

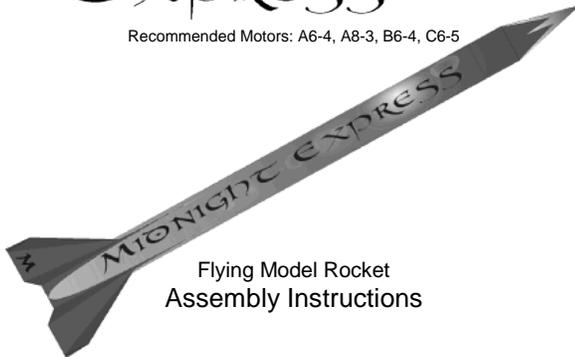


Engineering Directive

From:	Office of Chief Engineer
Vehicle(s):	FRE01
Effective Date:	26-March-2002
Chief Ordinance Engineer	Chief Deployment Engineer
<i>James M Flis</i>	<i>Brian McCarthy</i>
Effective immediately, the attached procedures will be used in the assembly and deployment of Launch Vehicle FRE01, known as "Midnight Express".	

MIDNIGHT EXPRESS™

Recommended Motors: A6-4, A8-3, B6-4, C6-5



Flying Model Rocket
Assembly Instructions

The **Midnight Express** model rocket kit is a FREE download kit available from FlisKits, Inc. These instructions, and available pattern sheets are copyright 2003, FlisKits, Inc. and can not be reproduced in any way, by any means, electronic or otherwise without the expressed written permission of FlisKits, Inc.

The **Midnight Express** will provide you with hours of building and flying fun while showing that very non-conventional materials can be used to build a very different 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 a single sheet of card stock!

The **Midnight Express** 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 **Midnight Express** 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 **Midnight Express**, you will need the following: Pencil, razor knife, white glue, 1/8" dowel (for shaping launch lug), short length of BT-5 body tube or other narrow tube, 3-4 expended engine casings (for shaping the body tube), patience and your imagination! You will also need the following components to add to these patterns, to complete this FREE kit:

- o 12" – 18" Shock Cord material
- o 12" Cotton Button Thread
- o Masking Tape or tape disk
- o 18" Crepe Paper Streamer
- o Clay Weight or other nose weight material

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 **Products** section to obtain the pattern sheets for the Midnight Express (Under **Sport** rockets)

1. Referring to **Figure 1**, use a straight edge and razor knife to cut out the **Body Tube** from the provided pattern.

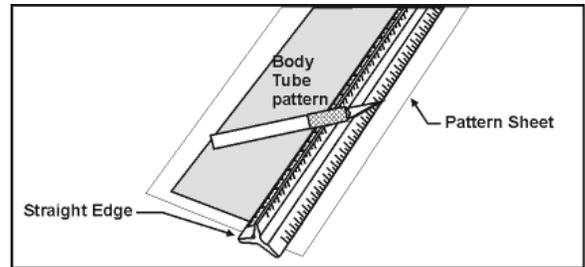


Figure 1

2. Resting the pattern on your fingers, print side down, press and roll the body tube, with the unprinted side against a table edge, as shown in **Figure 2**. This will cause the paper to begin to curl in the direction needed for assembly.

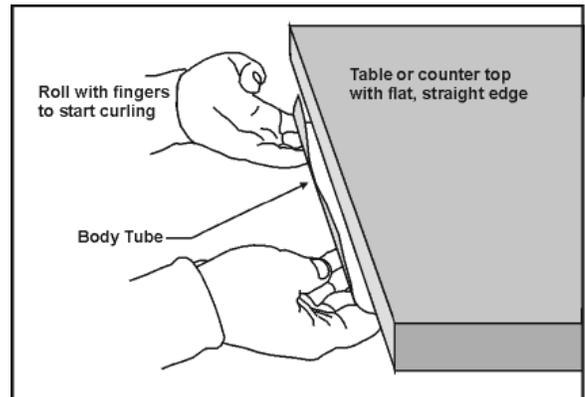


Figure 2

3. Tightly roll the Body Tube until it is narrow enough to fit **INSIDE** a narrow tube (like a BT-5 body tube). Place this inside the narrow tube, as shown in **Figure 3**, and set aside. This will help it to retain its shape as you go on to the next few steps.

