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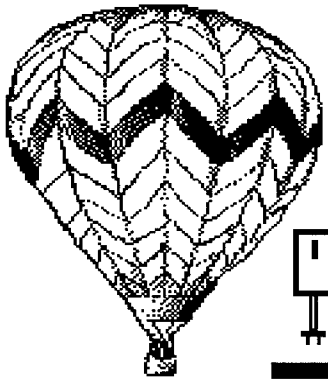
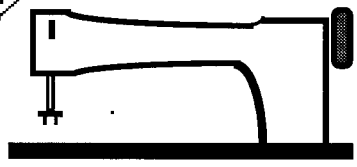


Dedicated to the Sport Balloon Home-Builder



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THE BALLOON BUILDERS' JOURNAL

May-June 1994

In This Issue

Up and Coming

Adrian Brookes will discuss the Tracy Barnes philosophy of envelope construction. Construction details will also be presented. A year-end financial summary will display the current status of *The Homebuilders Journal*. Look forward to an upcoming issue on a homebuilt theodolite to permit local 'piball' soundings. We will also follow-up on construction with 'second' grade fabric and additional notes on envelope to basket cable lengths.

Notices To Readers

For many readers it's time to renew subscriptions.

We have included a self addressed stamped envelope along with a renewal form in this issue. Those readers with extended subscriptions are advised of the number of issues remaining in their subscription.

The subscription continues at the current rate of $12 for six issues.

We will attempt to maintain an inventory of old issues so new subscribers may purchase the entire set.

This issue was mailed about a week late so we could include a report from the Vermont Experimental Balloon Meet. Our next issue should be back on our normal schedule.

Financial Summary: Total revenues received are $1,298, with expenditures to date of $1,147.14, leaving a balance of $150.86. Our current circulation is 103 subscribers,

Some Thoughts on Light Weight, Low Cost Envelopes

By Bob LeDoux,

2895 Brandi Lane, Jefferson, OR. 97352 or CompuServe 73474,76

This is a set of three articles on building with non-traditional materials.

First time builders should seek the assistance of more experienced builders before trying some of these ideas.

Part I: Introduction

The *Balloon Builders Journal* has, on several occasions, encouraged builders to replicate a factory envelope as a first time project. We have often pointed to Aerostar designs because they are well documented in *Aerostar's Continued Airworthiness Instructions.* Aerostar products are also in abundance permitting examination of a factory balloon by the new builder.

This approach is appropriate when the builder is uncertain about his or her construction skills and when technical skill, in the form of other experienced builders, is in limited supply. For many constructors, this conservative approach provides the confidence necessary to achieve a successful project completion.

In this issue an alternative approach is suggested. This approach emphasizes the use of lighter weight materials than found in traditional factory balloon construction. We are also encouraging persons with some balloon building experience to consider purchasing factory seconds as a low cost material for envelope construction. These approaches may be appropriate for a number of reasons:

1. Several readers have noted that the United States currently has an abundance of good quality, 1.1 ounce rip stop nylon. This buyer's market, has resulted in good prices for seconds and mill ends. Several readers who have purchased seconds have commented that their material has generally been "first" grade. It is important to remember that some risk must be accepted when buying these grades of fabric.

2. A number of builders and writers, including, Brian Boland, Bill Arras, Ruth Ludwig, and Mike Emich, among others, have commented on the benefits of very light balloon systems. The need for minimal crew, and equipment; permitting "spur of the moment" flying; are among the benefits of these light systems. Some of these systems can be transported as carry-on airlines luggage.

3. Brian Boland reports that 300 hours on 1.1 ounce fabric envelopes may not be uncommon. But builders should be prepared to accept a shorter envelope life than found on factory balloons with their heavier fabric. We would argue that this is consistent with the sport and recreational aspects of building.

Many sport fliers would find a light weight, low cost envelope with a life of 250 hours preferable to a heavy envelope with a life of 350 hours. This would be particularly true if an AX-7, light weight envelope could be built for around $1,600. Such an envelope is achievable using low cost second grade fabric. The low cost, but shorter life span encourages more construction, which may result in more innovation. It also encourages the pilot to expand his, or her, ballooning environment by providing more building, as well as flying time

4. By making use of light weight materials we may be able to improve access for the first time builder. The traditional envelope construction tool is a double needle sewing machine, a heavy, awkward, big, expensive, piece of equipment, out of place in the modern home. Is there a market and design potential for building a light weight balloon using the home sewing machine? Perhaps a fabric seam system can be documented around a single or multi-step zig zag stitch using Balloon Works-standard size 30 thread. I am not proposing that the reader go out and build with this system. But our more knowledgeable readers might want to test and document seam and fabric systems specific to lighter weight construction.

