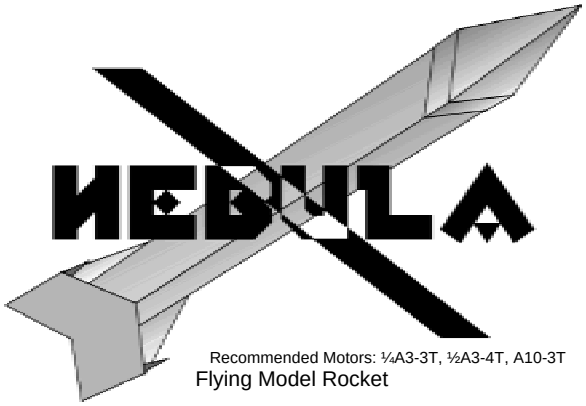
Engineering Directive	
From:	Office of Chief Engineer
Vehicle(s):	FRE03
Effective Date:	14-February-2005
Chief Ordinance Engineer: James M Flis	Chief Deployment Engineer: Brian McCarthy
Effective immediately, the attached procedures will be used in the assembly and deployment of Launch Vehicle FRE03, known as **"Nebula".**	



Recommended Motors: ¼A3-3T, ½A3-4T, A10-3T

Flying Model Rocket

Assembly Instructions

The **"Nebula"** will provide you with hours of building and flying fun while showing that very non-conventional materials can be used to build a very conventional looking model rocket. Other than the recovery device (Shock Cord and Streamer), there are NO standard model rocket materials used in this kit. The entire model (body tube, fins, launch lug and nose cone) is made entirely from two sheets of card stock!

The **"Nebula"** will show you techniques that you can apply to other models, both kits and scratch built models. You will learn how to fabricate tubes, cones and fins, each with surprising strength, from very simple and readily available materials.

One set of patterns comes pre-printed with the **"Nebula"** artwork. A second pattern sheet is available that has just the outline of all of the parts needed for this model. You are encouraged to use your imagination and decorate this model in any way you choose! You may wish to color/decorate this other kit before assembly, as you may find it easier to do so while the parts are flat (something you can't do with conventional model rocketry materials!) You can use paints, markers, pencils and even crayons to get just the look you want for your paper model rocket!

To construct your **"Nebula",** you will need the following: Pencil, razor knife, white glue, cellophane tape, motor casing and a new A10-3T model rocket motor (for balancing), patience and your imagination! You will also need the following components to add to these patterns, to complete this FREE kit:

- 12" Elastic Shock Cord material
- 15" Kevlar® Cord (optional)
- 12" Cotton Button Thread
- Masking Tape or tape disk
- 12" Crepe Paper Streamer
- Clay Weight or other nose weight material
- 3 Toothpicks

HINT: To protect the finish of pre-printed patterns, it may help to do your scoring from the back side of the pattern.

Please read these instructions through, to become familiar with each step, before beginning construction. You must go to http://fliskits.com/ and go to the **FREE STUFF** section to obtain the pattern sheets for the **"Nebula"** model rocket kit.

1. Using a straight edge and razor knife. cut out the **Body Tube** from the provided pattern. Referring to **Figure 1, CAREFULLY** score all 3 fold lines as indicated. Do **NOT** cut all the way through the pattern. Just enough to aid in creasing the body at these lines.

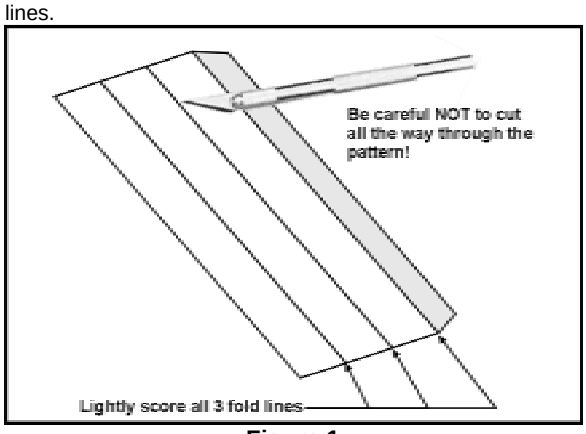


Figure 1

2. Referring to **Figure 2**, crease the Body Tube along these score lines. Apply a thin bead of glue along the inside of one corner, to within 1" of the top of the tube. Lay your **Kevlar**® cord into this corner to anchor it in place (**NOTE:** If you are not using Kevlar, glue your elastic cord in its place, 2" from the top). Now apply a film of glue along the full length of the Glue Tab and compete your Body Tube by gluing this Tab to the inside of the other edge of the Body Tube. Your finished tube should look like a long triangular tube as seen in the right of **Figure 2.**

