Volume 3, Number 3 (Issue #15) **$2.00**

Dedicated to the Sport Balloon Home-Builder

Published every two months–$12 per year

THE BALLOON BUILDERS' JOURNAL

November-December 1995

In This Issue

Up and Coming

Details of our experimentation with a low-cost ($100) envelope temperature gauge will be presented. On a more theoretical bent, we discuss the considerations for balloon component testing from the perspective of the builder.

Your Help is Needed

We need your help in identifying homebuilt balloons which consist of a homebuilt envelope flying over a factory-built basket. If you have built, or know of someone who has built such a balloon system, please take a moment to provide us some information.

Mail to *BBJ* the name and address of the builder. Even a partial address is helpful. If you have a make or model for the balloon, or an 'N' number, please include that information.

This data is needed because a Federal Aviation Administration (FAA) field office has been reluctant to give an airworthiness certificate to a builder who made an envelope to fly over a factory-built basket. This office contends the amount of work performed in building an envelope is not enough to justify the certificate. This position is at odds with the rules interpretation of many other FAA field offices.

With this list of builders we hope to minimize this problem in the future.

More details will be printed in a future issue of *BBJ*.

A Homebuilt Tape Feeder and other Sewing Attachments

By Bob LeDoux, Editor,

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

We review the sewing machine attachments, commonly used by balloon builders, and describe a simple-to-build load tape feeder.

Part I: General Attachments

Only a few tools are required for the builder who decides to construct envelopes. Most prominent on the tool list is, of course, a sewing machine. For the typical builder, a commercial double needle sewing machine is essential. Other than the sewing machine most of the other tools are simple. Special tools, like a Nicopress™ pliers, for assembling cables, can be borrowed or rented for the few times they are needed. Nicropress pliers, for example, are often kept by local Experimental Aircraft Association (EAA) chapters for use by their membership.

When it comes to the sewing machine there are a number of accessories that may simplify construction:

Attachment 1: A Seam Folder

As classic envelope construction uses a folded fell seam, some builders have found a *seam folder* (*Figure 1*) to be a useful sewing machine accessory. This device, cost of about $125, looks like something from the world of Rube Goldburg. Pieces of thin stainless steel, bent up and silver soldered together, create a device which folds the seam together. The folder is mounted in front of the presser foot. The two fabric edges are fed through it, come out folded, and then move under the presser foot.

Figure 1. A Seam Folder which mounts in front of the presser foot on a sewing machine.

While some builders cherish these devices other builders avoid them, preferring instead to hand fold their seams. To be effective, the seam folder must be carefully made for a specific application. Even changing the weight of balloon fabric can turn an effective folder into a worthless junk drawer commodity. Before purchasing this accessory borrow one to determine whether you will benefit from this expenditure. If you are interested in purchasing a seam folder, one source is *The Tennessee Attachments Company* at the address given later on.

Attachment 2: Fabric Puller

Some builders add a *puller* attachment (*Figure 2*) to their sewing machine. This device pulls the completed seam out from the back of the sewing machine. Most pullers utilize a pair of rollers, using principal not unlike the rollers in an antique wringer washing machine. Some puller attachments are constructed with long, exposed steel shafts. These have a tendency to foul up in the mountains of fabric common in balloon construction. Perhaps the best pullers are the

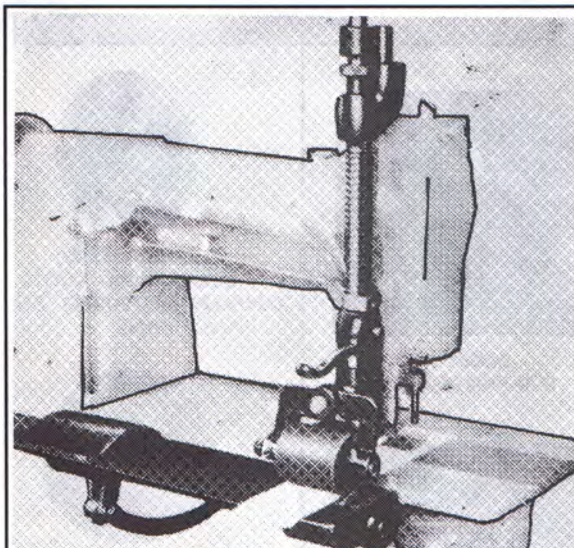

Figure 2: A puller which is mounted on the back of the sewing machine.

