



Estes Industries Rocket Plan No. 56

FLYIN' STOVEPIPE

BOOST GLIDER
by
Larry Deran

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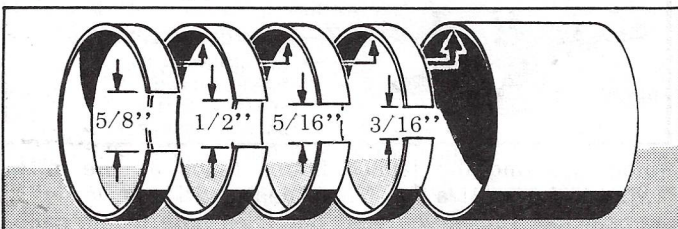
An entirely new concept in model rocket vehicles, the Stovepipe boost-glider was designed by Larry Deran of Santa Barbara, Calif. The Stovepipe represents what is probably one of the simplest gliders ever created. When designing his model, Larry was primarily concerned with the glider portion, conducting extensive tests to arrive at the present configuration.

In operation the booster pulls the tubular glider into the air. The fins on the booster spin the vehicle, averaging out any assembly misalignment and providing a straight upward flight. At ejection the shock of the engine hitting the hook forces the booster rearward, out of the tubular glider. The booster tumbles to earth while the pipe glides back.

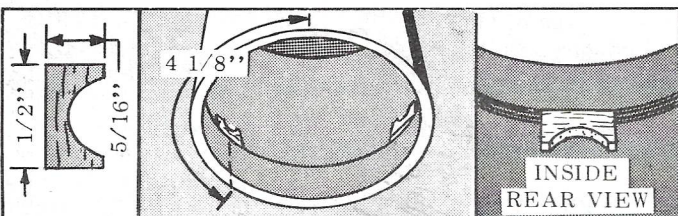
Because the Stovepipe is a new concept, it opens many areas to the experimenter. What, for example, is the best booster design? What is the effect of airfoil on the performance of a tubular glider? What size should the glider be? For providing model rocketeers with more questions to answer, Larry Deran wins first place in the July, 1968 Design of the Month Contest.

BUILDING THE GLIDER

1A. Cut off six $\frac{1}{2}$ inch long pieces and one 4 inch long piece from the BT-101K. Use the technique shown in your Estes Catalog "Construction Tips" section to cut the tube. A large mailing tube should be used instead of the stage coupler in making your cuts.



2A. Remove a $\frac{3}{16}$ inch wide section from one of the $\frac{1}{2}$ inch long pieces of tube. Glue this piece inside one end of the 4 inch long tube piece. Hold the piece in place with paper clips until the glue starts to set. Next cut a $\frac{5}{16}$ inch section from one of the remaining $\frac{1}{2}$ inch long pieces. Glue this piece to the inside of the first piece and clamp it with paper clips for a few minutes. Cut a $\frac{1}{2}$ inch wide section from the third piece and glue it to the second. Finally, cut a $\frac{5}{8}$ inch section from the fourth piece and glue it to the third. When this operation is finished you will have an extra-thick (and heavy) wall at one end of the tube. Save the remaining $\frac{1}{2}$ inch long tube pieces for later adjustments.

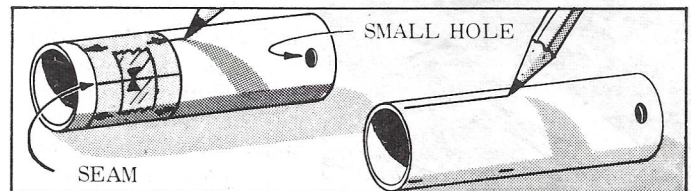


3A. Mark three points around the outside of the tube at the top, each point $4\frac{1}{8}$ inch from the others. Cut out three pieces of $\frac{1}{8}$ inch thick balsa to the shape shown above. Glue one piece to the inside of the tube just below the rings at each mark. The fins of the booster will fit against these pieces at lift-off.

4A. The tubular glider can be tested for balance without launching the rocket if you have a good "throwing arm" or have access to a fairly steep hillside. When hand launching the Stovepipe, toss it as you would a football, making it spin as it leaves your hand. If the Stovepipe tumbles instead of glides, even after repeated tosses, glue another ring to the inside of the tube, trimming a section from it to fit the inside of the built-up area. After this dries, try again, adjusting the balance point until a glide is achieved. (Some rocketeers find it easier to launch the model, observe how it acts under actual flight conditions, and *then* adjust the balance.)

BUILDING THE BOOSTER

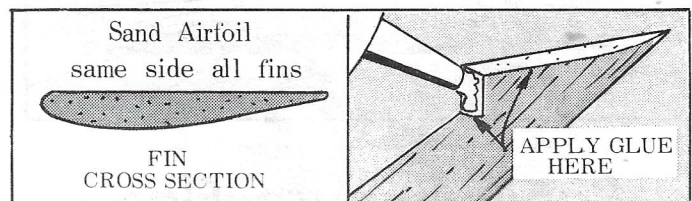
1B. Carefully trace the fin pattern and tube marking guide onto a separate piece of paper (typing paper will do). Cut out the copies you have made.



2B. Wrap the tube marking guide copy around the BT-30A body at the end that does *not* have the holes. Position the guide so the small hole in the tube is in line with the seam of the guide and mark the tube at each of the arrow points. Draw a straight line connecting each pair of marks as shown.

