



Balloon Explorium

Building and Flying Paper Hot Air Balloons

By Brian Queen

I decided to write this article after seeing the interest created by Elaine Koretsky's presentation "Paper Fire Balloons Over Burma" at the last Friends of Dard Hunter conference held in New York City. The excitement exhibited by the Burmese people launching paper balloons to honor Buddha reminded me of paper balloons that I had built and flown in my youth.

The model balloons I describe here require thin, light-weight paper that weighs less than 20 grams per square meter. Paper made from bast fibers utilizing the Japanese or nagashi-zuki method of papermaking is ideal because it is light weight, flexible and strong. The weight of the paper should be similar to that of commercial tissue paper, the kind available in card shops for gift wrapping or used as filler in packaging clothes.

The explanation and drawings that follow describe a six-foot high balloon. You can make a smaller version by simply halving all the dimensions.

Making model hot air balloons could be the basis for a course, with the students making the paper, assembling the balloons and flying them.

Materials

- 1) Eight sheets of 24" x 96" Unless you make paper in your swimming pool, you will probably have to join several sheets together using a 3/8" overlap. You will also need one eight-inch diameter circle to be used at the crown. Use the cut offs to make this circle. The smaller balloon requires eight 12" x 48" sheets. If you do not want to use your own handmade paper, substitute common light-weight tissue paper available at most card shops.
- 2) Stiff card stock for making a template.
- 3) An adhesive-any paste or glue you would normally use to glue paper. A squeezable liquid glue pen that features a pad applicator is a convenient alternative to a brush and paste.
- 4) A thirty-inch length of wire for the bottom ring. A thin wire coat hanger works well.
- 5) A campstove, a hair dryer or industrial heat gun.
- 6) If you use a campstove for your source of heat, you will also need an 18 inch length of six-inch diameter stove pipe.
- 7) An eight-inch length of string to make a loop at the top of the balloon.
- 8) A broom handle or stick with a hook on the end to support the balloon while being filled with hot air.

Assembly

The balloon is assembled from panels called "gores" which are glued together to form the shape or envelope of the balloon. The gores can be decorated with permanent markers

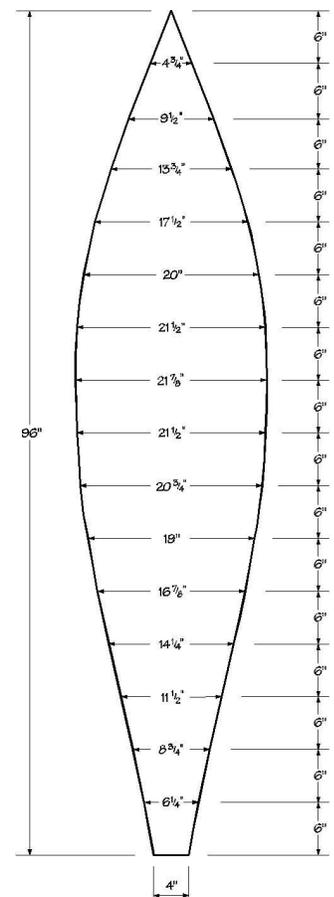


Figure 1.
Dimensions of Gore Template



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or can alternate in color.

First make a template out of cardboard or stiff card stock following the dimensions given in Figure 1. Pile the eight sheets of paper on top of one another. Lay the template on top and, using a sharp cutting blade, cut through all eight sheets at once.

Take two of the gores and lay one on top of the other, slightly offsetting the top gore to one side by 3/8" (see Figure2). Apply glue to the lower panel along the 3/8" margin and fold it over onto the top panel. Glue and fold immediately as you work along the length of the panel.

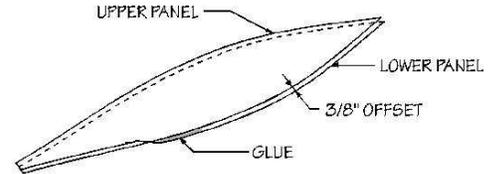


Figure 2. Assembly of first two gores

Lay a third panel on top of the two just glued, but this time offset the panel to the opposite side (see Figure 3). Glue and fold as you did the first time creating an accordion fold. Continue in this manner until you have glued all eight gores. Check often to see if any of the panels are being glued in the wrong place.

