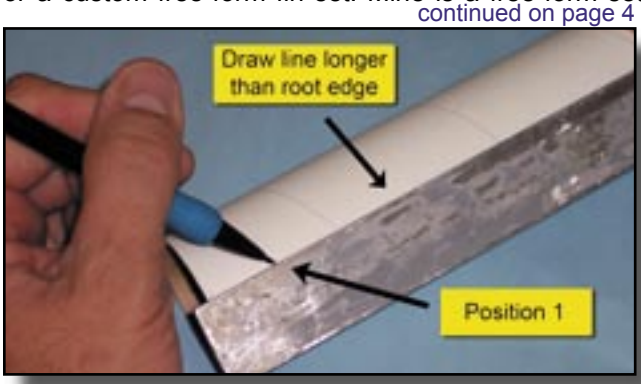

Photo 4

About this Newsletter

You can subscribe "FREE" to receive this e-zine at the Apogee Components web site (www.ApogeeRockets.com), or by sending an e-mail to: ezine@apogeerockets.com with "SUBSCRIBE" as the subject line of the message.

First Annual Apogee Components' Rocket Photo Contest

Apogee is pleased to announce its first annual rocket photo contest winners!

It was felt that the First Place winning photo not only followed the rules of the contest, and was of good quality and composition, but more importantly depicted the heart behind our hobby; families together, passing down rocketry from one generation to the next.

First Prize - Full Version of Rocksim 8.0

Ron and Hannah Cox

This is a scratch/clone that Ron cobbled together based on pics of the shuttle express. He used RockSim to get his tube lengths just right to fit the payload. Hannah wanted to launch some little toys of hers, which deploy on parachutes. The whole project was based on getting her involved in anything that wasn't Barbies. Since then, she has been begging to go the National Air and Space Museum as well as Space Camp®. Ron thought it was a good picture of getting kids involved in something that wasn't a video game or dolls.

Second Prize - "Building Skill Level 2" CD

Ian Cinnamon

Our second place winner was chosen for many reasons. The composition is nice in that the boy launching the rocket is almost out of the picture, signifying the safe distance rule in rocketry. In addition, it is a nice liftoff photo.

This rocket was built entirely from parts bought from Apogee. It even features the clear payload bay with a camera in it! He used four BT-70 Apogee 18" tubes, four BT-70 Apogee tube couplers, 6 BT-50 apogee body tubes for fins and a motor mount, one Apogee PNC-56A for the nose cone, one BT-70 apogee clear tube for the camera bay, 2 Apogee Centering Ring 24-56, two 1/4" Apogee launch lugs, and a lot of "Fix - it" epoxy clay. He fired it on an F39-6T reload and an E15-4W.

"Fun With Apogee Products!" RESULTS!

Third Prize - "Building Skill Level 1" CD

Len Johnson

Finally, our third place winner depicted the teamwork in rocketry. Everyone in the picture has a role in the launch. One is holding the checklist, another is setting the rocket on the pad with another getting ready to back him up as he lets the model down. The last is steadying the chair.

The St. Andrews TARC Team was caught in this scene setting up their model. They call it their "Iwo Jima" shot before launch. This rocket was designed by St. Andrews Team members using the RockSim 8 software program. The rocket is powered by a cluster of two E9-6's.The tubing is a BT-80 with 3/16" balsa fins and custom designed rip-stop nylon chutes.

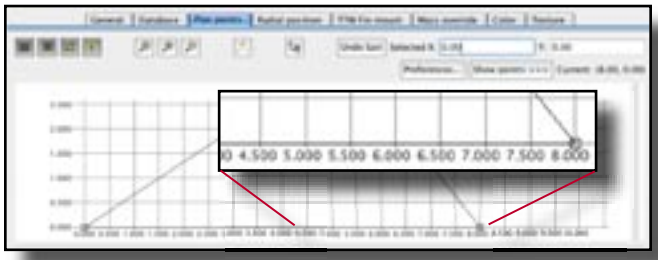

Photo 5

information about which is found in the "plot points" tab of the fin screen. For standard fins, the information for length is on the main screen.