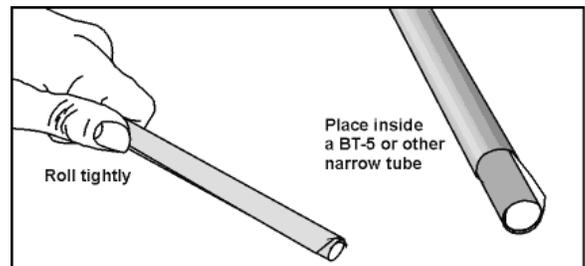


Figure 3

4. Using your razor knife cut out the **Nose Cone**. (**NOTE:** Take your time while working the Nose Cone into shape for gluing. A second Nose Cone is provided should the first one not come out right) Referring to **Figure 4**, set the curl in the nose cone, with the edge of a table, as you did for the Body Tube. After the curl has begun, continue rolling the Nose Cone between your fingers, bringing the edges together, until the Nose Cone can hold its shape.

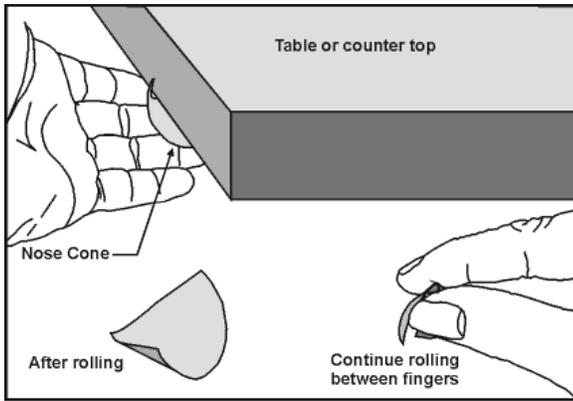


Figure 4

5. **NOTE:** Practice this step **WITHOUT** glue first. Apply a glue film to the glue tab and form the Nose Cone by bringing the other edge over the glue tab as shown in **Figure 5**. Hold the Nose Cone to the proper shape between your fingers or, place the point of a sharp pencil into the Nose Cone and hold with your thumb (as shown on the left side of Figure 5). Hold until the glue is set. The finished cone is shown in Figure 5, bottom-right. **NOTE:** It is normal to see a small gap or hole at the top of the Nose Cone.

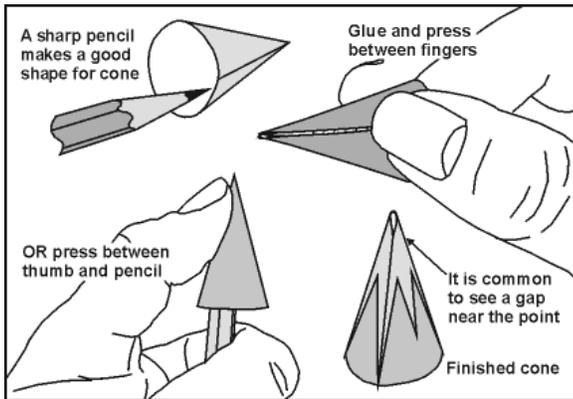


Figure 5

6. Using a straight edge and razor knife, cut out a Fin from the provided pattern sheet. **LIGHTLY** score each of the fold lines, from the printed size, using your knife and straight edge as shown in **Figure 6**, on the right. You should have 9 score lines (2 for each tab and one long one along the center of the Fin). **NOTE:** Do **NOT** cut all the way through the material. Just enough to enable easy folding along these lines. After scoring, gently fold at each score line as show on the right of Figure 6. Repeat for the remaining two fins.

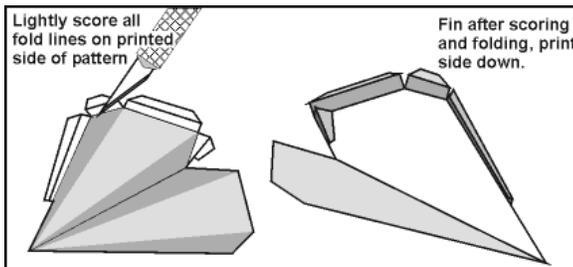


Figure 6

7. Apply a bead of glue on all 4 tabs (gray areas) and form the fin, compressing it between your fingers to hold its shape as the glue sets, as shown in **Figure 7**. **NOTE:** Make sure that the edges of the fin are flat and flush, as shown on the right of Figure 7. Repeat for the remaining two fins.



Figure 7

8. Cut out the **Launch Lug** and begin curling it as you did with the Body Tube and Nose Cone. After curling, roll the Launch Lug tightly upon itself to help it retain its shape. Referring to **Figure 8**, apply a bead of glue along the glue tab and roll the launch lug over a 1/8" length wood dowel. Press and hold until the glue has set. Remove the wood dowel as soon as possible to prevent it from being glued inside the Launch Lug. **NOTE:** The Launch Lug will be larger in diameter than the dowel. Make sure that, as you wrap the lug around the dowel, that you do so very loosely.