Part II: A Personal Experience

1. About the time I started editing this newsletter, I found myself in "fabric heaven." I had purchased 1,800 yards of premium grade 2.2 ounce per square yard fabric for $1.85 per yard. I thought this should keep me in balloon building materials for the next five years. Was I wrong! I ran into a number of readers touting the virtues

of balloon systems, built around light weight 1.1 ounce fabric.

2. Readers were also writing about the problems of finding fabric suppliers.

3. About this same time, I concluded that my little 37,000 cubic foot balloon, *Castaway*, was too small to fly on warm summer days. At a 600 pound gross weight, I was pushing her well up into marginal temperatures. The balloon is heavy, in part because of the 2.2 ounce fabric in the envelope. The envelope alone weighs 114 pounds. *Castaway* has flown 180 hours and is still in good shape. But the colors, dark blue and purple, are boring, so boring in fact that after her first season I added pink pennants for color.

All these factors have encouraged me to begin construction on a new, lightweight balloon system. In addition to getting a new balloon, I foresee the opportunity to help out our readers while creating a couple of interesting articles.

Finding Sources of Fabric

My first task was to locate suitable fabric. Reader Jerry Reed always seems to know the where and how's about locating materials, be they tanks, load tape, or fabric. A telephone call to him turned into an hour long exchange of information. We talked about the availability of materials and the reluctance of manufacturers to sell fabric to balloon builders. One of Jerry's ideas really struck home: consider buying fabric through an independent broker, not a factory dealer. The dealer is often constrained by various factory policies, which may include liability considerations, that limit sales to risky ventures like balloon builders. The broker, on the other hand, often represents a number of different suppliers and may have creative ways to avoid some of the factory entanglements.

By the way, you may find that fabric houses who won't like sell to balloon builders are very willing to sell their goods for construction of sky diving parachutes or paragliders. Does this logic confuse you?

Jerry put me in contact with broker Kenny Santos (telephone 508-675-9979). While Kenny generates most of his sales through one major textile manufacturer, he has access to a number of other companies. Kenny suggested that I write a manufacturer to get a color chart from which to make my selection. The color chart and spec sheets arrived in the mail in about a week.

Considering 'Firsts' Versus 'Seconds'

Kenny advised me about current fabric prices. I could purchase first grade material which ran about $5 per yard, or buy seconds at about a third the cost. Though an experienced balloon builder I was apprehensive about using seconds. Kenny encouraged me to talk to one of his customers, a sport parachute manufacturer who was building with his second grade material. This manufacturer reported that the material was often first grade, and that the textile problems were minor, generally involving minor abrasion or other weave problems near the edge of the cloth,.

My enthusiasm for his report was tempered by the knowledge that parachutes are made by sewing up fairly small pieces of fabric. He could work around fabric defects more easily than could I. While I was feeling better, I recognized there is still a small possibility some second grade fabric might not 'make the grade' for balloon building.

Kenny never discussed mill ends, which are traditionally short lengths of fabric, often first grade. Could the textile industry be simplifying their inventory by treating all mill-ends as "seconds?"

To ensure I had sufficient fabric for my project, I decided to purchase an extra 30% of fabric beyond my minimum needs. (I've also decided to cut out the top panels in my envelope first. This ensures that the best fabric is placed in the most critical areas.)

Since I was going to use a vertical (Aerostar "S" type pattern) the fabric width was of concern. My half gores are 54 inches wide. The fabric stock comes in 64 inch width allowing work around some defects. Note that the vertical gore construction, like that presented in *Issue 1* of *The Balloon Builders Journal* is less forgiving of fabric defects, as each half gore is a long length of fabric. The multi-panel construction presented in *Issue 3* uses much smaller fabric pieces and may be a better choice for some builders.

I am generally not concerned about the strength of second grade material. When I build a balloon I examine every yard of the fabric for defects. If necessary, I perform pull tests to check on fabric strength.

Some first time builders might be hesitant to try this approach, and perhaps

appropriately so. Some builders might consider first grade fabric at three times the cost money well spent. But experience shows that even first grade material has occasional flaws. When buying first grade fabric, I recommend that at least 10% more fabric be purchased than the computed minimum need. This will cover potential defects and breaks in the fabric length. When in doubt, seek out an experienced builder.

Its also worth noting that a poorer grade of fabric doesn't necessarily result in an unsafe balloon. It may however, result in a shorter service life. It is important to assess the envelope airworthiness by performing annual strength tests. Balloon envelopes have no hidden structures. Anything of importance is in the open for inspection. Because fabric deterioration is progressive in nature, it is easy to monitor.

