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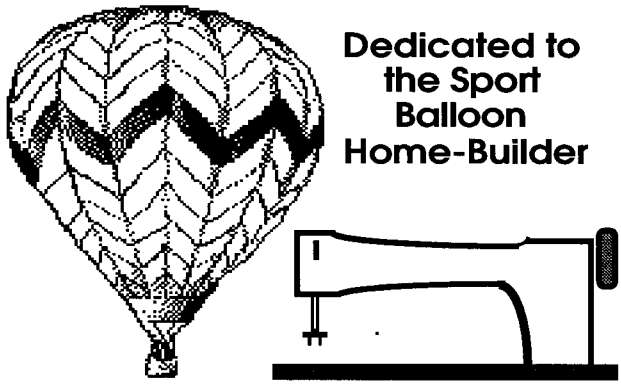


Dedicated to the Sport Balloon Home-Builder

THE BALLOON BUILDERS' JOURNAL

January-February 1994

In This Issue

Notices To Readers

Balloon Builders Journal is now on CompuServe. Contact us at 73474,76.

We will begin building a library of free technical materials under the Sport and Recreation section (Section 9) of the Aviation Forum (GO AVSIG). We would also like to encourage you to participate under this forum on building and other ballooning issues.

To access CompuServe, you need a recent vintage computer with a modem. Software is available for most popular computers which makes the service efficient and cost effective. Free trial service subscriberships are often included with a modem purchase. Basic access costs about $9 per month. Forum access is at additional cost of about $6 to $8 per hour. Most users can contact the service through a local telephone call.

We check our CompuServe mail daily. Its a good way to ask questions or submit ideas for review.

Financial Summary: Total revenues received are $880, with expenditures to date of $561.89, leaving a balance of $318.11. Our current circulation is 75 subscribers.

Flying Gas On A Whim

By John Kugler,

1612 Centennial Drive, McCook, NE 69001 or CompuServe 72074,1525

John is one of the forefathers of ammonia gas ballooning. In this article he describes a recent flight. We hope this article will inform and help dispel some misconceptions about ammonia as a lifting gas.

Background

The challenge to fly gas balloons has been tempting me since I first saw them fly out of Albuquerque in 1982. Little did I know that it would be 10 years before my chance to build and fly gas balloons would come about! There is considerable mysticism about gas balloons and the pilots that fly them. Balloon systems have been expensive and the price of gas has virtually put flying out of the reach of the masses. Consequently, there are very few experienced pilots in the United States and few opportunities to learn to fly gas.

During the 10 years I have been ballooning I have attended a few gas meets. These meets, for the most part, were both boring and labor intensive. My enthusiasm waned until Nick Saum began flying his home built Rosiere balloon from a nearby helium plant in Burlington, Colorado. Nick broke the mold for gas pilots and encouraged me to take up the sport. This all occurred BEFORE the real excitement of ammonia developed.

Gas Is Gas...

This has been an active year for me. This year's Kodak Balloon Fiesta included a magnificent display of gas balloons. Albuquerque played host to this year's Gordon Bennett Gas Race. At these events there were many different systems to examine in hopes of finding design changes that could be implemented into home builts (I'm always looking for new ideas!).

During the Fiesta Troy Bradley (who flew the Chrysler Transatlantic Challenge) introduced me to Rob and Julia Bayly, from England. Rob was Don Cameron's copilot on the Chrysler Transatlantic Challenge, while Julia attended to crew chief duties. They wanted to fly ammonia, if there was time. Of course, there is always a way to find time when it comes to ballooning. I found it rather ironic that while the Gordon Bennett pilots were spending thousands of dollars on gas and countless hours on strategies, we were going to set up a simple ammonia flight on a spur of the moment with costs of a couple of hundred dollars.

After Fiesta, Troy, Rob, Julia and I traveled to Moriarity, New Mexico to prepare for a flight. The day before the flight we laid out the bag for examination. I wanted to check it over as it had been loaned to the French team to fly in the Gordon Bennett. I knew the envelope was tough as it had been built from a kit supplied by Tim Cole and Dennis Brown, who run BC Products.

After the layout and inspection I briefed Rob and Julia about the next day's planned flight. Inflation would take about 2 hours, Julia was to be the first passenger and we would fly for several hours and land. After the landing Rob would assume Julia's place and the flight would continue. Then another landing would be attempted and both of them would fly together, leaving me on the ground.

Both Rob and Julia expressed concern about the irritating characteristics of ammonia. After demonstrating the use of our gas masks, explaining the proper handling of ammonia, as well as allowing them to get a good whiff of the gas–all felt better prepared.

Driving back to Albuquerque the time was spent discussing the flight characteristics of ammonia and talking about Troy, Rob and Julia's adventures. These are truly a bunch of world class pilots! It was going to be a privilege to fly them.