As you can see in photo 5, the root length for these fins is 8". So now we can go back to the body tube and make a mark 8 " from position 1, going forward. This is

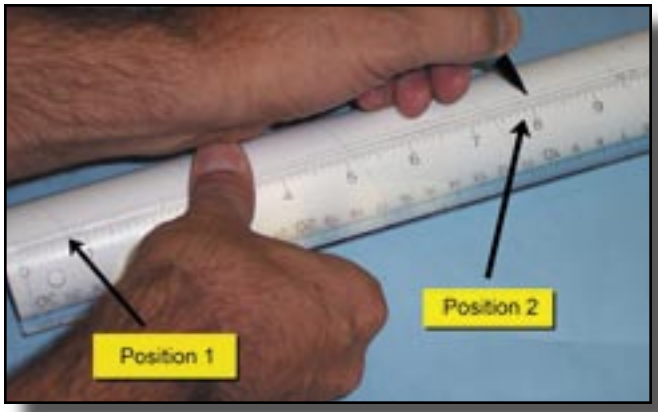

Photo 6

shown in the photo above and will be called position 2.

Tab, Please!

Next, we need to find out how far the tab offset is. This is the distance that the tab begins from the forward end of the fin, which was position 2. While in the fin editing screen, click on the "TTW Fin Mount" tab. This will show you the information. Photo 7 shows that the tab

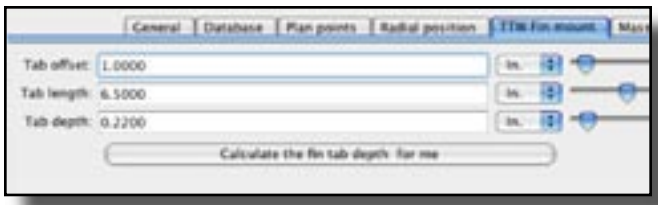

Photo 7

offset for these fins is 1".

Now go back to the model and make a mark that 1" rearward from position 2. This is shown in photo 8. This gives us position 3 and the start of the tab; next we need the *length* of the tab. Go to the same fin screen that you

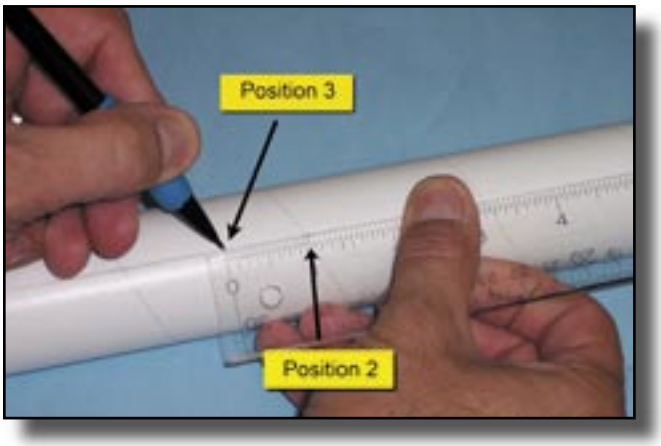

Photo 8

were just in and check on the measurement. This one is 6.5" long, so now make the next mark that 6.5" rearward from position 3. This is seen in photo 9. Since there are so many little marks at this point, go ahead and make small arrows pointing to positions 2 and 3. This

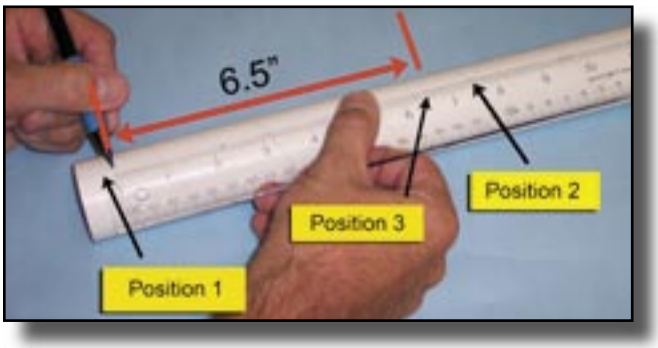

Photo 9

will help distinguish them from the rest of the marks. You can see in photo 10 where I have done this. They don't have to be large, just enough to see.