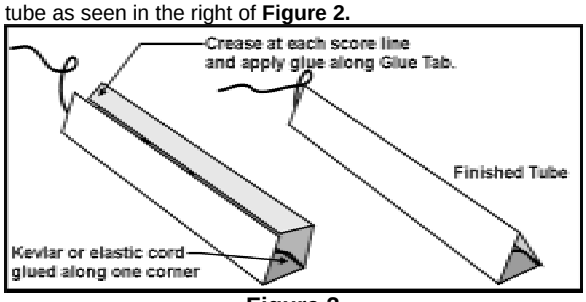


Figure 2

3. Cut out the Engine Tube (found on page 3 of the Instructions) and, referring to **Figure 3,** flip this over and lightly score a line opposite the horizontal line that defines the "Second Glue Area". Score this the full length of the pattern.

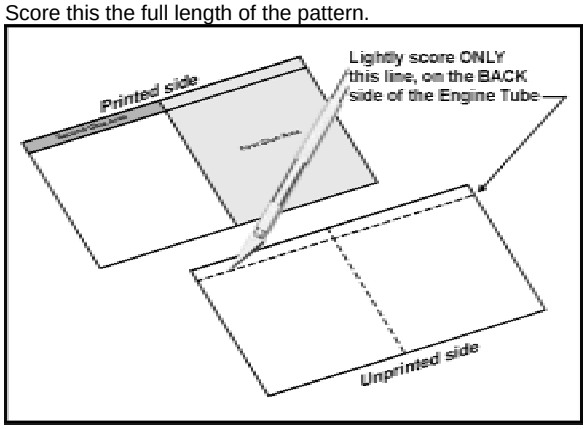


Figure 3

NOTE: Read steps 4 & 5 and be sure that you understand the steps that you need to take in rolling up and forming the Engine Tube.

4. Apply two lengths of cellophane tape to the ends of the Engine Tube pattern as shown in **Figure 4,** and described here. Each piece of tape should be an inch or two longer than the pattern is wide, so that there is ample overhang at each end of the tape. With the pattern printed side up, place one length of tape, sticky side down, at the end with the white background that has the area identified as "Second Glue Area". This tape should overhang the end of the pattern by half the width of the tape. Fold over ¼" of the tape ends. Place the second length of tape, sticky side **UP**, at the other end, overhanging the end of the pattern as before and fold the ends over. Now, apply a thin film of glue to the entire light gray area identified as "First Glue Area" then ***quickly*** move onto Step 5.

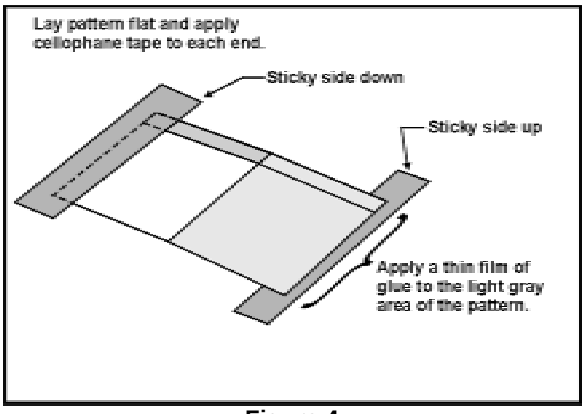


Figure 4

5. Using a 13mm motor casing (A10-3T, for example), and starting from the WHITE end of the Engine Tube Pattern, begin to tightly roll the motor casing in the Engine Tube Pattern. As you roll the motor casing up, the first piece of tape will stick itself to the inside of the forming tube, preventing glue from oozing onto the motor casing. Continue rolling for one more full revolution, resulting in the second piece of tape securing the end of the Engine Tube pattern in place while drying. The final formed tube should look like that shown in **Figure 5.** Check to make sure that no glue oozed onto the motor casing then set aside to dry.

