

HD HOLVERSON
DESIGNS, INC

ZOOMIE™

FLYING MODEL
ROCKET KIT

cat# HD12000

LASER
CUT
BALSA



requires assembly
skill level 1
beginners or easy

"the world's
simplest
boost glider!"

easy-to-follow
instructions are
designed to be
filed and collected

length: 15.3cm (6")
span: 21.3 cm (8.35")
diameter: 14mm (.55")
net weight: 5g (0.2oz)
launch weight 11g (0.4oz)

recommended engine:
1/4A3-3T
predicted altitude:
42m (120')

made
in the
USA



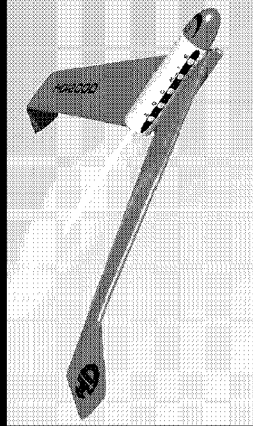
BOOST GLIDER

RECOVERY

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kit2000 975

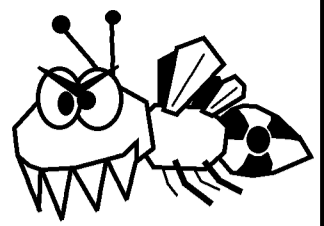
HOLVERSON DESIGNS, INC.
25075 CO HWY L20 • Soldier, IA 51572
<http://www.pionet.net/~holvrson>



ZOOMIE™

HD12000
Skill Level 1

HD HOLVERSON
DESIGNS, INC.



length: 15.25 cm (6") • wing span: 21.3 cm (8.375") • diameter: 1.38 cm (.545")
net weight: 5 grams (0.2 oz) • recommended engine: 1/4A3-3T • predicted altitude: 120'

Thank you! We would like to thank you for purchasing this Holverson Designs flying model rocket. We hope that you enjoy building and flying this model as much as we have. Please let us know if you like your kit, or if you have any questions or need technical advise. Contact us at: Holverson Designs, Inc. 25075 CO HWY L20, Soldier, Iowa 51572 or <http://www.pionet.net/~holvrson>.

This instruction sheet is laid out to allow you to start a rocket plans reference file. Save your entire set of instructions for future reference.

your new Zoomie™

is a simple, easy to build, sport boost glider. Read the building instructions first. Become familiar with the names of the parts using the exploded view below. Check to make sure that all parts are included in this kit. Test fit all the parts before applying glue.



before flight

Read the trimming for flight procedure thoroughly. Follow the test glide and balancing steps exactly to ensure the best flight performance from your Zoomie™.



what is a boost glider?

The National Association of Rocketry (NAR) defines a boost glider as a model rocket with a portion that returns to the ground in a stable gliding flight supported by aerodynamic lifting surfaces which sustain that portion against gravity.



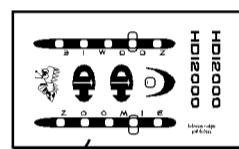
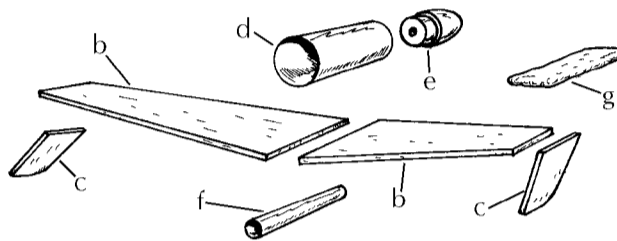
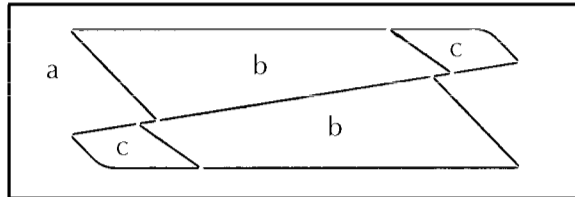
why is it unique?

You will discover that model rocketeers use many recovery devices to ensure that their model returns safely to earth for another flight. A boost glider is an exciting and challenging method since it combines the art and sciences of both rocketry and aerodynamics in one design. Ascending like a rocket and returning via lifting wings poses several challenging tasks for you as a rocket modeler. The balancing of lifting and gravity forces to allow a conventional boost to altitude, then a transition to gliding flight and finally a smooth aircraft-like landing require that you build your model as well as you can.



parts views

Check the parts in your kit with this illustration. This drawing shows how the parts go together. It is not intended to be used to assemble your kit.