Singer 300 or the *Gem* double roller system. In these systems, the driven rubber roller is mounted in the sewing machine table, behind the presser foot, in and even with the top of the table surface. A second roller, mounted on the back of the sewing machine head, drops down on the first roller, capturing the fabric between the rollers. The device is reliable and a proven accessory. Setup may require the services of a professional sewing machine repairman. On some installations, gears must be selected for the puller which match your stitch length.

For certain fabrics, like silicone coated materials, a puller can be a good investment. But at a cost of about $600, most builders are content to use one of their hands to pull the completed seam out the back of the sewing machine. An assistant, acting as a puller, can be helpful for those difficult feed jobs like the application of circumferential load tapes.

Attachment 3: Tape Feeder

There remains one accessory which should be considered even by the first time builder. That accessory is a *tape feeder.* A tape feeder is a device which feeds the load tape under the presser foot at the same time as the seam is being sewn.

Figure 3: A top-reel tape feeder on a balloon factory sewing machine.

Some builders construct their envelopes without the use of a tape feeder. They fold the seam, and then lay the tape on top of the fold, running the whole assembly through the sewing machine. This is an awkward process, which slows down sewing, and requires special care for consistent seam construction. The tape feeder provides a more consistent and efficient seam construction system.

For balloon construction there are two basic approaches to feeding load tape into a sewing machine. The most common approach is to mount the tape on a reel above the sewing machine, feeding the tape through a special presser foot, called a *tube foot* and under the needles. The less common approach is to mount the tape reel underneath the sewing machine table, feeding the tape over the front of the table and through the machine. While each has its own advantages and disadvantages the top feed system is most commonly the system of choice by balloon manufacturers, with a major disadvantage of higher cost.

Let's compare the two systems. *Figure 3* shows a typical top feed system in a balloon factory setting. The reel mounts on the top of the sewing machine. The load tape is fed down in front of the sewing machine mechanism, into the tube foot and into the seam.

You can replicate this tape feed system with the following parts. One recommended supplier is *Tennessee Attachments,* P.O Box 188, White Bluff, TN 37187-0188.

The Tape reel, Model 872DT, with drag tension is available at a cost of $59. The tube presser foot is custom made for your sewing machine and your tape width. One tube presser foot, the Model 26027, costs $137. Occasionally, an additional stabilizer is required, which supports the tape between the reel and the presser foot. The total cost for this tape feeder is at least $196.

This tape feeder arrangement has a number of advantages. The tape is clearly visible to the operator thus defects or breaks in the tape can be identified before they are sewn into the seam. The tape on the reel is easily monitored so one is not surprised by 'running out' of tape at an inappropriate time. If a seam folder is part of the sewing machine setup, the top tape feeder simplifies the setup. These advantages make the higher cost a minor consideration is choosing this system for production line sewing, or for the builder contemplating construction of a number of balloons.

In addition to the higher cost there are a few other disadvantages. Some sewing machine operating parts are invisible to the operator. Adjusting top thread tension or identifying frayed thread at the needles is a

Figure 4: The author's first version of a bottom feed reel system. This system has proven dependable through 7 years of use.

bit more difficult. Unless the feeder is removed when not required, it is always there and may interfere with other operations, especially when someone is helping from behind the sewing machine.

For the talented builder, construction of the top reel assembly is not difficult, but few builders have the tools or skills to make the tube foot. Typically, the tube is constructed of thin stainless steel sheet which is cut and bent to shape and silver soldered to a modified presser foot.

Another type of tape feeder mounts the reel of tape under the sewing machine, passing it up over the front edge of the table and under the needles. This is the system I use for my homebuilt envelope construction. Its setup and use can be seen in *figure 4*. The principal advantage to this approach is lower cost. This feed mechanism can be easily constructed by a tinkerer. It does not hide the sewing machine mechanism and generally operates unobtrusively. When not in use, it is invisible to the eye.

But there are a number of disadvantages. These are more limiting to the production line than to the amateur builder. Defects in the tape, or breaks in the tape are hidden from view. This requires inspecting the tape before sewing.

The guide plate, which mounts in front of the needles may impede replacement of bobbins. To remedy this problem the 'guide plate' is mounted on the 'sliding attachment plate' found on most commercial sewing machines. This 'sliding attachment plate' is a steel plate, in front of the presser foot, which can be removed by sliding it out of its grove.