Coated Versus Uncoated Fabric

I had my choice of either coated or uncoated fabric. The silicon polymer coated fabric is stronger. While both fabrics have the same tensile strength of 45 pounds per inch in the warp and woof directions, the tear strength is stronger for the coated stock. It is 12 pounds versus 5 pounds for the uncoated stock.

The coated stock is very slippery. Several readers have commented that a sewing machine fabric puller maybe necessary to ensure even construction. I do not use a puller, but I do use my free hand to pull the completed seam out the back of the sewing machine. The rolls must be carried carefully. If the roll is tilted off the horizontal, the fabric tends to telescope out the end. Brian Boland argues that this material makes good tree landings, without damage.

The coated fabric was looking good until I tried the flammability test. The uncoated fabric acted in typical style, the flame went out when the heat source was removed. The coated fabric was a different story. To call it flammable was an understatement. I started having second thoughts.

Talking to other builders, I found no agreement on the flammability issue. Some builders were using the coated stock only above the equator. Some were running it down to the mouth. Others shared my concern about using it at all. *Castaway* has more than one singe hole from bits of chaff, ignited by the burner, which floated up into the envelope to burn the fabric.

I took the conservative approach and chose non-coated fabric. Shortly after making my purchase I received an interesting *CompuServe* note from Bruce Comstock. Bruce is a believer in the coated textile. Read his viewpoint at the end of this article.

Selecting Colors and Yardages

Decisions, Decisions. It was now time to choose colors. When buying low cost seconds its unlikely that you can go to your broker and order 225 yards of this color and 85 yards of thatcolor. The yardage is low cost because it is leftovers from big orders placed by high volume users. The broker will be selling in "roll units," so don't ask to have "150 yards rolled off of a 400 yard roll." To take advantage of these low costs, the balloon builder must be flexible.

We had to choose an envelope pattern. Mari and I finally chose to replicate an Adams pattern found in an early 1980's *Ballooning Journal.* This pattern required one primary and two accent colors. Then we set down with the fabric manufacturer's color charts and generated a set of different color combinations

We came up with about 15 different color schemes. Our color choices were between an extensive family of fluorescent colors, and a family of more traditional shades. Be advised, that these day-glo colors tend to fade in fairly quick order, and some builders feel they become porous more rapidly. But we are in an experimental frame of mind and for $1,300, we decided that even if the envelope only looked good for 100 hours, we were still into really cheap flying. We decided either fluorescent or traditional dyes would make an acceptable envelope.

We asked Kenny to check out our main color, a fluorescent cantaloupe. We wanted 325 to 400 yards in this color. He found two rolls, with 225 yards on one roll and 113 yards on the other for a total of 338 yards. Then we went down the list of acceptable accent colors. Most of the colors we wanted were not available or were in 400 yard rolls. (400 yards are full length rolls, could these be firsts?) We finally decided on a 126 yard roll of fluorescent lime and 121 yards of black. Now, talk about a colorful balloon!

Consider Shipping Charges

I was particularly curious about the shipping charges. My last purchase was a lot of fabric mill ends came as 28 rolls and weighed 352 pounds. Truck charges to

Oregon from the East coast was $235 or about 25 cents per yard. Kenny agreed to package up my purchase for shipping by UPS. which came to less than $50. Here is another advantage to light fabric. Most fabric bolts, come in under the weight and size limits for United Parcel or Roadway Parcel Services. Avoid truck shipping whenever possible.

As I write this, we have cut panels from most of the fabric. Flaws have been few. None of our yardage was unusable. There were minor flaws across the width of the fabric. These tended to be doubling up of the rip stop filler threads. We also found a few 'slubs,' which appear as a bit of lint caught in the weave. These defects do not affect fabric strength.

More common was abrasion or thinning on the edge, generally marked by a black, rubber mark. When stressed these areas, of the fabric would pull apart. We were able to use these areas by trimming off the damaged selvage.

Most of our flaws had been identified in the factory and marked with masking tape on the selvage edge.

In Closing...

Low cost second grade fabric can make an airworthy envelope, but be prepared for some yardage to 'fail the grade.' Ordering more fabric than needed is one approach. Buying 1,000 yards of fabric still makes a balloon builder "small potatoes" in the textile market. Brokers aren't getting big bucks for selling small lots, particularly when they have to educate the buyer in the process. Don't ruin it for other balloon builders. This is not retail buying. Be sensitive to the broker's time and be flexible in your design, colors and yardages.

Part III: Some Fabric History

The following is a brief history of light weight nylon fabric. These textiles, materials of choice when building a light weight envelope, were originally developed under military standards for use as parachutes. With the growth of sport parachuting and paragliding, the private sector is playing a growing role in developing new materials.