The Day Arrives

Monday, October 11, 1993 was the day that the Brits made history! Our inflation began about 4:30 AM and was completed about an hour later. Rob and Julia could not believe how smoothly it all went. My wife, Kathy, was helping explain all the necessary details about the inflation. Rob paced about and marveled at the simplicity of the operation as compared to the highly regimented Gordon Bennett. Weather was excellent.

Ammonia has about half the lift of helium and we were flying a 35,000 cubic foot (1000 cubic meter) balloon from a launch field of 6200 feet MSL. I was concerned that, since I weigh in at 250 pounds, it might be difficult to get everyone up according to plan. That was my problem to solve.

Since lift is so critical with gas ballooning (especially ammonia) the pilots that regularly fly ammonia have learned to fly with minimal ballast and are quite stingy with any ballast on board. This characteristic startled the Brits! At takeoff, there were about 3 bags of ballast-frills were not allowed.

As the sun rose, the gas heated, and the balloon rose to about 500' AGL and leveled out. Any apprehensions about the gas smell were dispelled once the flight began. Julia took over the controls and flew nicely. She noticed that ammonia requires about half as much ballasting as does helium. That's great since we didn't have much to begin with! After an hour or so flight, a landing approach was set up into a open pasture several miles from our launch site. Out went the trail rope and our crew was right there to catch us.

Intermediate Landings

Now here came the real trick, exchanging passengers! Getting the proper weight and balance was the tricky part of the second takeoff. Rob jumped in and we loaded (or in this case unloaded) the basket with the proper amount of sand and stuff. Much to Rob's dismay, he had to leave his camera behind. The sun warmed the gas in the bag and we began to get light, but not light enough. My boots were the last to go and a stern warning was issued to Rob: "land this thing close to a road, I am not walking through stickers in my socks!"

Rob took over the control of the balloon and was amazed at how easily it flew. It was nice to just be a spectator for a change. Again, the gas smell fear was dismissed as Rob only used the mask once or twice for a few seconds in the hour long flight. We were both feeling quite "sporty" and made two take off and landings to test Rob's abilities. The sun was gently "solaring" the gas in the bag, so valving effects were minimal. Flying with a light trail rope made the landings fun. After our second landing, the gas heated and we took off on our own, without ballasting! Flying gas is fun.

Our flight path took us near the airport and a variety of good roads. Since this was the opportunity I was looking for (remember, no boots!), we landed and radioed the crew with our Icom amateur radios to prepare for an exchange of ballast and crew. They arrived about the time we made our landing. When Julia got in we had to add seven bags of ballast-ample for a fairly long flight. Rob was even able to take up his beloved camera! It was a beautiful sight to watch them takeoff, even if I was left on the ground.

The winds began to pick up ever so slightly and the balloon bobbed along in the sky. It was a pretty sight.

Communications were important in case any unforeseen incident occurred, but the most frightening thing we faced was Rob's jokes. These British do have a strange sense of humor!

After an hour of flight, the pair decided to land in a small housing development near some horses. After careful examination of the situation, the gas was released and the locals came around to examine the curiosity. The ammonia odor while packing up the bag is the worst thing about flying ammonia!

Flight Summary

All toll, for 3.5 hours of flying, the gas mask was used sparingly, about 5 minutes. This could have been totally eliminated if the gas could have been valved off instead of being allowed to burp out the appendix. (I was hesitant to valve in the early part of the flight due to the lack of both ballast and heating from the sun).

We drank a few beers and debriefed our flight. We even had a few jokes about the Gordon Bennett...for a few hundred dollars, we could have flown as far as some of the competitors. It was a cruel and tasteless joke, but unfortunately the truth! Again as always, when pilots fly ammonia and become acquainted with it's characteristics, they wonder why pilots from the United States and Europe are so quick to condemn its use. I think that it's just politics.

Isn't This What Its All About?

At any rate we had a helluva good flight and some memories that will last a lifetime in a balloon that was built in someone's garage. Ballooning is about meeting new friends and pushing the envelope of flight. This flight did both.

There is a wealth of information about gas balloon construction available. If you want to build bags, load rings or baskets it's not a mystical thing like some would like to make you think. When you live in the middle of nowhere like Tim Cole, Dennis Brown and myself, you learn to improvise and use what is available. One thing we do know how to do, is have fun!

Continued next page

The following chart displays a summary of John Kugler's gas balloon experience.