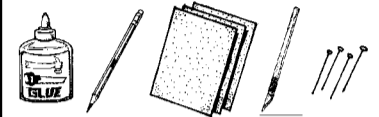


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- a. laser-cut balsa sheet (bal20011)
- b. wing
- c. diffuser
- d. body tube (bt01451)
- e. nose cone (bnc14001)
- f. launch lug (ll04051)
- g. balancing clay (msc00001)
- h. decal (dec02001)

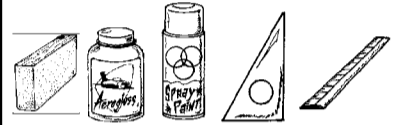
required building materials

- Carpenter's (preferred) or white glue
- Pencil
- Sandpaper: 120, 200, and 400 grit
- Hobby knife
- Four small straight pins



optional building materials

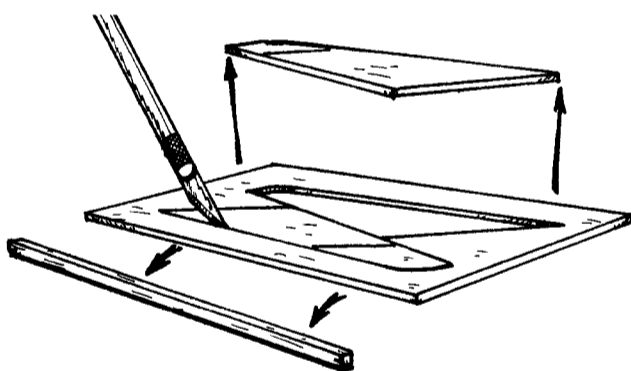
- Sanding block
- Sanding sealer or aerogloss
- Spray paint
- Square or ruler



getting started

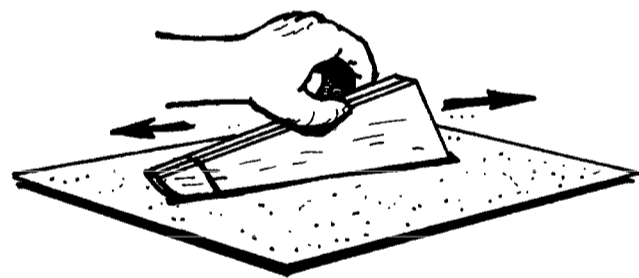
- You will need a flat surface to work on. A piece of flat cardboard works great to protect your table top and allow you to pin parts or glue and sand. When the cardboard gets too rough, replace it with a new sheet.
- After reading the instructions and visualizing the assembly steps, work slowly and carefully and most of all, have fun!
- The more care you use in building your model, the better it will perform and the more fun you will have flying it!

1. wing and tip preparation



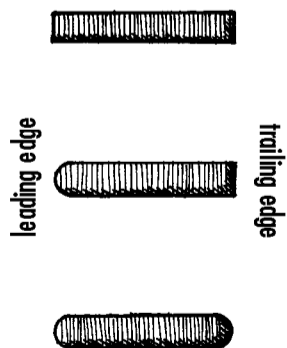
- Using your knife, carefully remove the wings and diffusers from the balsa wood sheet. Cut out the wing and diffuser as one piece for sanding in steps two and three.
- Save a scrap section of balsa sheet for later use as a glue applicator stick.

2. sanding the edges



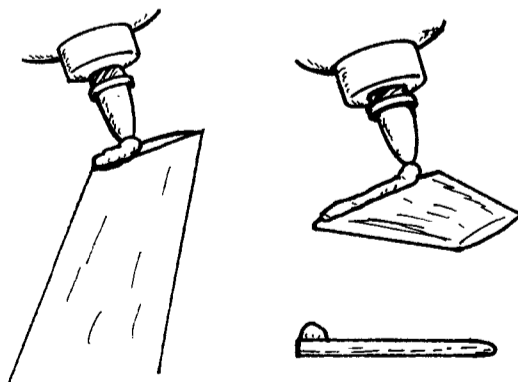
- Stack the two wing and diffuser halves together and lightly sand the four edges only.
- This operation makes the wing's edges smooth and square.