Silk and sometimes cotton were the classic parachute materials. In 1941, just prior to World War II, with Japan controlling the major sources of silk and placing a halt to its export, the US. military looked to nylon as a replacement fabric. As might be expected, early results showed that nylon was actually superior to silk and other natural fibers for parachute construction. Out of these early experiences grew a set of military specifications for textile products used in parachute construction.

One early specification is known as MIL-C-7020. Under it parachute cloth is manufactured in three types. Type I weighs 1.1 ounces per square yard. Types II and III are 1.6 ounces per square yard. Types I and III are rip stop weaves while type II is a twill. Fabrics constructed to this MIL SPEC are still being produced and used for construction of round parachutes.

These older fabrics have a porosity range of 80 to 120 cubic feet of air per minute. This porosity is measured using an air pressure differential of 0.5 inches of water. These measurements cannot be directly related to balloon fabric which is generally measured using a much higher air pressure differential of 10 inches of water.

(These pressure measurements are made with a device calibrated against a machine called a *manometer*, a simple glass tube in the shape of a "U' which is partially filled with water. The water normally stands at a level height on each side of the "U", but when one end of the tube is connected to pressure or vacuum, the water in each side is no longer level. The difference in water height is measured in inches, thus the measure noted above.)

The fabric made to this older specification was commonly woven in a 36 inch width. Early parachute designs called for cutting parachute gores pieces from the full width of the fabric, leaving the selvage edges intact.

Because of the high porosity in these older fabrics, they are a poor choice for balloon construction.

In the 1960's, improvements were made in fabric porosity by *calendering* the fabric. This involves rolling the fabric between closely spaced heated rollers. By pressing the fibers in the weave together, there is less air passage through the fabric. These lower porosity fabrics were popular in early sport parachutes, and some balloon envelopes.

The porosity picture changed dramatically in 1979 when The George Harris company changed their weaving process and generated a fabric called F-111™ ("ef-one-eleven") with a porosity of 0-3 cubic feet per minute. This low permeability was achieved using untwisted yarn in fabric weaving. This resulted in a tighter weave.

The lower porosity lead to a revolution in parachute design. Parachutes made with low porosity fabric dropped at a slower speed than parachutes made with the older textiles. Smaller, lighter parachutes were the result.

The early 1980's saw the successful commercial development of ram-air parachutes. Low porosity fabric was critical to their development. These parachutes are generally in a square shape, and consist of a series of air cells which are inflated by the motion of the parachute through the air. Once inflated, the parachute takes on an airfoil shape, much like an airplane wing. These parachutes can be flown to predetermined points. Some of these ram-air parachutes have a forward speed of up to 30 miles per hour, but can be landed by a trained jumper with little landing shock. Ram-air parachutes are the standard for sport jumpers today.

With the technical development of low porosity fabric the military came forth with a new specification to match it: MIL-C-44378. Under this SPEC, we find a fabric with a maximum weight per square yard of 1.12 ounces; a minimum breaking strength as measured in warp or fill directions of 45 pounds, and ta minimum tear strength in each direction of 5 pounds.

A number of manufacturers produce these fabrics, good choices for balloon construction. An example is Performance Textiles, (which also produces fabric for Aerostar balloons.) They produce an "F-111" type fabric called Exacta-Chute™.

With the growing need for low porosity fabrics, a number of coatings have been tried, among these Acrylic, urethane, and silicone polymers. Acrylic tends to trap the fibers, reducing the fabric tear strength, and has not proven popular. Urethanes are available from a number of fabric finishers, and have been the popular finish for the heavier weight, traditional balloon fabrics.

In the light weight parachute fabrics, silicon polymers have proven to be the most popular. These polymers may actually improve the tear strength of the coated fabric.

An example of a silicon coated fabric product is Performance Textiles' Soar-Coat™. It is truly non porous, and matches the porosity found in traditional urethane coated balloon fabrics. The coating also contributes to Soar-Coat's tear strength of 12 pounds.

At the turn of this decade, some of these fabrics became available in fluorescent colors. Again, Performance Textiles was a leader in this development. Fabrics with these colors fade more rapidly than fabrics finished with regular dyes. This fading may also indicate reduced fabric strength.

The technology continues to change. Currently, fabrics are being developed with better resistance to UV light. Balloon fabrics are more demanding of UV exposure than parachute fabrics. A sport parachute has a life of about 500 jumps. In the course of that life it may be exposed to sun light for 75 to 100 hours. With the growth of paragliding the concern about UV has increased. Paragliders may spend hours in a single flight, and good UV protection is critical to the life of a $3,000 paraglider.