Date	Location	Flying hours	Take-offs	Notes
11-Feb-91	Burlington, CO	19	1	Helium-Sioux City, IA. Night flight VFR over the top in AM. Landing at 40 mph.
26-May-91	Culbertson, NE	3	1	First NH3 Flight-unexpected landing..not enough ballast! Poor flight planning & knowledge.
8-Jun-91	St. Francis, KS	3	1	Dennis Brown flew his balloon too, Dewey Reinhart was on hand to witness.
25-Jul-91	Culbertson, NE	6	8	Ken Kennedy instructional flight, calm overcast day. Tree topped, stand up landing on road.
14-Sep-91	Tyndall, SD	2.5	1	Nick Saum was a great help. Could have flown to Canada this flight.
17-Dec-91	Culbertson, NE	5	1	Planned long flight, but leaky valve forced landing at McCook Airport, 11 miles and 230 lbs of ballast.
26-Dec-91	Culbertson, NE	1.5	1	Short flight-crew member Doug Dueland...not enough ballast.
25-Apr-92	Culbertson, NE	2	1	First Gathering--Valve would not open. Landed in Oberlin, KS. Real experience.
26-Apr-92	Culbertson, NE	2.5	1	Second day of gathering. Everything worked fine. Landed near Herndon, KS.
26-Jul-92	Mitchell, SD	2	1	Corn Palace Ammonia Cup. Nick Saum and Kathy Kugler flew on with me on ground-first place.
17-Nov-92	Culbertson, NE	2.5	1	Flew to Brady, NE. Tried to land and trade with Nick Saum, but too windy. Landed at North Platte.
15-Aug-93	Perry, NE	4	1	----Just another flight! Too calm to go anywhere.
11-Sep-93	Perry, NE	3.5	1	First flight Kugler Gas---I think it works the way it was designed to, looks good on paper.
11-Oct-93	Moriarity, NM	3	4	Rob and Julia Bayley-First Brits to fly ammonia!--see story.
7-Nov-93	Moriarity, NM	11.25	1	Helium--National Championship. Tough flight. Fought inversion and high winds (50 kts).
TOTALS	**16 FLIGHTS**	**73.25**	**26**	

Report on Sherwood 3250A Fuel Tank Valve Failure

Reader Brian Boland reported a recent failure of a Sherwood 3250A POL valve on a 10 gallon tank. The failure involved "stripping out" of the liquid valve stem threads. The damage and internal propane pressure made it impossible to close the valve. Other valve components retained their integrity and there was no leakage of fuel into the basket compartment. Under normal circumstances, this valve failure would have been an inconvenience and not a major problem as other valves in the fuel system would continue to provide flow control. But in his case, this valve was the sole control of a "raw propane feed, backup burner." Thus the failure resulted a burner flame which could not be stopped until fuel was exhausted. Fuel exhaustion then resulted in pilot light failure; the pilot lights were on the same tank.

Brian, who runs a repair station, states: "The valve had been turning on and off hard for several flights, and I had planned to empty the cylinder and dissect the valve shortly." He goes on to say, "This valve... just disintegrated internally over a period of time. When I disassembled it, my initial prize was a handful of what looked like gold dust. In reality it was the completely pulverized brass inner valve stem threads." The tank had been purchased new in 1988 and had been flown approximately 250 hours. Brian frequently used the back up burner for noise reduction, extra burner output and for illumination. Thus heavier than normal service would have been demanded of this valve, perhaps contributing to the failure.

We take this moment to remind our readers:

1. We are not aware that this problem exists on other makes or models of valves. But we should not dismiss the possibility that other makes and models of valves could have the potential for this type of failure.

2. Be suspicious of any liquid feed screw valve which exhibits a change in its operation. In particular be suspicious of valves with grinding, stiffening, or otherwise rough operation.

2. While there can be a number of reasons why these symptoms might occur, the prudent course of action is to have any tank valve with unusual symptoms checked by your repair station or local propane dealer.

3. If you are operating a burner which relies *only* on a "screw mechanism tank valve" to control backup burner fuel flow, be particularly conservative.

The Novice Builder: Part 4, The Vertical Gore Envelope: Design, Layout, and Pattern Making

By Bob LeDoux

This article completes our series on The Gore Pattern Spreadsheet. We review vertical-panel envelopes, discuss layout of patterns and techniques for cutting out the fabric.

This article completes our series of articles on The Gore pattern Spreadsheet. Using the material in this and the preceding three issues of *The Journal*, the builder has been presented essential tools and measurements from which to design a multi-panel or vertical gore balloon. Certain detail constructions such as stitch patterns for cable attachments have not been discussed. The best source of data for such details is a good balloon repair manual like the *Aerostar Continued Airworthiness Instructions.*

In our last issue we presented a modified version of The Gore Pattern Spreadsheet to permit building the multi-panel family of envelopes. Multi-panel envelopes use gore patterns in which the fabric length runs in the horizontal or diagonal direction.

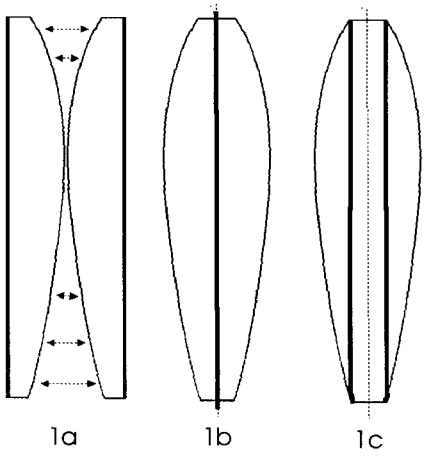


Figure 1. Vertical Gore Patterns. "a" and "b' are identical vertical half gore patterns and "c" is a tri-gore pattern.