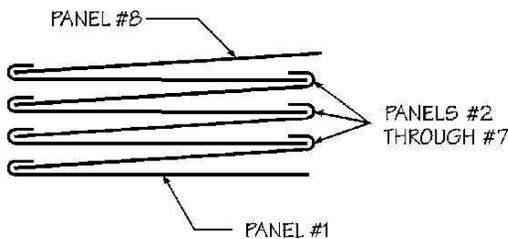


Figure 3. End View of Panels

Now lift the unglued edge of the top or eighth panel and fold panels two through seven in half into the center leaving the edges of panels one and eight to be glued together like the rest, completing the circle (see Figure 4). Check once again that there are no areas glued that should not be.

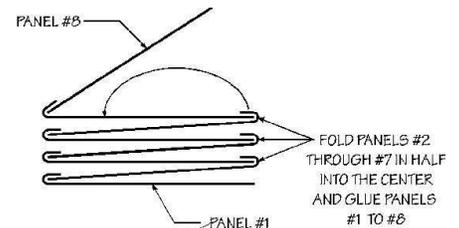


Figure 4. Gluing Panels #1 and #8 Together

While the balloon is still folded cut one inch off the crown. Tape a short piece of string to the eight-inch diameter circle of paper creating a loop and glue the circle to the top of the balloon to close the hole.

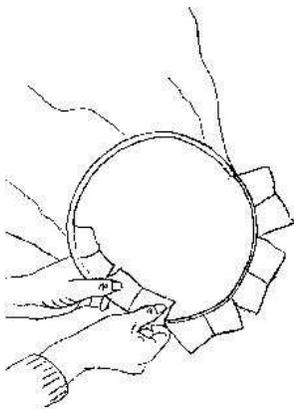


Figure 5. Gluing in Wire Hoop

Next make a hoop from the coat hanger about nine inches in diameter plus an overlap. Size the hoop by opening it inside the neck of the balloon an inch from the bottom of the gores. Remove the sized hoop and tape the overlap. Make eight tabs in the neck of the balloon by cutting one-inch deep cuts between each of the eight seams (see Figure 5). Pin the wire hoop in place by gluing and folding over the tabs. The wire hoop serves two purposes-to weigh down the bottom of the balloon so that it is more stable in flight and to create an opening, making it easier to fill with hot air. Now inflate the balloon with hot air using a hair dryer or heat gun and repair any unglued seams or holes. This should be done indoors. Your hot air balloon is now ready to launch!



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Launching

You must have a large space to launch your balloon because, like the real thing, it is at the mercy of the wind, except that there is no one controlling it. Depending on the size and weight of the balloon, temperature and wind conditions, you may have to chase the balloon for a couple of miles. The danger is that it may come down on a busy street or freeway or get caught in power lines. Choose an open field and only fly the balloon in very light wind. It can also be flown in a large auditorium for a more controlled flight.

To fill the balloon, support the crown with the broom and hook through the loop (see Figure 6). Place the stove pipe over the lit campstove and lower the neck over the stove pipe. Fill with hot air until a distinct upward pull is felt. Then let go and it will quickly ascend.

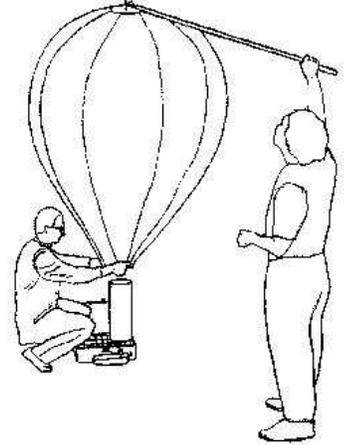


Figure 6. Launching

From website: <http://members.shaw.ca/castlepaperandpress/balloons.htm>