In spite of these shortfalls, the economy minded builder may find the lower feed system preferable. It can be constructed for $10 to $30.

We should note there is another type of feeder system, which a balloon builder should avoid. This is a side feed system which is commonly found in the foundation garment industry. In this system the tape reel is mounted horizontally, typically on the right hand side of the sewing machine table. The tape then runs across the table and through a specially constructed tube assembly which rotates the tape under the needles. This system isn't appropriate to the mountains of fabric involved in balloon construction.

Part II: Building a Tape Feeder

Introduction

In this section we will lay out the design of a low cost bottom-feed tape feeder, similar to the feed system shown in *figure 4*. The reel is mounted under the sewing machine. The tape rolls off the reel, and over the front edge of the sewing machine. where it enters a tension device (*figure 7*).

This commercial tension device is mounted on the front edge of the my sewing machine table. This device has spring adjustments which vary the tension of the tape, and a center screw which adjusts feed guides that help keep the tape centered. You may find this device unnecessary.

After leaving the tension device, the tape enters the guide plate, which is mentioned above. The guide plate ensures the tape is centered under the presser foot, and therefore is centered in the seam.

The reel assembly shown in *figure 4* has been used to construct a number of balloons.

But the reel support structure involves welding, and is difficult to mount on some sewing machine tables. So I chose to replace it with a simpler assembly shown in *figure 5* and *figure 6*. This assembly uses commonly available parts and eliminates all welding.

Required Parts

The following items, which can be seen in *figures 5 and 6,* are required to build the feeder:

The base of the reel, which mounts the reel assembly to the bottom of the sewing machine table, is a galvanized cast iron floor flange for $^3/_4$ inch pipe. I paid $2.79 for this item.

A plastic column threaded into the floor flange supports the reel. My column is a 12 inch long plastic pipe of $^3/_4$ inch pipe dimensions with pipe threads on each end. These are commonly sold for underground sprinkler systems and are called 'risers'.

Figure 5: The reel, with its pipe flange base and plastic pipe column.

This cost me $1.79.

The axle for the reel is constructed from a $^3/_8$ inch diameter carriage bolt. Choose a bolt which has a minimum of 2-$^1/_2$ inches of threaded length and at least 4 inches of unthreaded length. I found a bolt 10 inches of length which met these requirements for a cost of $1.16.

The most uncommon part is a $^3/_8$ inch internal diameter stop collar or shaft collar. I bought a *Kreg* $^3/_8$ inch drill bit stop collar from a woodworking specialty tool store for $1.00. You can also buy a shaft collar from an electric motor supply shop.

The hex nut in the shaft collar will be removed and replaced with a thumb screw. The *Kreg* stop collar takes a $^1/_2$ inch length thumbscrew with a $^1/_4$ x 20 thread. My thumb screw cost $0.33.

A spring is required for the tension. I chose to use a $^1/_2$ inch diameter by 1-$^1/_2$ inch length light weight compression spring. A common brand is the *Curtis* number 91704. Two springs come in a bag for $1.46

The elastic tension device, mentioned above, (*figure 7*) was purchased locally at a commercial sewing machine dealer for about $11.

The guide plate, which sits in front of the presser foot, can be constructed from a 3 inch

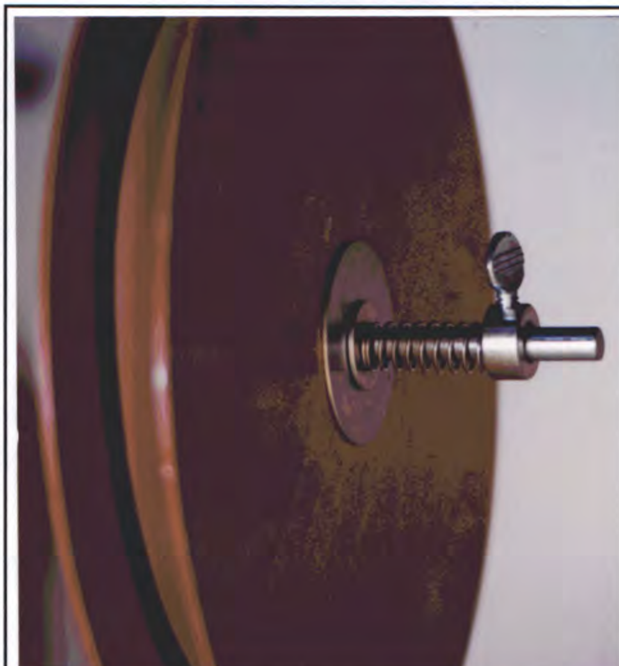

Figure 6: The end of the reel axle showing the reel tension assembly components.