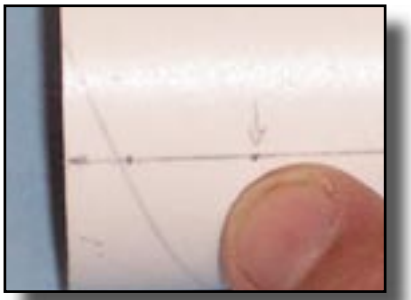

Photo 10

Mark my Words

We've got the main measurments down, now we will actually make the marks and outlines for where the tabs will be cut out. Whatever the thickness of the fins are, you will divide that in half. In my case, the fins are 1/16" so that gives me 1/32".

Take your favorite measuring device and make a small mark on each side of the lines for the fin tabs

continued on page 5

where the small arrows are. Again, for me, this will be 1/32" on either side of the fin lines. I show this in photo 11. Do this for each end of the fin tabs.

Now we'll play "connect the dots" and draw lines from one end to the other, connecting the marks that were made. As shown above, you can see how handy the metal angle is turning out to be.

Photo 11

Fun with Power Tools

The Dremel® is your friend. Get one and use it. Seriously, I've talked before about this great tool. I got one a few years ago and use it for a lot of things! Take the Dremel® and insert a sanding disk attachment into it. You will want to use it on the high speed

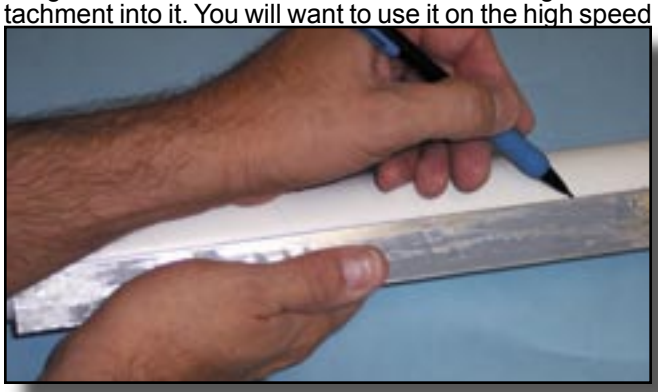

Photo 12

to cut the slots. This can be the tricky part; if you are not used to a Dremel®, especially on high speed, you should test it out on a scrap tube that's laying around.

As shown in photo 13, the technique I use to cut the slots out is to grip the Dremel® firmly near the end closest to the attachment. Then I turn it on and butt my rounded index finger against the body tube. Work very slowly and carefully as a high speed Dremel® and working too quickly is a bad combination! The time you take to do this the right way will pay you dividends in the end with nicely

Photo 13

Photo 14

cut fin slots. As seen above, work your way to the end and then turn around and go back the other way until the slot is completely cut out.

The Results

In photo 15 you will see the results of my efforts. I really like the extra strength of having fin tabs in my designs, especially if they are for E motors and above. If you would like to try some "scratch-building", we

Photo 15

have plenty of supplies to help you out at http://www.apogeerockets.com/building_supplies.asp. I think you'll like this method!

About the Author

John Manfredo is the Education Coordinator and Newsletter Editor at Apogee Components. He's a member of the Tripoli Rocketry Association and a certified Level 1 High-Power user. John hopes to achieve his Level 2 certification next year. Married and the father of 6, he enjoys introducing his kids to this hobby that he is so passionate about. He has been building his own rockets on and off for the last 30 years.

