

# PEAK OF FLIGHT

NEWSLETTER

ISSUE 443 | May 16th 2017

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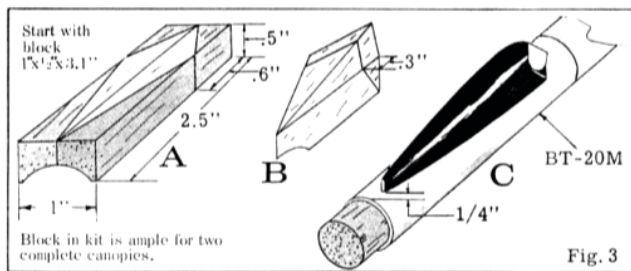
## Making A Custom Model Rocket Canopy

By Chris Michielssen

A custom canopy can make your model rockets look more like a manned plane or rocket jet. The Estes Interceptor and Centuri Shuttle models wouldn't be the same without a raised canopy detail.

Recently I had to make a canopy mold master for the upcoming Odd'I Rockets F-16 kit. This would involve some old school carving.

I reflected back to the first raised canopy to ever appear in a model rocket kit from 1970 - The Estes Star Blazer, Kit #31. You can see the original instructions here: <http://www.spacemodeling.org/jimz/estes/estk-31.pdf>



**Figure 1: First raised canopy from the Estes Star Blazer Kit.**

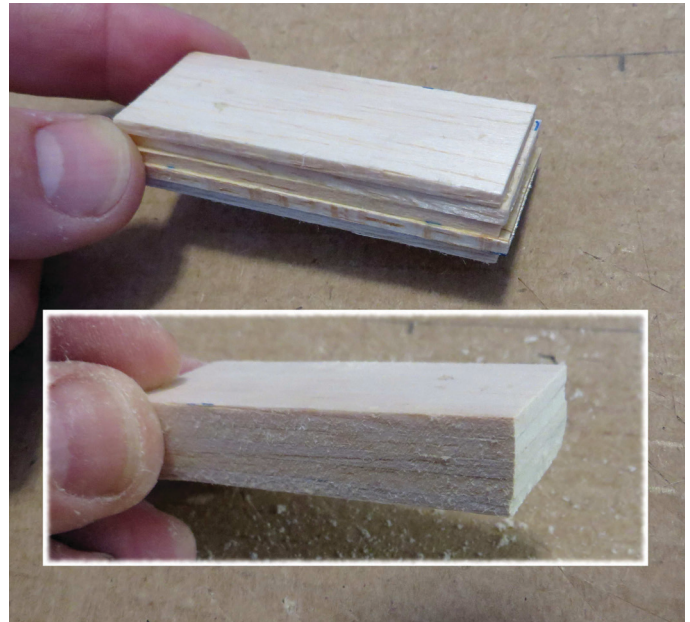
Brief shaping directions were shown in the kit instructions. The canopy was cut, carved and sanded from a solid block of balsa.

On the canopies I make I don't use a block of balsa, I laminate 3/32" thick flat pieces of balsa or basswood into a wood block.

There is a good reason for this. You'll be able to see the glued layers to help form a more symmetrical canopy.

In this tutorial we'll be making a Star Blazer style canopy where the carved canopy follows and hugs the curvature of the main airframe body

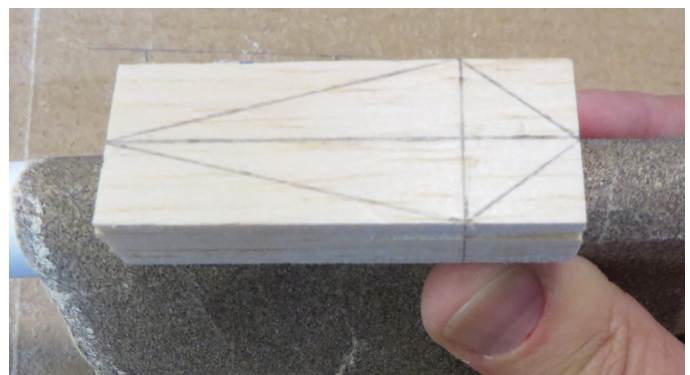
tube. Later in the article I'll explain some other possibilities where a canopy is glued to the tapered nose cone.



**Figure 2: Instead of using a solid block of balsa there are several pieces of balsa glued together.**

After the flat sheet pieces are glued up and dried the sides are sanded smooth.

Draw a centerline down the length of the block. In this example an elongated Rhombus or "kite" shape is drawn on the top of the block.



**Figure 3: A kite shape (rhombus) is drawn on the top of the block.**

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**Figure 4: Use a spent engine casing to wrap your sand paper around to shape the bottom curvature of the balsa**

The old Star Blazer instructions tell you to sand the underside body tube curvature after carving the canopy. TIP: You'll find it easier to sand the bottom curve before carving the top. You simply have more to hold onto before the top is shaped.

Wrap 100 grit sandpaper around an engine casing, in this instance a used 18mm engine. Use a rough grit sandpaper as you'll have quite a bit of wood to remove from the bottom. TIP: You'll get a better fit using a slightly smaller engine casing (or body tube) as opposed to sanding over the final main airframe tube diameter. "Hogging out" the bottom of the canopy can be

a loose sanding operation. By the time you finish sanding with a smaller casing it'll probably open up to the correct diameter concave trough.



**Figure 5: Check the bottom of the balsa while sanding to make sure the bottom curve is straight.**

Chances are the initial sanding passes won't be straight down the block. Sand a bit and check the bottom, making adjustments until the trough is straight and centered.