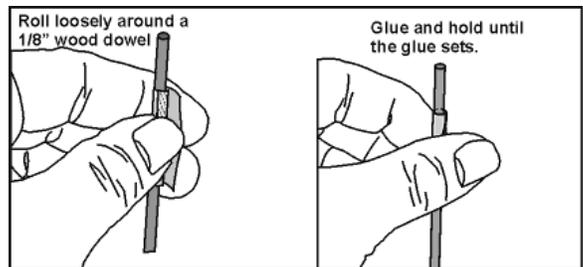


Figure 8

9. Getting back to the Body Tube, remove the Body Tube from the tube you placed it in from Step 3. You will notice that the Body Tube will retain its shape. Referring to **Figure 9**, insert engine casings into the Body Tube (4 casings will fill the entire Body Tube and will result in the best construction). Run a bead of glue along the full length of the glue tab and smooth it out to cover the whole glue tab. **NOTE:** Be very careful **NOT** to get any glue on the engine casings!

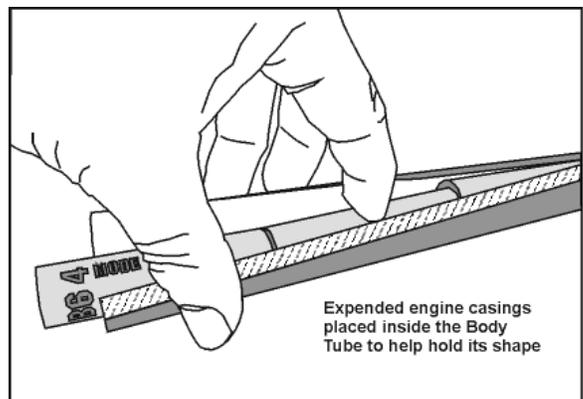


Figure 9

10. Carefully line up the edge of the Body Tube along the glue tab and press into place, on a smooth flat surface. Referring to **Figure 10**, roll the Body Tube on the flat surface until the seam is on the underside, held in place with your fingers and the engine

casings (the casings prevent you from crushing the Body Tube during this operation). It is a good idea to occasionally check the seam to make sure that it hasn't shifted during this operation. Also, it is **IMPORTANT** to check that the engine casings are still loose and not glued inside the Body Tube. Remove the engine casings **as soon as possible**, after the glue seam has set.

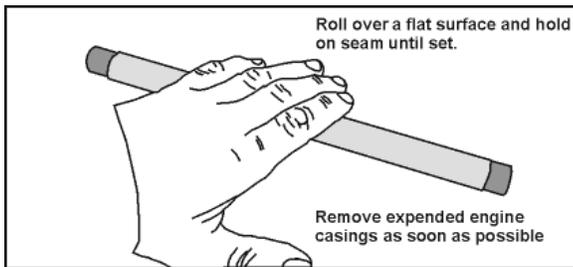


Figure 10

- Cut out the **Engine Block** and the **Nose Cone Shoulder**. Curl both items as done earlier. The patterns should look like that shown on the left of **Figure 11**. Apply a bead of glue to the glue tab and glue the Engine Block and Nose Cone Shoulder as shown at the right. **NOTE:** Check that both components fit inside the Body Tube before the glue dries.

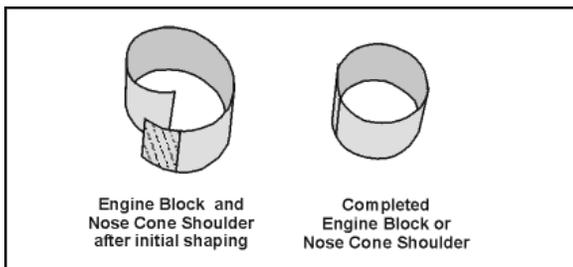


Figure 11

- As shown in **Figure 12**, apply a bead of glue inside the base of the Nose Cone from Step 5. Carefully place the Nose Cone on the Nose Cone Shoulder, as shown, making sure that the Nose Cone is sitting flat and straight on the Shoulder. Refer to the bottom center and bottom right images to see how this assembly should look.