While Performance Textiles is a major fabric supplier there are other companies making similar products. These include Parachutes de France, in France, and Gelvenor Textiles in South Africa.

A polyester rip stop fabric is also produced by the Japanese firm of Teijin Shoji Kaisha, Ltd. This fabric has been quite popular with European paraglider manufacturers.

The paraglider movement may be a major force in the development of new lightweight balloon fabrics. As this movement is centered in Europe, we may see some of the new fabric technology coming from the continent.

We hope this material will make the balloon builder a better fabric buyer. The early looms were capable of producing 36 inch wide fabric, and the early parachute designs specified this width. These early fabrics also exhibit high porosity. Be suspicious of fabric stock you find in 36 inch width as it may be high porosity stock. In the intervening years looms have gotten wider. Today fabric up to 72 inches wide is available, But the high porosity fabric may also be purchased in these wider widths. The key here is to know the fabric you are buying and stay with the more recent, low porosity textiles.

The low porosity fabric, suitable for envelope construction will be described as an 'F-111" type fabric, like Exacta-Chute, or a coated version of that fabric, like Soar-Coat. These fabrics are generally available in 64 inch wide bolts. The 48 inch wide material is also common, so check on the width when ordering.

Silicon Polymer Coated Fabric, another viewpoint:

Bob,

You might be interested to know about a test we did years ago at Cameron Balloons US. At that time we had made a developmental light-weight (about 1.45 ounce per square yard) silicone-coated fabric, which we informally called "HyperLight". We were concerned that this fabric, like all silicone-coated fabrics, would burn merrily if ignited in totally still air, but theorized that virtually any air flow around the fabric would extinguish the flame.

In order to test this theory, we replaced the lowest panels in several gores of a retired envelope with this new fabric. We then waited for a dead-calm day. When the day came, we inflated the envelope, fired up a video recorder, and I lifted off to just above the ground in free flight. I then aimed the MK-IV double burner directly at the mouth of the balloon and fired both burners for a few seconds. Half the flame went up the outside of the balloon, half into the balloon. A large hole appeared, but the remaining fabric had not ignited. We tried his a few more times, until there wasn't enough of the silicone-coated fabric left to do it anymore.

Our conclusion was that any motion of the air around the fabric will prevent flame from being sustained. In fact, the burner itself is probably an efficient fabric fire extinguisher. If the fabric in a balloon I was flying caught fire, I would immediately initiate a brisk descent. This would extinguish the flame and would also serve to get me to the ground, which is where I would want to be as soon as possible under these circumstances.

You might be interested to know that my personal balloon is all Soar-Coat except for about 16" of 4.5 ounce Nomex at the mouth, more for strength than for melt or flame resistance.

The "HyperLight" was wonderful fabric, and several balloons were built from it. These have been flying for years now. One was involved in a drag landing on a mountainside which would have shredded any other envelope, but it was UNDAMAGED! Unfortunately, the fabric was expensive enough that we felt people wouldn't understand that the extra performance would be well worth the cost, so the fabric was never introduced.

Incidentally, as you might know, I recently sold Cameron Balloons US and no longer have any financial interest in it. I do not speak on behalf of Cameron Balloons, so nothing I have said in this letter should be assumed to be the position of that company. Among other projects, I now plan to do some amateur design and construction of both hot air and gas balloons. In fact, the biggest reason for my disassociating myself from balloon manufacturing was so that I could have the opportunity to have more freedom and flexibility in design, construction and flying projects.

Bruce Comstock

FAI Envelope Volume Limits

AX Class	Minimum Size Cubic Meters	Maximum Size Cubic Meters	Minimum Size Cubic Feet	Maximum Size Cubic Feet
1	0	250	0	8,829
2	250	400	8,829	14,126
3	400	600	14,126	21,188
4	600	900	21,188	31,783
5	900	1,200	31,783	42,377
6	1,200	1,600	42,377	56,502
7	1,600	2,200	56,502	77,691
8	2,200	3,000	77,691	105,942
9	3,000	4,000	105,942	141,256

A Report from Post Mills

By Bob LeDoux,

2895 Brandi Lane, Jefferson, OR. 97352 or CompuServe 73474,76

In what must be the first event of its kind, the gathering of builders at Post Mills made some participants, editor included, re-think their concepts of ballooning.

We climbed onto the big silver bird at Portland, Oregon, 7am on Thursday, May 5th. I knew we had an intermediate stop before touching down at Boston, but I never considered Atlanta, Georgia to be 'on route.' We missed our connection in Boston, because of weather, and finally got to the Silver Maple Inn, in Fairlee, Vermont, about 10 pm.