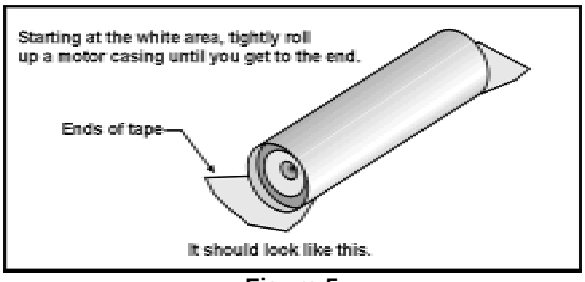


Figure 5

6. Cut out the patterns for the Nose Cone, Shoulder and Launch Lug. From the printed side, lightly score along the score lines found on each pattern, being very careful not to cut all the way through the pattern. Referring to **Figure 6,** crease each pattern at all score lines, apply a film of glue along the glue tabs and join the tabs as shown, forming your each part. Set aside to dry. When dry, apply a film of glue to the 3 glue tabs on the Shoulder and attach to the Nose Cone as shown in the lower right of Figure 6. **NOTE:** Refrain from using tape to hold these items together while drying as the tape may spoil the finish on the part.

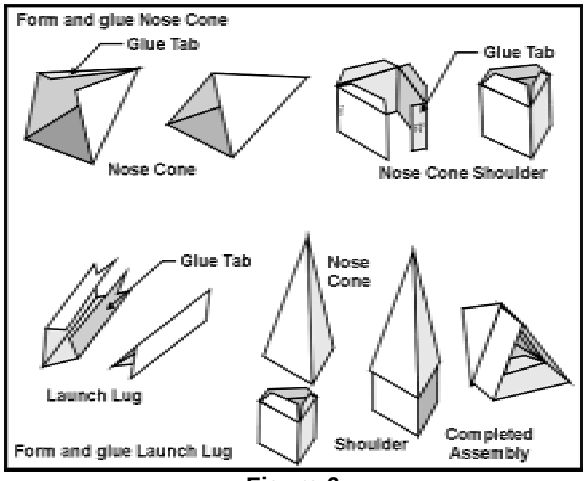


Figure 6

7. Cut out the Fin Unit pattern. As with the other items, lightly score along all score lines, fold along score lines then apply a film of glue along the glue tab and form your Fin Unit as shown in **Figure 7.**

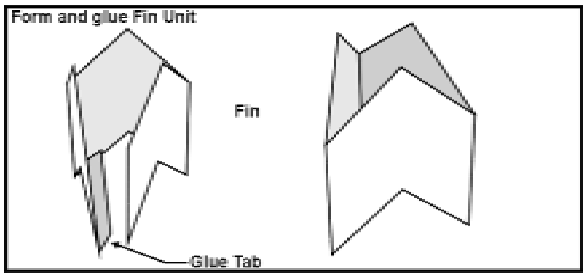


Figure 7

8. Returning to the Engine Tube from Step 5, remove the engine casing and the tape that was used to hold the edges down while drying. Run a thin film of glue just inside the end of the Engine Tube with the score line (where it is marked "Second Glue Area", covering ¼" inside the tube. Using your finger, and referring to **Figure 8,** carefully fold the edge of the Engine Tube into the inside of the tube as shown. This will form your Engine Block.

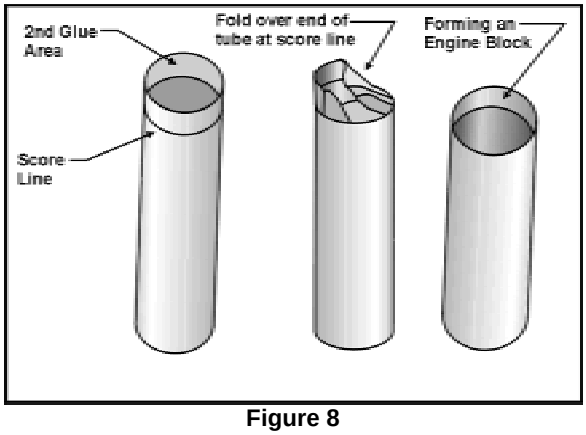


Figure 8

9. Run 3 equally spaced thin beads of glue along the length of the Engine Tube, as shown in **Figure 9.** Slide the Engine Tube (with the Engine Block forward) into the bottom of the Body Tube with the glue beads aligned with the **corners** of the Body Tube, until the bottom of the Engine Tube protrudes ¼" from the end of the Body Tube. Twist the Engine Tube until the 3 beads of glue come into contact with the flat sides of the Body Tube. Now, take small balls of tissue, soaked in white glue, and poke these into the open areas in the corners of the Body Tube, around the Engine Tube.