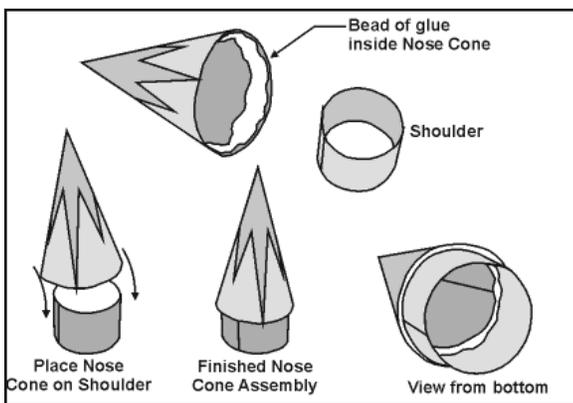


Figure 12

- Make a mark $\frac{1}{4}$ " from the end of one engine casing. Apply a bead of glue 1 – 2" inside the bottom (end with the Fin Location marks) of the Body Tube. Referring to **Figure 13**, use the engine casing to push the Engine Block into the Body Tube up to the mark made on the engine casing. **NOTE:** Remove the engine casing **QUICKLY** to prevent it from becoming glued inside the Body Tube.

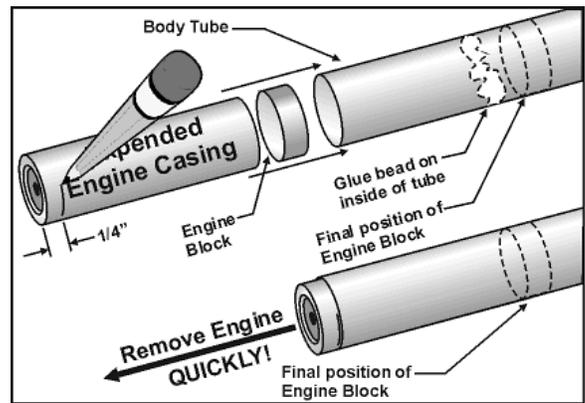


Figure 13

- As shown in **Figure 14**, apply a bead of glue to the root edge of one fin and attach to the Body Tube onto the triangular Fin Location marks. Allow to dry then repeat with the remaining two fins.

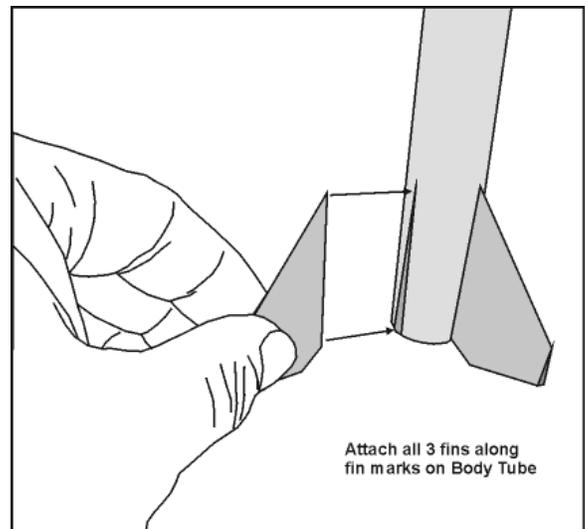


Figure 14

- Run a bead of glue along the seam of the Launch Lug and attach the on the launch lug line, $2\frac{1}{2}$ " from the bottom of the Body Tube and between two fins, as shown in **Figure 15**.

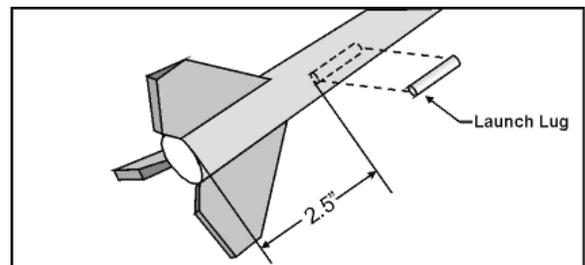


Figure 15

- After the Fins have thoroughly dried, apply a bead of glue on each side of the fin, at the fin/tube joint. Smooth this bead of glue with your finger to form a strong fillet of glue, as shown in **Figure 16**.