We were tired, after a 13 hour day, and were late getting out to the Post Mills Airport on Friday. At about 9 am three balloons were flying. Mike Emich, from Akron had brought two of his systems and was flying his larger multi-place Boland-type balloon. Brian Boland was checking out a new system for Swiss pilot Peter Blaser.

On Friday evening, Ron Parigoris, from Long Island, N.Y. flew a most interesting system. His basket was a highly modified Yamaha ATV, including, among other additions, a set of gold plated faucets to dispense one's favorite beverages. His balloon, '8-Ball' was inflated over the ATV and off he went, with passengers belted onto the vehicle. On landing, the envelope was bagged up and the retrieve was made over open roads. The ATV is not licensed for on-road use. Ron does not yet have a 'certificate' for speeding with a hot air balloon basket.

Jim Byron, from Hamden, Ct, made a very interesting Friday evening flight. His basket was a common-looking dinning room chair with a 10 gallon tank on each side. We thought its was a joke, to be replaced with a normal basket at takeoff, but he flew the chair. On inspection its clear that the chair was highly modified and contained certain unseen changes befitting an aircraft.

Saturday was the main event. I came to Post Mills, looking forward to seeing the Boland blimp. I was not disappointed. Because of the pressure to prepare for the weekend, Brian had been unable to mount the 28 horsepower Rotax engine on his blimp. Nevertheless, it was making circuits around the airport using a 5 horsepower inflator fan for propulsion. Forward speed appeared to be 4 to 5 miles per hour. A number of pilots were given a turn at the blimp controls. It was easy flying for anyone with some balloon experience.

This blimp is Brian's third prototype. The carriage is his light weight balloon basket with a mount for the thrust engine. The whole system breaks down into the same space as a regular balloon. Brian reports that the blimp forward speed has little impact on fuel consumption.

Tom Hancock from Portland, Maine, brought the biggest balloon, an AX-10, flying under a big Balloon Works basket. On Saturday morning, it was used as a 'hanger.' An AX-3 was inflated inside and flown around the interior of the big '10. Once inflation was completed, no heat was applied by the big balloon burner. The heat coming out of the AX-3 was sufficient to keep the big envelope standing up.

Paul Stumpf brought his small hang balloon system. The envelope was constructed from various fabric remnants from his shop. This true ultra-light system was very popular as Paul allowed all light-weight comers, including many kids, the chance at flying a hot air balloon, on tether, of course.

Brian was an exceptional host and made a light 48,000 cubic foot system available to Mari and me. I looked it over carefully, and we made our first flight on Saturday morning. I thought it very generous that we were flying, what appeared to be, a low-time envelope. We found out later that it had close to 250 hours on the envelope. I am still surprised just how new the 1.1 ounce fabric looked after all that flight time. Because of the payload, about 400 pounds, the little envelope was flying fairly hot, but it performed well.

Saturday afternoon saw an informal gas conference. Interested persons gathered around Bert Padelt to discuss access to lifting gas and envelope fabrics. Bert expressed particular interest in a fabric being used by Boeing on the 747-400. Its weight and composition looked promising for flammable gas envelopes. I was puzzled that the

participants appeared to be primarily persons not from the U.S.

Being from Oregon, I thought I might have traveled the greatest distance. There was one pilot from San Francisco with a fiberglass bolt together basket. It was designed like the old collapsible drinking cup. Each fiberglass section telescoped into the next. The sections were extended and bolted together. It took considerable time to assemble, but created a sturdy and reliable balloon carriage.

Peter Blaser, the Swiss industrialist, came the greatest distance, as he flew to Post Mills to pick up his new Boland balloon system. The colors were white with blue, a dramatic looking balloon,. Peter made his maiden flight on Saturday morning.

We spent part of Saturday acquainting ourselves with the Post Mills operation:

The balloon shop at Post Mills Airport is overwhelming. Brian literally has more balloon making material than most traditional balloon manufacturers. Fabric is stacked in racks in three different rooms. I started counting rolls of fabric and quit at 600, with many more to go. Fuel tanks are too many to count. Burner assemblies are a common item. Numerous baskets and envelopes are inventoried in one hanger.

A number of items are truly unique, including a Volkswagen van which has been transformed into a balloon carriage. The body was removed and replaced with a big rattan exterior. A very large 5 foot by 10 foot partitioned basket sits in one hanger, ready to fly under a 260,000 cubic foot envelope.