This article, covers the other family, the vertical panel envelopes. These envelopes all run the length of the fabric in the vertical direction. The most common examples of these envelopes are the *Rally* and *"S"* series envelopes manufactured by Aerostar.

Summary of Vertical Patterns

Figure 1 displays these gore patterns. As with our last article, the line width denotes the type of seam. The heavy vertical lines denote load tapes. If these tapes occur on the edge of the gore then the tapes are applied as the two adjacent gores are sewn together. Light lines denote a simple seam. A very light dotted line up the center of a gore is a symmetry line and does not denote a seam. Note that horizontal load tapes, at the mouth, or deflation port are not shown. Nor are the rip stopping horizontal load tapes shown. These are generally added after the envelope is completed. They are not necessary to our discussion.

Figure 1b is the gore pattern associated with the Aerostar "S" series envelope. It is also the pattern created by The Gore Pattern Spreadsheet described in Issue 1 of *The Balloon Builders Journal.* This is one of the simplest of balloon gore patterns. The fabric *warp* (the length of the fabric as it is unrolled) runs vertically. This gore consists of two long lengths of fabric (called half gores) sewn together along the straight fabric edges. The load tape is also sewn down this fabric seam. Most builders prefer to use a tape feeder which feeds the load tape under the sewing machine needles at the same time the two half gores are sewn together. Thus the seam is formed and the tape added in one sewing operation. The cut, curved fabric edges are sewn to adjacent gores. These edges are generally not covered with a tape.

While figure 1b displays the shape of the gore pattern associated with the "S" type envelope, it does not display the construction technique preferred by most builders. The preferred method is shown in figure 1a. Figures 1a and 1b create identical envelopes. Most builders prefer to create gores by sewing the two half gores together on the curved edge. These completed gores are then sewn into an envelope by sewing adjacent straight edges together, adding the vertical tape as the seam is formed.

Using either sewing sequence 1a or 1b an envelope is formed from 36 to 48 half gores, depending on the envelope volume. The width of each half gore is limited by the width of the balloon fabric. So this style of construction tends to have a larger number of

gores than found in some other designs. Assuming 60 inch wide fabric, these completed gores are not wider than about 110 inches at the equator.

Figure 1c displays the tri-gore pattern used in the Aerostar *Rally*. This pattern is a vertical gore system which minimizes fabric waste and seam construction by creating a center panel the full width of the fabric. The vertical load tapes generally run down each edge of the uncut vertical panel. With this envelope style the width of the completed gore is limited to about 171 inches, assuming 60 inch wide fabric. While this envelope style requires fitting of tapered panel ends, this may be a good pattern for the beginner. It is quick to construct. On an AX-7 envelope only 36 fabric panels are required, and 12 of these are straight fabric lengths.

Some Gore Design Considerations

In our last issue we discussed a number of considerations about fabric width. For vertical panel balloons, the fabric width is important. As the gore pattern width is limited by the fabric width there is advantage to using the widest fabric possible.

For example, assume an AX-7 envelope of 77,500 cubic feet is constructed using a vertical half gore style. If the fabric width is 46 inches, then a 24 gore envelope (48 half gores) would be required. But if the available fabric is 60 inches wide, the same size envelope could be constructed using 20 gores or 40 vertical panels. In fact, if the fabric is untrimmed so that it runs a bit over 60 inches wide, an 18 gore envelope is possible. In heavier weight, 1.9 ounce per square yard fabric, 60 inch wide yard goods are generally available. In the lighter weight 1.1 ounce fabric 64 inch width is not uncommon. Occasionally you will run into older stock, some of which was only 36 inches wide.

Using the half gore construction the straight edge on the pattern can often be laid right up against the untrimmed fabric edge. (see figure 3). There is often "fuzz" on the selvage edge, and the coating often does not go all the way to the edge. These can generally be folded into the final seam, minimizing the amount of cutting required of the fabric.

While these factors are also true for the tri-gore pattern, the center panel in this envelope should be of consistent width. When building a tri gore balloon check the measured width of the actual fabric. If it varies, it may be necessary to trim to a common width to ensure the center panel is of consistent size.

Preparing Gore Patterns for Vertical Half-Gore Envelopes

In our last issue we covered many of the details about pattern construction. We won't restate all of the details. In the following we will discuss factors particular to the vertical gore configuration.

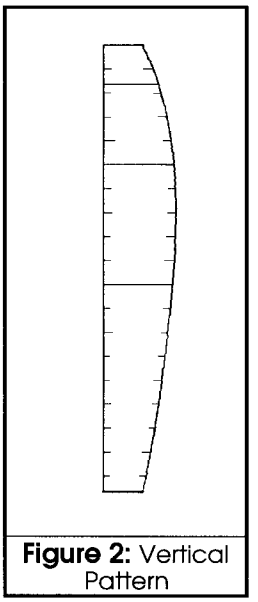


Figure 2: Vertical Pattern

Lets begin by constructing an envelope using the gore layout in figures 1a or 1b. Prepare The Gore Pattern Spreadsheet for the final envelope configuration. The original spreadsheet as presented in our first issue creates this particular style of pattern. Enter the number of gores, desired volume and seam allowance in The Spreadsheet. Make certain that the maximum width of cut fabric, shown in cell H32, does not exceed the uncut fabric width. Having selected the final gore characteristics, print out a copy of The Spreadsheet.