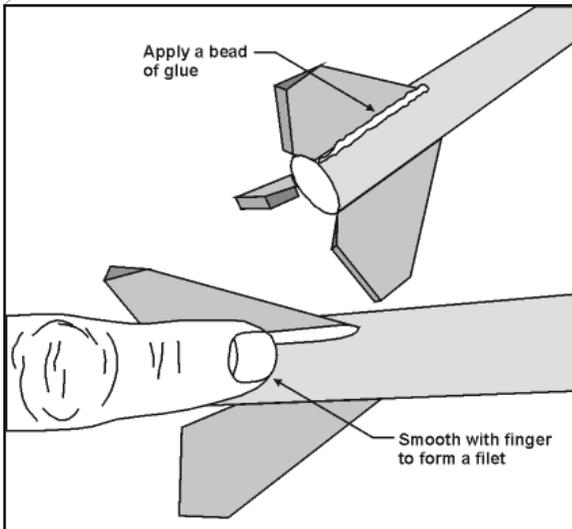


Figure 16

17. Cut out the Shock Cord Mount and glue the Shock Cord into it as shown at the top of **Figure 17** by applying glue as shown and folding the Shock Cord Mount over the Shock Cord twice, to trap it inside. Referring to the bottom of Figure 17, glue this Shock Cord assembly at least $\frac{3}{4}$ " inside the top of the Body Tube.

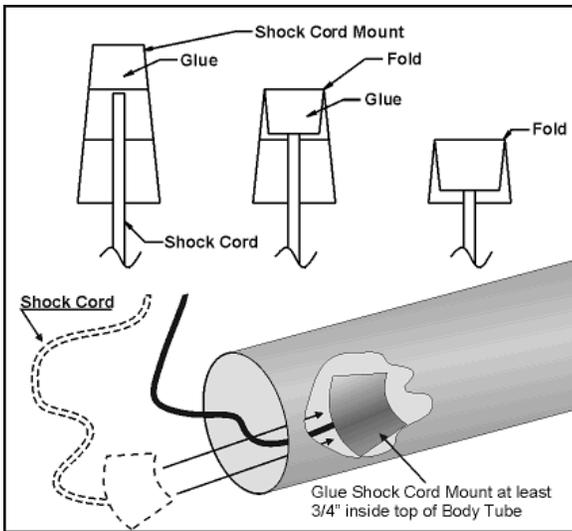


Figure 17

18. Tie a knot in the other end of the Shock Cord. Secure this knot in the tip of the Nose Cone by applying a bead of glue inside the Nose Cone tip. Allow to dry.
19. Taking the **Clay Weight**, roll it into an irregular ball and insert into the tip of the Nose Cone, as shown in **Figure 18**. **NOTE: Do NOT omit this added weight. This model rocket will NOT be stable without this added weight!** To verify the proper amount of nose weight, place the Nose Cone onto the Body Tube and balance it on your finger. The balance point (without motor or streamer) should be about $6\frac{1}{2}$ " from the bottom of the Body Tube (+/- $\frac{1}{2}$ "). Add or remove clay, as necessary, to achieve this balance point. Once you've found the proper balance point, apply a film of glue over the clay, securing it inside the Nose Cone.

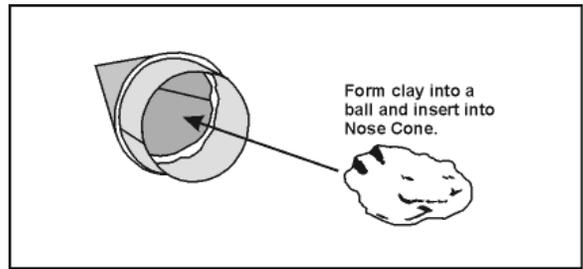


Figure 18

20. Referring to **Figure 19**, attach the **Shroud Line** to the **Streamer** by tying a small knot in the end of the Shroud Line and securing it to the end of the Streamer with a **Tape Disk** or a square of **Masking Tape**. Firmly press the tape into place. Tie the free end of the Shroud Line to the Shock Cord, near the Nose Cone.

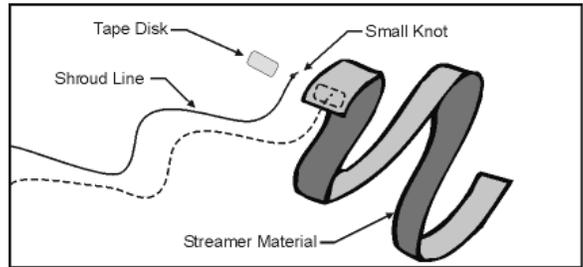


Figure 19

Congratulations! You have completed the assembly of your **Midnight Express** model rocket from **FlisKits!**

Recommended motors for this model are the A6-4, A8-3, B6-4 and C6-5. With these motors, you will enjoy impressive flights and safe returns via its brightly colored streamer for many more enjoyable flights.

Save these instructions for building your second paper rocket!