Current experiments include a partitioned fuel tank. Two Worthington 10 gallon tanks have been cut in half across the horizontal axis. A flange mounted on each tank permits the two halves to be bolted together. The intent is to make the tank interior available for storage. Total usable tank volume is 15 gallons. The system had not yet been tested when we arrived. Of course, there remain some questions about meeting LPG gas code requirements. The flange is also fairly wide and detracts from the smooth shape of the exterior.

I spent considerable time looking over the Boland systems. The baskets appear sturdy with reasonable pilot protection. They may show wear more rapidly than traditional rattan. Because of the exterior tanks, the baskets are smaller and are more difficult to get in and out of, especially for short people. The envelopes have traditional construction, but with 1.1 ounce fabric. The shape is a bit different than traditional designs. Brian feels his designs provide more lift for the same volume while garnering better fabric life.

Saturday evening saw a number of radio controlled model hot air balloons including Paul Stumpf and Bert Padelt. Saturday evening found the airport in a mini-balloon-mini-rally of these machines.

Sunday morning saw rain, and no flying. There was however, the daily breakfast of ham and pancakes covered with real Vermont maple syrup.

By Sunday night the crowd had, for the most part, cleared out. Mike Emich, along with Kay, Mari and I stopped by to say good bye to Ruth Ludwig, BFA publications editor, who lives some distance from the airport. Ruth flies a system called 'Whimpy.' (I think the name is probably quite effective in getting strong men for crew.) Ruth was very instrumental in getting us to fly out from Oregon. She had also gone out of her way to make us feel at home while in Vermont.

I went to Post Mills for the 'Experimentalists Unite' weekend with the expectation of seeing new and different equipment and some new design and building ideas. I came away with new friends, and a sense that ballooning, both building and flying can be much different than what I have expected in the past.

A couple of the aircraft were designed to be theatrical But on further investigation, we found reasonable engineering considerations hidden in their designs. I found the builders and pilots at the rally to generally be sensitive to good designs translated into safe flying aircraft.

Its Wednesday, May 11th. We got back to Oregon yesterday. Tomorrow we drive to Walla Walla (WA) for their 20th Annual Balloon Stampede. I'm rushing to finish this article, get this newsletter to the printer, while getting two balloons together for a day long drive. I've spent most of this day lugging around two traditional rattan baskets and heavy envelopes. One of these envelopes weighs 250 pounds. Last weekend I carried a light weight envelope with the same lifting power and one third the weight in Post Mills. I think I'm about ready to sell lots of 2.2 ounce fabric.

Letters to the Editor

Modifying Aerostar Burners

Dear Editor Bob,

I'm glad I subscribed to this newsletter. What a missing link! Thank you for providing the back issues, so I wouldn't miss any great information.

In the second issue on page 4 (I started reading with the first issue so please pardon my untimeliness) you mention that your Square Shooter I burner (HPI) has a diffuse flame. I have an HPIID with the same characteristic caused by the standard s-nozzle. But I have discovered an alternative to scorching the throat (and my crew). Aerostar uses a jetted S-nozzle in the HPIII burner, which allows the flame pattern to be tuned and adjusted. Aerostar P/N 17527-1 lists for around $100, can be changed with minimal disassembly, and is part of a burner upgrade package; although the part can be ordered separately. One might consider checking into whether the nozzle fits the older HPI burner as well.

I learned to fly using dual Zone 5 burners (HPIII), which have a handle that directs both burners simultaneously, and has the blast trigger incorporated into the handle. This allows single handed operation even during inflation. I have to admit I don't like my current burners nearly as much, because during inflation I have to hold the bottom of the burner and aim with one hand while I operate the blast valve with the other. After doing a little part number checking, I discovered that the trigger assembly from a single HPIII burner can be fitted to the gimbaled burner of the HPII with some modification.

Also adding the relatively cheap piezo electric lighter (Aerostar P/N 51868) to the swiveling burner would make inflations quicker, safer. These modifications would provide the three features I admire most in the Zone 5 burners for about 1/10 the cost of the real thing.

A friend was quick to point out though, that in modifying the burner in an unapproved manner (the nozzle and piezo are part of an approved upgrade, the handle is not), one would invalidate the type certificate on that appliance. While this is of little concern to the home builder, it is a major obstacle to selling the burner at a later date for use in a standard category balloon. Likewise, It is not something you would want to do if you also use the burner in another standard category balloon.

Light & Variable,

Jack Burpee
6009 NE 102nd Ave #2
Vancouver, WA 98662

Editor's note: Thanks for the ideas Jack. When I compare my original HP burner to the more recent models, I note the new burners are much larger. I'd want to be certain the new nozzle will fit the old burner before ordering the part. The piezo sparker is very nice. I have yet to find a way to build one into my original HP burner. Perhaps a reader has had more success.