Before I actually cut out the pattern, I prefer to make a second copy of my table of values. This copy contains only the vertical stations and the width measurement at each station. I also convert the decimal measurements of The Spreadsheet into a more readable "feet, inches, and fractional inch" measurement. Another option, if the measurement tools are available is to convert the dimensions to metric measure.

Figure 2 presents the general idea of the completed pattern. Again, we assume a floor like a gym is available.

Begin by taping down a strip of Kraft paper, longer than the final pattern. If the gym has a straight line painted on the floor, line one edge of the paper up with this line.

Now mark the stations up the length of the paper. These station measures are dimensioned in feet in column C of The Spreadsheet.

At each station, measure across the pattern from the vertical straight edge the distance for that station. On The Gore Pattern Spreadsheet, these distances are dimensioned in inches in column "H." After these points are marked, look down the line of dots to see if they form a smooth, curved line. Dots off line may have been mis-measured and should be checked again. Of course, all marks should fall on the paper and not on the floor.

Connect the dots with a felt tip pen and flexible wood stick. Continue this process down the length of the pattern until the curved line is drawn the entire pattern length.

Mark the lines for the mouth and deflation port cut offs and for the horizontal load tapes. I generally mark a dotted line as a fold line and add one inch in length as a cutoff line to permit folding the edge under the tape which is sewn into each opening. Also mark across the pattern for the horizontal, rip stopping load tapes.

There should be index marks every foot or two up the length of the straight and curved edges. These marks are transferred to the fabric during cutting. They ensure that seams properly line up during sewing. The vertical station marks make good index marks.

Mark the bottom of the pattern with the word "mouth". There have been instances when builders have sewn their panels in upside down. This can have a telling effect on the look of the finished balloon. Transfer all marks to the back side of the pattern. Mark the front side of the pattern as "right" and the back side as "left." Now is a good time to cut out the pattern long the curved and straight edges.

Figure 3 displays the technique for using the pattern. Fabric is unrolled and laid out flat. I prefer to layout with the coated side of the fabric up. To ensure consistent panel size it is important to apply the same amount of tension each time as the fabric is laid out. The coating may be a bit "tacky" and by putting this side up, more consistent tension over the fabric length may be realized. I prefer to tape one edge to a straight line. The pattern is laid over the fabric and aligned to the edge of the fabric. Then a sharp pair of scissors are used to cut along the edge. With a sharp scissors there is no need to open and close the scissors to cut. Simply hold the scissors open and slide it along the pattern edge, cutting like a knife.

Don't forget that half of the panels are "right" and half are "left." In other words, the pattern is turned over and the back side is used for half of the cutting. Failure to do this results in some panels that have to be sewn into the envelope with the coated side out.

Preparing Gore Patterns for Tri-Gore Envelopes

Begin by creating a Modified Gore Pattern Spreadsheet for the desired envelope. Assuming 60 inch wide fabric and a 1.00 inch seam allowance, then the maximum width of the pattern is 1.5 x 60 or 90 inches, less 3 inches for 3 seam allowances for a total half gore width of 87 inches. In this example, 87 inches would be the maximum width in cell H32 of the Modified Gore Pattern Spreadsheet. The three seam allowances represent two allowances where the straight, vertical seam is made, and one allowance for the outside gore edge. Choose an appropriate number of gores to achieve the desired volume while not exceeding this half gore width. For AX-6 or AX-7 size envelopes, try using 12 gores. For larger envelopes 13 or 14 gores may be required. These counts assumes 60 inch wide fabric.

Print out the copy of the Modified Gore Pattern Spreadsheet. Refer now to figure 4 which describes the process for creating the patterns.

Three patterns are required. The largest pattern is for the curved section which lies in the equator area of the gore. The straight, center fabric panels can be made by cutting the fabric to length and then trimming the short tapers at each end. Two very small patterns are required to cut the tapered ends

Lets review the process shown in figure 4:

Step 1 shows the gore for which the pattern is made. There is a symmetry line down the middle of the gore shown as a light dotted line. On either side of this line is a vertical taped seam. In step 2 the symmetry line is laid out. Then a second line is laid out parallel

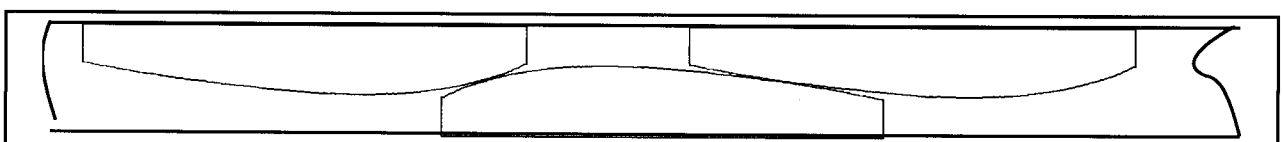


Figure 3: Displays placement of half gore patterns on fabric for cutting.

to the first line and half the width of the fabric from the first line. This second line represents the outside edge of the center panel fabric, where it forms the vertical seam. This line is shown as a solid line in step 2.