2.5. optional: airfoiling the wings



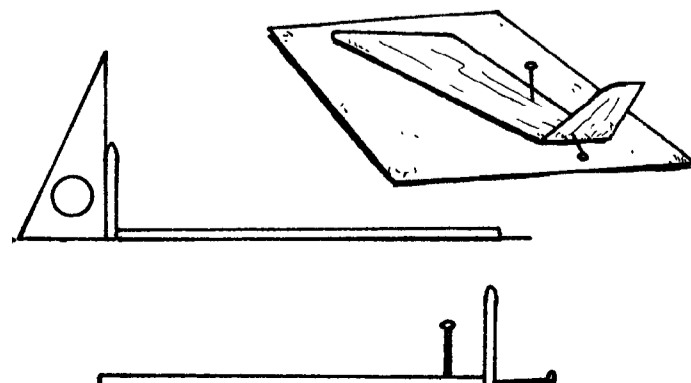
- Drag produced by Zoomie's blunt surfaces is used as a stabilizing force. Glide times and distances are reduced, but a stable gliding descent is achieved and you get your Zoomie back for another flight.
- Although, the blunt-edged wing shape from Step 2 will fly, more streamlined shapes will allow better air flow around the wing.
- Slightly rounded both leading and trailing edges are the best compromise between duration and stability.
- Drag stabilizing techniques were used on aircraft such as the X-15 and lifting body designs. Data from these machines were applied to the Space Shuttle and X-33 spacecraft.

3. pre-glue the wings and diffusers



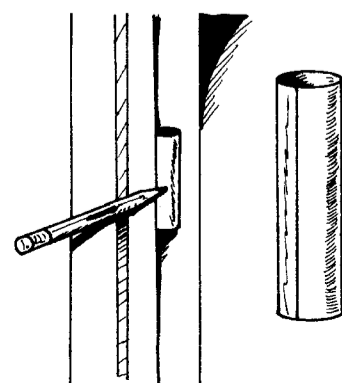
- Make sure that you build one left and one right wing. Lay a piece of wax paper on your building table before pinning the wing to the surface.
- Lightly coat the outer tips of the wings and the inner edge of the diffusers (see illustration) with glue. Now let the wings and diffusers set and dry.

4. gluing the wings and diffusers



- Once the tips are dry, apply a second generous glue bead to the wing tip edges. This second application of glue increases the strength of the joint.
- Attach the diffusers to wing panels. Smooth any excess into the joint.
- Position the diffusers at right angles to the wings as viewed down the joint. Check the accuracy with a triangle or edge of a ruler.
- Pin the wing and diffuser together to ensure a positive bond with no gaps.
- Allow the glue to completely dry.

5. body tube marking



- Find a convenient channel or groove, such as a door jam or molding to use as a guide. Draw a straight line along the length of the body tube.

6. nose cone attachment

- Apply glue to the inside of the body tube along one end. Insert the nose cone and let dry.
- Note: Glue joint must be strong. It must resist the ejection charge from separating the nose cone from the body tube.

7. wing assembly

- After the glue in the wings is completely dry, position wing halves on your work surface as shown.
- Sand the root edge of the wing until it's perpendicular to the work surface. When properly sanded, the inner edges of each wing half should join tightly together with no gaps.

7 continued. wing assembly

- Lightly coat the roots of the wings with glue and let dry.
- After drying, apply a second generous glue bead to the root and press the wings together as shown.
- Smooth the glue seam and wipe off any excess glue. Allow to dry thoroughly.
- Note, this is a good time to read the "trimming for flight" instructions.

8. attach fuselage to wings

- Apply a thin bead of glue along the mark on the fuselage. Allow to dry.
- Apply a second bead of glue to the fuselage marking. Press the fuselage to the wing, making sure the marking aligns with the wing root and the ends are flush.
- Smooth the glue along the fuselage and wing seam. Make sure the fuselage is straight with the wings as shown. Allow your model to thoroughly dry.

9. launch lug attachment.

- Once the fuselage and wing assembly is thoroughly dry, apply a generous bead of glue to the launch lug.
- Carefully align and attach the launch lug to the bottom center of the wing joint as shown.

10. final filleting

- After the launch lug is dry, apply reinforcing glue joints, known as fillets, into the areas shown by arrows.
- Apply a glue bead along the length of a joint. Then use your finger tip to sculpt a radius that blends the two joining surfaces together.
- Now allow your Zoomie™ to dry completely.