Apogee Components'

August Special

For a limited time only, when you purchase the new Dynastar "Sky Torpedo" along with the "Building Skill Level 2 Model Rockets" CD ROM, you'll receive a Generic Vacuuform Wrap to spice-up your latest creation at no extra cost! That's a $7.50 value! You can't go wrong and the crowd at the next launch will be envious of you as the "Sky Torpedo" punches and whirrs its way into the sky!

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To order, visit:

www.apogeerockets.com/sky-torpedo.asp

RockSim: The Software That Lets You Design Amazing Rockets!

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RockSim is the leading software for designing rockets, and finding out how high they will fly. Here is what rocketeers are saying about it:

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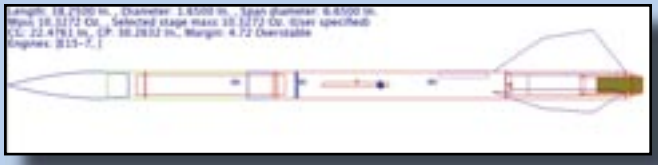
TIP OF THE FIN

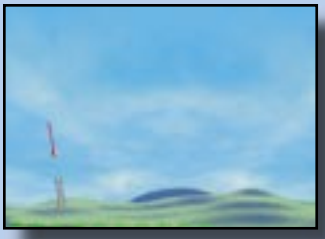
Rocksim can be used to decide what you should do when different wind conditions present themselves. This will help you avoid costly mistakes, aid you in achieving the highest flights, or keep the rocket low depending upon your flight desires.



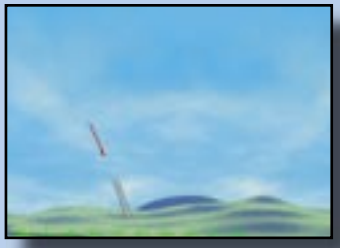
Picture 1

In Picture 1 you will notice that my model is quite overstable at 4.72 calibers (the distance from the center of gravity to the center of pressure). If there is no wind, this isn't a problem. But add wind into the mix and you have to decide how to angle the rod. Picture 2 is my first simulation where my launch rod is pointed straight up. The flight goes fairly straight also. Picture 3 shows a launch when I angle the rod at +10˚ (with the wind); the model actually heads back into the wind. Lastly, in Picture 4, I run a sim with the rod at -10˚ (into the wind). This makes the model weathercock pretty significantly into the wind. Going to the simulation summary shows the final results. I wanted to achieve the greatest altitude in this wind. As Picture 5 reveals, the best altitude was actually when I angled the rod +10˚ with the wind, achieving 1497 feet. I never would have guessed that would be the result.

Picture 2



Picture 3



Picture 4

If you have a tip and I use it here, I'll send you a 58" Dynastar Ripstop Nylon Parachute. Write to me at johnm@apogeerockets.com.

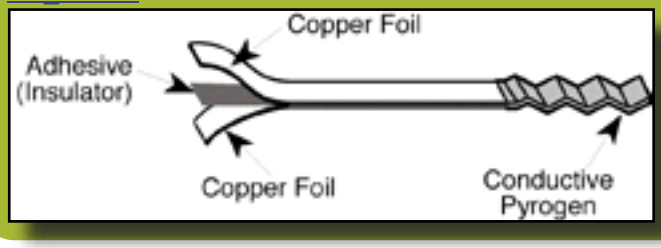
[E15-7]	1214.07	221.88	8.71	68.40	1200.38	-10
[E15-7]	1581.08	219.00	9.28	44.22	1378.95	0
[E15-7]	1497.92	218.45	9.68	1.54	1497.89	+10

Picture 5

QUESTION AND ANSWER CORNER

We get asked here quite often why a Copperhead igniter looks so different from a 2-lead igniter and how you hook them up. The answer is shown below and to the right. The "1 lead copperhead" is actually 2 copper foils with a very thin insulator in-between them.