In step 3 pattern paper is laid over the solid line. The pattern paper overlaps the solid line by twice the seam allowance.

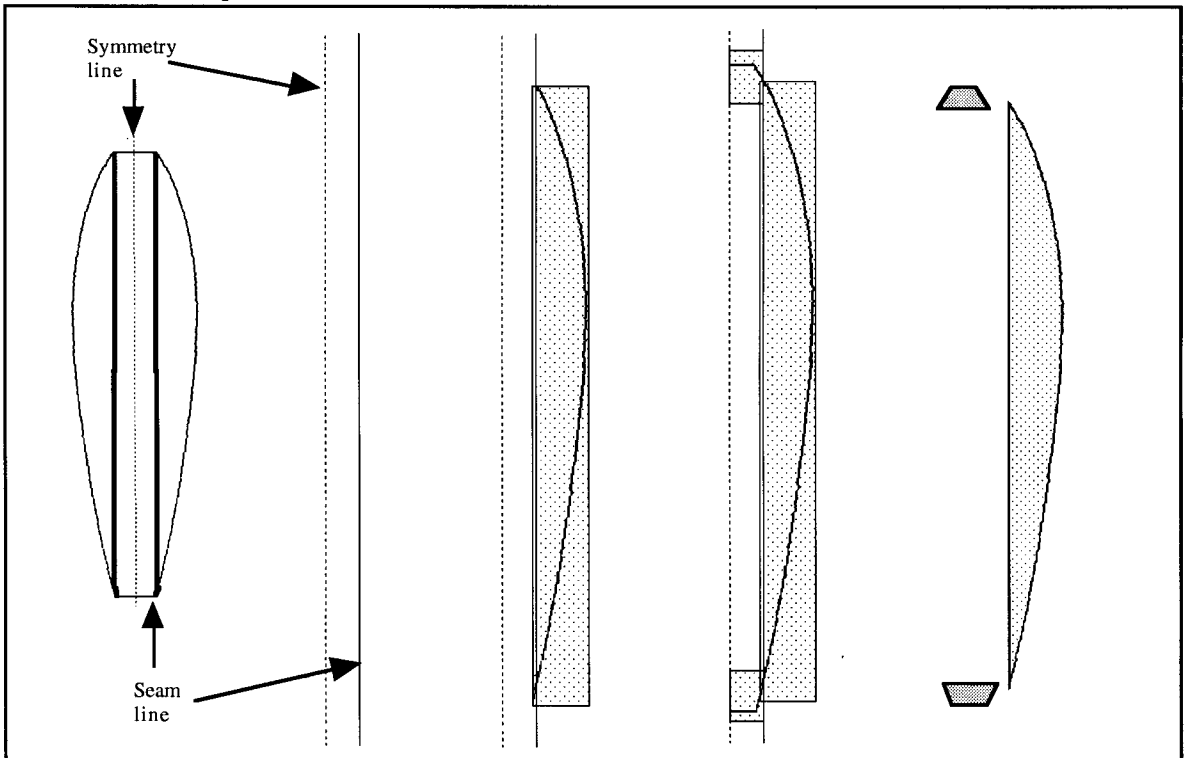
To mark out the curved line, the station marks must be put up the symmetry line. As there is no paper on the floor up the symmetry line, put down pieces of masking tape at each station on the symmetry line Then mark out from the station the distance to the gore outer edge.

In step 4, pattern paper has been placed down to continue the outer curve where it runs into the center panel. Horizontal lines representing the deflation port and mouth cutoffs are also marked on these end patterns.

In step 5 the patterns have been cut out. Make certain to put index marks on both edges of the curved pattern. Transfer these marks to the back side of the pattern. Mark the "bottom" of the pattern so the top side of cut panels can be identified. Mark the two sides of the pattern as "right" and "left."

Make full width top and bottom patterns by laying the half patterns over pattern paper folded in half. Cut out the pattern and unfold to show the full pattern. This half-pattern method was explained in "Figure 2" in our last issue of *The Journal.*

The center gore fabric panels are cut by laying out a length of fabric and trimming the fabric to final length. It is important that the same tension be applied as every piece is laid out to ensure consistent panel length. After trimming to length, the two small patterns are placed over each end and the tapers are cut.