11. finishing the Zoomie™

- Boost gliders fly better when they are as light as possible and have a smooth finish for better airflow. However smooth finishes add weight, so a compromise between a smooth appearance and weight must be found.
- Sand the balsa surfaces lightly with 200-400 grit-sand paper to prep them for sealing.
- If you apply sealer, first apply two coats of sealer. Sand between each coat. To save weight, use one part thinner to two parts sealer.
- Your Zoomie™ may be colored with food coloring, markers, aerogloss or spray paint. Because your Zoomie™ is very small and fast, it's best to use very bright, high visibility colors.
- Use the least amount of paint possible to cover. To aid in painting, make a painting wand. Hold your Zoomie™ horizontally on a 1/2" wood dowel or rolled up paper. Apply the paint in even strokes parallel to the surface being painted.

12. trimming for flight

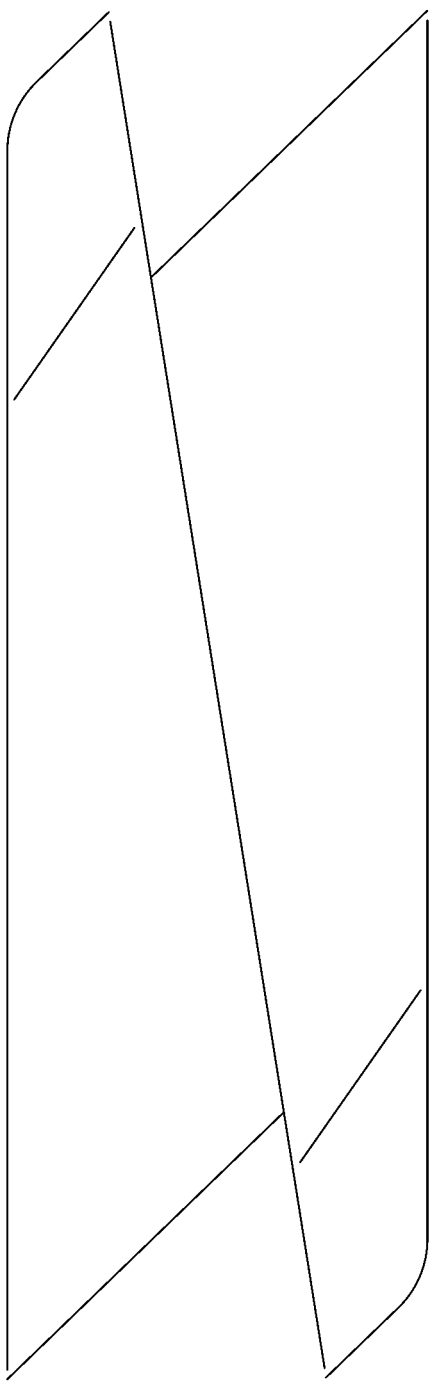
- Your Zoomie™ will have to be trimmed before each flight.
- First statically balance the Zoomie™ by adding equal small amounts of clay to both sides of the body tube near the nose until it balances 3mm (1/8") ahead of the rear edge of the wing root. Or if it is initially nose heavy, add equal small amounts of clay to the rear of the tip joints.
- Now toss test your Zoomie™. Grip it by the launch lug with your forefinger placed on the body tube opening. Briskly toss in a smooth motion. Always toss it into the wind.
- A properly trimmed Zoomie™ should have a flat slightly descending glide about 8 meters (25').
- If it stalls, add nose weight or delete tail weight until a correct glide is achieved.
- If it dives, remove nose weight or add tail weight until a correct glide is achieved.
- If it turns too sharply in one direction, add weight to the tip on the opposite side and retrim.
- Trim your Zoomie™ using the least clay possible.

13. launching

- Check the trim of your Zoomie™ before each flight and retrim it if necessary. Unsealed balsa gliders are temperamental about holding their trim over changes in the climate.
- Prep the engine according to the manufacturer's suggestions. 1/4A3-3T is the only recommended engine. Then insert the engine into the body tube. The engine should slide out easy but stay in your Zoomie™ on the pad.
- Launch your Zoomie™ from a pad with an 1/8" rod and electric launch controller. If you tilt the rod, make sure that the rocket is tilted with the launch lug side towards the wind.
- Your Zoomie™ is very small and fast, so it is wise to have friends along to track it during flight.

What to expect

- Zoomie™ boosts vertically under power, arcs slightly during coast, ejects the engine casing, and transitions into glide for descent.
- If your Zoomie flutters, stalls or dives during recovery, you will need to retrim it!
- Our final prototype glided about 400' from the pad routinely. It was lightly sanded with one coat of brushed on orange food coloring and it actually trimmed without adding clay weight.

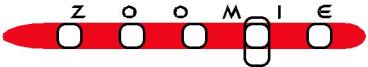




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