To hook a Copperhead up to standard 2 clip ignition systems, simply follow the picture on the right. Stick a small piece of masking-type tape on either side of the lead and then hook your clips on. That way, current only gets to one side of each of the 2 thin foil leads. We currently stock Copperheads and First Fire Jr. igniters. These can both be found at http://www.apogeerockets.com/copperhead_igniter.asp and http://www.apogeerockets.com/Aerotech_motors.asp#First_fire_anchor.



NAR NEWS

Science Fair and R&D Projects

As most research project ideas take a long time to conceive, and often require a lot of trial and error in experimentation, it is a good idea to encourage students to start thinking about their next science fair project months ahead of time. Students may also want to consider entering the model rocketry Research and Development competition at the NAR's Annual Meet (NARAM) held each August. Dr. Joyce Guzik has written an article "R&D Advice", originally published in the March/April 2004 issue of Sport Rocketry, to help competitors prepare for R&D events. Much of this advice also applies to science fair projects. An additional report, "Basic Statistics for R&D" by shuttle astronaut Dr. Jay Apt is also available, which has a short but detailed explanation of calculating a mean and standard deviation. For projects with repeated measurements, having enough trials for the conclusion to be statistically significant is one of the first things that the judges will look for when evaluating a project. These articles can be found at http://members.aol.com/GCGassaway/contest/R_and_D.htm.

Careers: Exploring the Possibilities

The New Mexico Network for Women in Science and Education has written a booklet aimed at middle-school and high-school students to encourage them to consider careers in science. The articles in this book are all authored by women scientists, which are designed especially to encourage girls to consider technical careers. The booklet also has articles on the importance of taking mathematics classes, financing a college education, finding a mentor, dealing with stress, being assertive, and getting a summer job. The booklet can be found at http://biology.unm.edu/Potter/Careers/HTML/C00TOC.html.

Educator Grant - $250 for Rockets

The Air Force Association (AFA) is offering Educator Grants of up to $250 per academic year to elementary, middle and secondary school instructors for aerospace education activities. Funds may be used for anything aerospace related, from purchasing textbooks, videotapes, DVDs, model rockets, and radio controlled airplanes, to going on field trips to aviation museums, military bases or local airports. The Educator Grant provides teachers with the opportunity to find creative ways to introduce aerospace related activities into their classrooms. Applications are accepted from August 1 to November 15. For more information, go to http://www.afa.org/aef/aid/grants.asp:

3... 2... 1... Liftoff! Educator Guide

This educator guide introduces children to the International Space Station (ISS), the most complex international scientific endeavor in history. Activities focus on the purpose and construction of the ISS, the history of rockets, and the role of rockets in space station assembly. Data collection, observation, exploration, prediction, interpretation, problem solving, and language skills are emphasized. (NASA)

http://www.nasa.gov/audience/foreducators/topnav/materials/listbytype//3-2-1.Liftoff.html:

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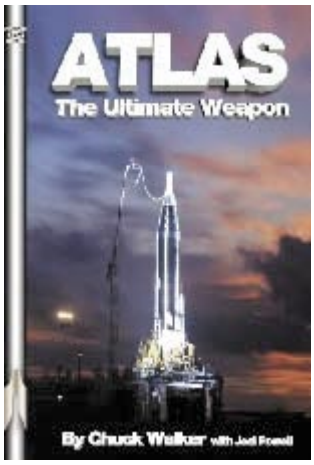


If you want to build *REALLY* big rockets try these two great books from Apogee Space Books

www.apogeebooks.com
905 637 5737

"Apogee Books" is not affiliated with Apogee Components. But they do sell some nifty space books, and we do recommend them.