1. This is the tri-gore pattern. We will build patterns based on the right half of the pattern.

2. Construct two lines. The distance between the lines is half of the fabric width.

3. Lay out a length of Kraft paper, shown in grey. Overlap the right most line by 2 times the seam allowance. Mark out the curve on the paper.

4. Put down Kraft paper where the line runs into the center section at top and bottom. Lay out line on these papers.

5. Cut out the curved pattern. Make full width patterns for the tapered ends of the straight section.

Figure 4: Sequence of steps to create tri-gore pattern.

Which to Use: Vertical Or Horizontal Gore Patterns?

By Bob LeDoux

Choosing between the pattern families is a question for the first time builder. The following chart compares the costs and benefits of vertical versus horizontal gore patterns.

Assumes 77,500 cubic foot envelope	Vertical Gore Designs	Multi-Panel Gore Designs
Number of Fabric Pieces	Tri-gore (Rally-style) pattern requires 36 pieces. The half gore ("S"-style) requires 36-48 pieces.	A minimum of 96 panels is required with an average of 200- 400. panels Large balloons could exceed 1,000 panels
Fabric Waste	10% to 20% is typical. The larger size pieces makes working around defects in the fabric more difficult. The half gore pattern permits incorporating the selvage into the seam thus reducing waste.	As little as 1% waste is possible for premium fabric with consistent width. Typical fabric will have higher waste as selvage edge is trimmed. About 2%-3% of fabric goes into horizontal seams.
Other Material Use	A typical envelope requires about 3 pounds of size 24 thread and 800-1000 yards of load tape.	Expect to use 6-12 pounds of thread. Some builders eliminate horizontal tapes saving about 150 yards of tape.
Principal Tools	Basic double needle sewing machine with a tape feeder are basic tools.	Add a cutting table and a seam folder to the list of tools.
Fabric Preparation	All fabric pieces can be cut out on a gym floor over the course of a weekend. This work can be very uncomfortable. 1-3 pattern pieces are required.	Pieces are prepared on a cutting table which generally requires 12 to 24 pattern pieces. Preparing pattern pieces may require a large, clean floor.
Work Space Required	After fabric pieces are cut all sewing can take place in a small room.	More space required for cutting table. Few builders desire to cut out hundreds of fabric pieces on a floor.
Time to Complete	More quickly completed because of the limited number of fabric pieces. Completing individual gores requires sewing 1 or 2 long seams.	Considerably longer time required to complete envelope. About half of construction time will be spent in completing gores which require 12 to 24 short seams.
The Bottom Line	For the first time builder or a builder renting a sewing machine, minimizing the number of fabric pieces may result in better construction at a more economical cost. These envelope styles limit color and pattern changes. Additional cost due to fabric waste is partially offset by lower cost for thread and needles which can run as much as 4% of the envelope cost.	This choice provides more color and pattern options. It is less forgiving of sewing and cutting errors. A seam folder is recommended for the beginner. Thread and needles could run as high as 10% of envelope cost.

We offer our condolences to Brian Boland and his family on the recent loss of their son Jeff shortly before Thanksgiving. Jeff was a fine athlete who suffered a heart attack while biking. Jeff was into biking the same way his father is into ballooning. Our best wishes go to the family during these difficult times.

Bill Arras reports that at the last BFA Competition Division board meeting, a committee was formed to examine issues related to experimental balloons, including insurance. The committee will include Bill Arras who seeks participation by other interested balloonists. Participants do not have to be Competition Division members. If you are interested, contact Bill at 7843 SW 77th. St, Redmond, OR 97756, or call him at (503)389-8739.

Letters to the Editor

Bob,

I have built two 39,000 cubic foot experimentals. The first in May of 1986, a Jack-O-Lantern; and in 1991, a Dove, inlayed.

David Woods
Mount Pisgah Balloons
Rt 1, Box 232
Chandler, NC 28715

Bob,

I am particularly interested in a top hat shape [envelope] and playing around with a PVC pipe framed basket design because its so cheap, flexible and forgiving.

Rob Carlson
P.O. Box 10
E. Walpole, MA 02032-0010

Dear Bob,

You ask whether a subject of interest is homebuilt gas balloons. My answer is yes, as that may be the only realistic route (using NH_3 or otherwise) for many of us to earn and use a gas rating.

...Topics of interest include: Plastic film vs. coated fabrics; seaming/welding methods; nets vs. load tapes; valve design and construction; rip panels vs. deflation sleeves.

I hope those involved in this fascinating side of the sport can be persuaded to share some of what they know through the pages of the *Journal.*

Mark Langenfeld
2020 Harley Drive
Madison, WI 53711

Bob,

I built my last envelope seven years ago and purchase MANN fabric at the time. Do you know of a good source of fabric currently? I've heard WESTMARK is good.

Mike Kelly
860 Clement St. #605
Denver, CO. 80220

Bob,

You're doing an excellent job. I especially like your two pages of Letters To The Editor. Must say of the 2 dozen LTA newsletters I receive, yours is the most worthwhile. Of course I still get the biggest kick out of Bill Murtoff's.