I agree that the handle assembly makes for more positive control of burner direction. It also extends the life of the blast valve bonnet. I own a couple of Aerostar burners and use both the squeeze handle and older Rego blast valve control. Am I the only pilot who considers the 'twist of the wrist' operation of the old Rego 7553 valve as more ergonomic than the hand squeeze operation of the Zone Five™?

Cable Lengths and High Speed Stitching

Bob, Another excellent issue on your part! I was glad to see your inclusion of the most basic Bill Arras approach on establishing cable lengths and your 'load it up advise' [from issue 5]. Very often knowing or figuring the 'drop' or mouth angle is a mystery for a novice, stumbling through builder, as well as a veteran.

On your homebuilder's tip, on page 6, "...50 feet of thread is moving back and forth through the needle eye every second." I think there's some error her or I'm awfully slow. Shouldn't take but 'bout 20 minutes to build an AX-7 including a break for coffee and microwave lunch at that speed....

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

Editor's note. Thanks for the comment. Let me clarify the 'thread through the needle comment for our readers:

To make a stitch, the thread take up arm drops, allowing about 6 to 8 inches of thread to pass through the needle eye This occurs to

allow the thread to pass around the bobbin case. After passing around the case, the take up arm pulls that 6 to 8 inches of thread back through the needle eye and pulls the knot tight, making the stitch. That 8 inches passing in both directions makes about 1.3 feet of thread per stitch. Assuming 2400 stitches per minute or 40 stitches per second, about 50 feet of thread is moving back and forth each second.

Stated another way: Assume the reader puts an ink mark on the thread coming from the cone on top of the sewing machine. That ink mark will pass back and forth through the needle about 40 times before it is finally embedded in the seam, depending of course on the stitch length.

I made this point to emphasize the importance of using quality thread and needles. Fraying thread and missed stitches are more than double the hassle on a double needle sewing machine.

Fabric and Folders

Hi Bob,

I just read the March/April issue, and enjoyed it, especially the cable length article. I have been thinking about trying to do cable lengths in Auto-CAD, and if successful I'll share it with you.

I notice several readers looking for fabric sources. I just went through that, and I know what it's like, so here are a few of my better tips: Kenny Santos, in Mass. is a broker, and he handles Aerostar seconds from Performance Textiles and Duro Industries (who won't sell to an individual for liability reasons). His phone is 508-675-9979. I bought 175 yards of black, 2.2 oz coated at $1.75 per yard, and he has a lot of black left–Limited other colors, but great prices. I tested the fabric rigorously, and it easily passed all of Aerostar's specs in their manual by a wide margin. I haven't unrolled the whole roll but it looks promising.

Westmark has very good first quality goods, great test marks, priced at $2.90/yd in 100 yd rolls, $4.00/yd for cut lengths under 100, and a big color selection. Best I've found for firsts.

F-111 and Soarcoat fans should talk to Noah-Lamport in California at 800-548-6940 for Brian Boland type fabrics.

Finally, I bought a folder from Tennessee Attachment. About $125, but nicely done, works good, and nice people. They made the first one wrong, happily took it back and Fed-Expressed the right one the next day. However, I later made one myself in my machine shop and though not as pretty it works as well. Wasn't as easy to make as it looked!

Talk to you later.

Joe Seawright,
Greenwood, MS

Ammonia in Albuquerque

Bob,

...We have formed a group of people here in Albuquerque to construct an ammonia gas balloon, using a B-C Products kit, After this is completed, I will start on constructing a 65,000 cubic foot hot air envelope to be flown over an old Thunder Bolt burner and basket. I've not made a decision yet whether to copy the Bolt envelope or to use your spreadsheet gore pattern program (adapted to Lotus 123) to produce a different shape/pattern envelope.

Thanks again and keep up the good work, I look forward to each issue of the newsletter.

Paul H. Clinton
3232 San Mateo, NE #142
Albuquerque, NM 87110

Other Tidbits

Adrian Brookes reports he has the older Balloon Works gore pattern dimensions that he is willing to make available to builders. Look for his article on the Balloon Works philosophy of design, along with construction details in an upcoming article.

Adrian can be reached at P.O. Box 9065, Station T; Ottawa, Ontario, Canada, K1G 3T8.

Paul Stumpf reports that because of his other balloon business obligations, he can no longer find the time to broker discount fabric and webbings. We will miss his service. Our best wishes go to Paul and his balloon accessory business **Danger Zone**, P.O. Box 913, Bristol, RI 02089.

An FAA official, reviewing the new **NPRM for Part 61** on Pilot and Flight Instructor Certifications reports the proposed rule and discussion is 600 pages long.