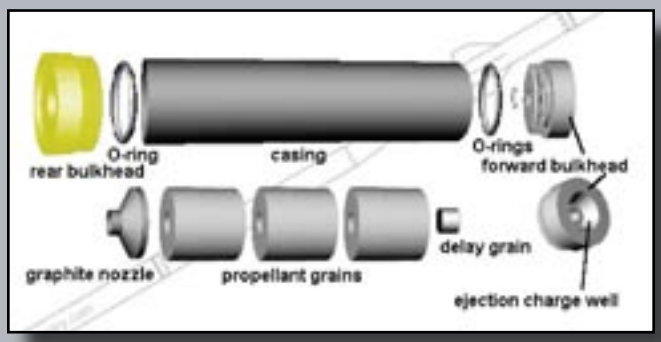
We are pleased to announce the addition of Rouse Tech "Monster Motor" reload casings and Aerotech RMS Reload Kits!

The 24/40, 29/60, 29/100, and 29/120 cases are currently being stocked with the following reload kits: E11, E18, E28, F12, F24, F37, F39, G54, F62, G77, G79, and G104. All of these can be shipped by USPS without any Hazmat fee!

WEB SITES WORTH VISITING

For this issue's website, I am going to feature one from my home state of Colorado. The chosen site is that of Mike Bennett at http://www.mbrocketry.com. One of the top features of this site for me (because I like seeing rockets launch) is the video section. There are many videos that he has taken at launches of Tripoli Colorado, Northern Colorado Rocketry, Balls '03 and '04, and LDRS 25 of this year, just to name a few. There are 50 videos from LDRS alone!

In all seriousness, what I really find useful about this website is that Mike has a lot of educational information. There are sections that explain about the different aspects of this hobby. Examples of these would be the different parts of a rocket and the different types of propulsion, including exploded views of the motors so that they are easier to understand (see opposite side). Safety issues, as well as recovery and computer software are talked about and have links including Rocksim, of course!



You will also see that he likes "paying forward" to the younger generation. Pictured at the left is Mike (in the back-right) with a friend and a group of boy scouts with Mike's "Sponge Bob" rocket. In addition, he has his Rocksim files pictured and available for download.

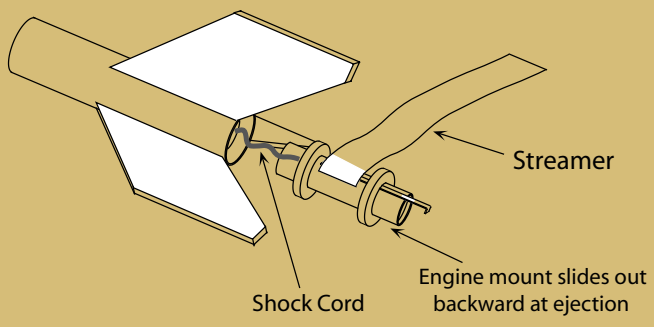
I appreciate that in the "links" section there is a link for Apogee Components. It makes me feel good when we can be a help to anyone in the rocketry community! Great job with the site, Mike!

If you have come across a site you would like me to feature, please email me at johnm@apogeerockets.com.

DEFINING MOMENTS

Rear ejection or deployment is a type of recovery method in which the parachute exits out the back end of the rocket. It is useful as a drag reduction technique, eliminating the small gap at the base of the nose cone. Rear ejection pops the engine and recovery device out the back end of the rocket. This permits the gap between the nose and body tube to be filled and sanded smooth.

The reason that I mention this is because one of the reasons that a modeler might want to change to rear ejection is that they may be trying for a rocket that is as aerodynamic as possible. If the streamer is being ejected out the back, the need for a nose cone that comes off of the model is gone. Most of the time this gap is insignificant, but to achieve optimum performance, this should be eliminated so that the finish will be more aerodynamic. This will give the rocket a much smoother recovery. Parachute recovery is also possible with this method. One of Apogee's models that has rear ejection and helicopter-type recovery is the Texas Twister, found at http://www.apogeerockets.com/texas_twister.asp.



Rear Ejection Illustration from Model Rocket Design and Construction www.apogeerockets.com