Brian J. Boland
P.O. Box 51
Post Mills, VT 05058

Dear Bob,

I have been involved in ballooning for 20 years and building my own balloons for 15 years now...I turned to building my own balloons because the market (15 years ago) refused to provide basic safety features and reasonable pricing.

Thomas Kotecki
3573 N. Maryland Ave.
Shorewood, WI 53211

Editor's note. The following letter was submitted anonymously. I have edited the letter for length.

Along with this letter I received a copy of FAA Order 8110.39 (3/19/84) regarding "Modified Manned Free Balloons." This order describes the process for mating different makes of balloon components under provisions of the Supplemental Type Certificate (STC) process. I also received a sample "Inspection Procedures Manual" which is an essential part of the process of getting an Air Agency Certificate to permit building of replacement parts for Type Certified aircraft. Copies of the complete original letter and attachments are available from your editor for $2 to cover printing and postage.

Dear Bob:

RE: FAA Certification Procedures - Hot Air Balloons

The task of building your own balloon, as I'm sure you'll agree, should not be taken casually. The idea that just anyone can buy some fabric and "copy" an existing type design, has had many of the paranoid types twitching for many

years. As long as *The Balloon Builders Journal* restricts it's direction, categorically, to Experimental Certification, you'll meet with little opposition. Why not Supplemental Type Certification (STC). The fact is that STCs are not "copies". You aren't stealing any manufacturer's design. STCs are not illegal or unsafe. They don't void your insurance. On the contrary, this certification method is a common place FAA procedure which can be easier than Experimental certification and produce better results.

The price of balloon fabric, purchased from a balloon manufacturer, is $8/yd for a reason. The price rose from $2/yd to $8/yd over a very short period of time (1983). Back then, *The Balloon Manufacturers Association* was formed to stifle consumers and repair stations who rebuilt balloons. The threat to them included issues of profit and indemnity. To some extent these manufacturers were justified in their paranoia, but not in their actions. There were unscrupulous repair stations, using inappropriate repair techniques that were meant for small repairs, as the basis for rebuilding entire envelopes. Without guidance or mandate people will at least try to get away with whatever they can. The answer was then, and is now, to provide this guidance. This guidance was not forthcoming. Instead everything became proprietary. If you are having trouble now finding information about balloon design and construction technique, realize that there are a few paranoid types who still flail at control.

Hypothetically, a balloonist has a problem that requires the replacement of a large percentage of the envelope fabric. The situation might even require that, over some period of time, most of the envelope fabric is replaced. The problem is that your favorite balloon manufacturer would like to limit your options when dealing with this dilemma, and they try to impose their paranoid limitations. They make amendments to their repair manuals, not to be confused with the required Instructions for Continued Airworthiness. When they found out that they had no right to impose themselves on the consumer in this way, they raised the price of their fabric to gain control. Manufacturers would like you to believe that the FAA Type and Production Certification that they must obtain gives them some sort of implied US patent, and, or, power over the consumer. They like to make threats, using the FAA as their bravado, that something bad will happen to the balloon owner who doesn't follow all their economically self serving and indemnity enhancement restrictions. The Instructions for Continued Airworthiness are required only for balloon type designs certified after 1981. Most of the hot air balloon type designs in service today were certified before this date. No owner, operator, or repair station is required by the FAA to follow manufacturers service bulletins or service letters. When asked, the FAA will deny that any of these documents are FAA Approved, even though they are sometimes stamped as such. I could go on and on here, but lets not lose the momentum of the subject at hand....

...My advice to *The Balloon Builders Journal* is that it is easier and better to obtain a STC for a Standard Airworthiness Hot-Air Balloon than to build from scratch and attempt an Experimental Certification procedure with all of it's inherent pitfalls and limitations. The experience level and procedures necessary to obtain an STC and an Air Agency Certificate, are no more difficult than, the path that you describe toward an "Experimental Airworthiness Certificate at your local FSDO." The subject of the STC might be, "a replacement fabric (supplier)" for the balloon type design of your choice. This alternate supplier of envelope fabric abates the manufacturers control over the consumer. A used system (envelope type design of your choice and a basket-burner combination that is certified to be mated with that envelope) is purchased. The finished STC'ed envelope might have nothing original but the Data Plate. The basket and burner are repaired and refitted with all new hoses, fittings, and the latest modifications. This approach will yield superior results, with less hassle, and more safety built in to the project...

...It seems to me that *The Balloon Builders Journal's* weakest area is an understanding of the FAA, and how the regulations apply to Hot-Air Balloon Certification options. Insight comes with the perspective of history and the general aviation experience you speak of. Address the subject of dealing with the FAA thoroughly and completely, with great importance of purpose, and with seasoned expertise. This will be your most important task. The road to certification, taken with proper direction and insight, can be an easy one. Help the first time balloon builder to accept the full measure of responsibility, while providing the guidance, to make owning a hot air balloon easier and safer for all of us.

Unsigned