Continue sanding until the rounded trough is halfway through the block. Notice the laminated layers. When the glue lamination lines are straight and equal the trough depth will be even from end to end.

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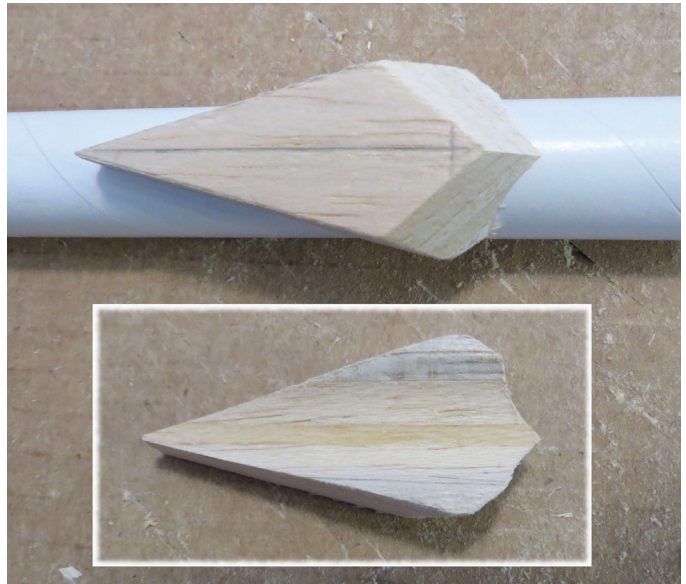
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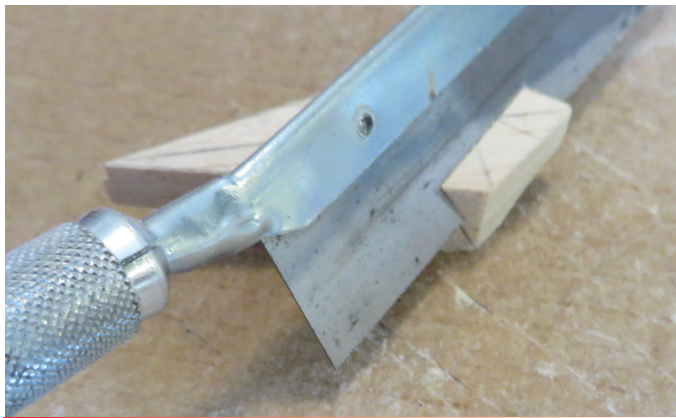
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**Figure 6:** Use a fine tooth saw to cut along the lines you drew on the balsa when you started.



**Figure 8:** Getting closer to the final shape.



**Figure 7:** Cut the front edges at an angle.

Use a fine tooth razor saw to remove the bulk of the excess wood from the top surface. Cut just outside the pencil lines.

The front cuts are made at an angle and will end up as the flat canopy window panes.

Even at this stage the canopy could be used on a model. It has a rakish look, a little like the canopy from the Battlestar Galactica Viper. The lower inset picture shows the concave trough underside.

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**Figure 9:** Begin rounding off the edges for a smoother look.

The final step is simply to round off the sides and taper the back. The front “windows” of the canopy are left flat. To round the top and back make small chip cuts with a sharp knife. Follow with smooth sanding using 220 grit wrapped over a finger. Wrapping the paper over your finger allows for cushioned sanding.



**Figure 10:** The front end begins to take on a window shape.

When the sides are rounded off, the flat front surfaces automatically form windows. Note again the lamination glue lines. When these are symmetrical the canopy windows will be straight and centered.



**Figure 11:** This picture shows a copy of the Quest X-15 canopy carved from basswood laminations. The lower canopy shows the finished concave bottom. The laminate layers are visible and will help direct where wood should be removed.

Fitting a canopy over a body tube isn't difficult, it just takes some time. To make a canopy fit over a nose cone requires much more hand fitting. The underside curvature is more complicated and will end up deeper in the center.

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**Figure 12: Here's three finished canopy examples from recent rocketry projects.**

To start, sand the bottom to the body tube curvature first as explained above. Set in place on the nose cone and notice where it touches and where it is raised above the nose cone. Chances are the front and rear of the canopy will be above the nose cone surface, and the center will be making contact.

It sounds simple and in essence it is - Wherever the canopy is making contact, remove some of that area. Wrap 220 grit sandpaper around an engine casing and sand, making an effort to remove the underside. Concentrate on removing from the center of the trough.

Sand and check, sand and check, making adjustments until you get full contact of the canopy sides down the nose cone.

In **Figure 12**: On the lower left is the old style Star Blazer canopy, the bottom shaped to fit over a BT-20 tube.

In the middle is a copy of the canopy from the old Quest X-15 kit. It was carved to fit over the nose cone of a BT-60 "Goony" version of the X-15. The underside has been gouged out to fit over the nose cone curve.

On the right is a vacuum-form master for the clear canopy supplied in the new Odd'l Rockets F-16 kit. This was carved from laminated basswood sheet. Basswood is a joy to carve - if you have a sharp knife!

Making a canopy is like any new modeling technique. Don't expect your first try to be perfect. Knowing that from the onset might inspire a second try and a usable canopy.

### **About the author:**

*Chris Michielssen is an avid builder and flyer of low power model rockets. He produces Odd'l Rockets and accessories available from Apogee Rockets.*

*His building blog: [www.modelrocketbuilding.blogspot.com](http://www.modelrocketbuilding.blogspot.com) is followed by 1,500 people each day worldwide.*

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