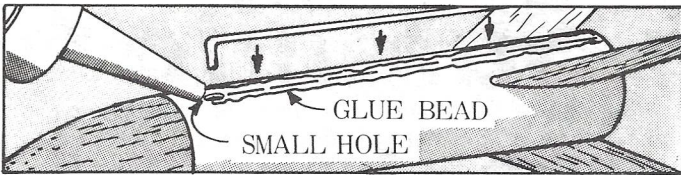
3B. Place the nose cone in the forward end of the body tube (the end with the holes) and check the fit. If the shoulder of the nose cone is higher than the body tube, sand the entire nose cone until the body line is smooth from tip to tail. Remove the nose cone and smear glue around the inside of the body tube to a $\frac{3}{8}$ inch depth. Insert the nose cone to its shoulder and wipe off any excess glue.

4B. Position the fin pattern you made on the balsa sheet with the grain of the wood *parallel* to the leading edge of the fin as shown. Trace around the pattern, then reposition it and trace two more identical fins. Cut the fins out carefully. Make sure you do not chip off any of the outer front corner as this part of the fin will grip the glider tube.

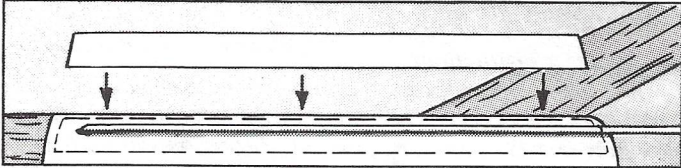


5B. Sand the fins to the airfoil shape shown above. It is very important to sand the airfoil on the same side of all fins, since the airfoil is intended to make the model spin, giving a straighter upward flight and a more reliable glide. Do not sand the fin tips; instead reinforce them with glue along the front as shown.

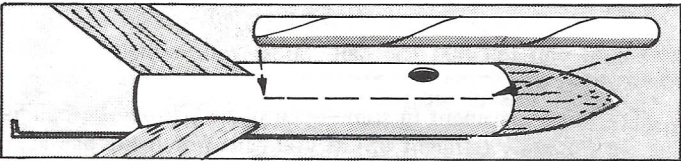
6B. When the fins have been sanded to shape glue them to the body. To do this, apply a light coating of glue to the root edge of a fin and press it against the body. The flat side of the fin should be exactly on one of the lines drawn in Step 2B. Repeat this with the other two fins.



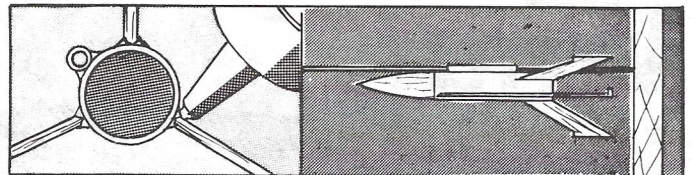
7B. Insert the long end of the engine hook into the small hole in the front of the body, punching through the nose cone as necessary to force the hook all the way in. Remove the hook, squirt glue into the hole and reinsert the hook, positioning it so it runs straight down along the body tube as shown. Apply a thin line of glue to the body and hook, all along the tube, and smooth the glue down with your finger.



8B. Cut out a piece of typing paper 1/2" wide and 3" long. Apply glue to one side of the paper and press it down into place over the engine hook as shown.



9B. Glue the launching lug to the body tube so its rear is even with the front of the fins and is halfway between two fins as shown. Sight along the tube and align the lug so it runs parallel to the body tube.



10B. When the first glue on the fins and launching lug has become hard, apply a glue fillet to each of the fin-body joints and to the launching lug as shown. The fillets should be smooth and bubble-free. Support the rocket horizontally while the glue is drying.

11B. Check the fit of the "booster" in the "glider." The three balsa blocks should fit against the fins so the booster vehicle cannot come out forwards. However, the booster should be loose enough so the lightest tap will send it out the rear of the glider. Sand the fin tips (or glue slivers of balsa on) until the booster fits correctly. Check the fit again after painting the model.

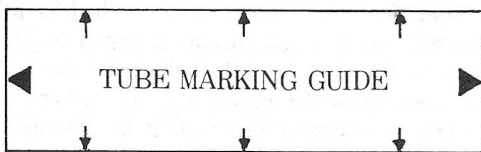
FLYING THE STOVEPIPE

When flying the Stovepipe install the igniter in the engine before inserting the engine into the rocket. Wrap a piece of masking tape around the launch rod approximately six to seven inches above the blast deflector to support the model as shown. Place the booster vehicle *alone* on the rod, connect your clips to the igniter, and then slide the glider down over the rod and into place on the booster. Continue with your regular countdown procedure.

After every flight clean the inside of the booster body tube so the engine will slide freely. If the engine sticks the model will not separate and recover properly.

FLYING STOVEPIPE PARTS LIST

- 1 Body Tube--Part #BT-101K*
- 1 Body Tube--Part #BT-30A
- 1 Engine Hook--Part #MH-1*
- 1 Nose Cone--Part #BNC-30D
- 1 Sheet Balsa Fin Stock--part #BFS-40
- 1 Launching Lug--Part #LL-2B



#LL-2B

#BNC-30D

BOOSTER

#MH-1*

#BT-30A

GLIDER

#BT-101K*

1 Inch

LEADING EDGE

GRAIN
Fin Pattern

ROOT EDGE

RECOMMENDED ENGINES

A5-2

A8-3

B4-2

B6-4

C6-5

* The BT-101K body tube is available as a special order item. Order by Cat. #682-BT-101K, \$1.00 each. The Engine Hook, Cat. #261-MH-1, is available for \$.15 each. Because these are not regular catalog items, it is especially important to use the correct catalog numbers when ordering.