square of $^1/_8$ inch thick acrylic (Plexiglas™) or polycarbonate (Lexan™). This scrap shouldn't cost more than a dollar or two. If you don't have the machining capabilities mentioned later, the guide plate can be glued up from a small piece of $^1/_{16}$ inch thick birch aircraft plywood, purchased from a hobby shop.

Two disks are formed to protect the roll of tape. If you want to be elegant, buy a piece of 12 inch by 24 inch by $^1/_8$ inch thick birch aircraft plywood from your local airplane model shop. If you want to be less elegant use a piece of $^1/_8$ inch thick pressed board (Masonite™). Even $^1/_8$ in thick acrylic (Plexiglas™) can be used to form these circles. Counter topping (like Formica™) might also work. Your cost will depend on your choice of material. At the low end is the pressed board which might run a buck. The aircraft plywood will cost about $10.

Other minor items are required. These are two fender washers with $^3/_8$ inch bore and a diameter of about 2 inches; a $^3/_8$ inch nut, a $^3/_8$ inch nylon insert stop nut, and 4, size 12 to 14 wood screws, each 1 inch long.

Assembly.

1. Cut the circles which make up the tape roll protection disks. The disks should be 10 inches to 12 inches in diameter, depending on the size of your tape rolls. Drill a $^3/_8$ inch hole through the center of each disk.

2a. Take the $^3/_8$ carriage bolt. Thread a standard nut onto the bolt and securely tighten the nut at the bottom of the threaded length.

2b. Measure from the nut, a length of thread of 2-$^1/_4$ inches. Mark that point on the thread. Thread a second nut down past the mark. Cut the excess threaded portion off at the mark with a hacksaw.

2c. File smooth the cut end on the bolt. Partially roll off the second nut to reshape the thread where it has been cut and filed. Lightly file any remaining burrs and then remove the second nut.

2d. Measure 4 inches of the unthreaded portion of the bolt. Cut off the excess length with a hacksaw and smooth the end with a file.

3. Take the stop sleeve. Remove the hex screw and replace it with the thumb screw.

4. Assemble the reel axle as follows. Take the bolt and mount these items in the following order on the unthreaded end:

A fender washer

A disk

A sample reel of tape (optional)

The second disk

A second fender washer

The spring

5. Place the stop sleeve over the bolt and partially compress the spring. Tighten the thumb screw to hold the whole assembly in place. At this point you will have an assembly which looks much like *figure 6*.

6a. Now take the riser, (the plastic pipe) and securely thread it into the flange. Take this assembly, and the reel assembly and determine where the two will mount under the sewing machine. The tape roll should unwind in a straight line from below the sewing machine needles. Placement of the final reel assembly cannot interfere with the foot pedal which controls the clutch motor. You might even need to adjust placement of the foot pedal.

You must determine two placements. The first placement is the position to mount the floor flange to the bottom of the sewing machine table. The second placement is the point to drill a hole through the plastic pipe to mount the reel. In my case, the floor flange was mounted on the back side of the sewing machine table just behind the sewing machine cutout. I also drilled my hole through the plastic riser 9 inches down

Figure 7: The elastic tensioning device which can be mounted on the sewing machine table to tension and guide the tape .

from the base of the flange.

6b. Once your placements have been determined, mark the placement of the flange on the bottom of the sewing machine table. Mark the placement of the hole through the plastic pipe.

6c. Drill a $^3/_8$ inch hole through the pipe. Slip the threaded portion of the bolt through the hole and screw on and tighten up the nylon lock nut to complete the assembly.

7. Mount the whole assembly under the table. My floor flange was made to take from size 12 to size 14 screws. I used size 14, 1 inch long screws for my mount.

Setting up the tape path.

8. Unwind a length of tape from the reel and roll it over the top of the table. Drop the presser foot on the tape. Pull the tape tight at the reel and look over your tape path.

9. If you chose to buy the elastic tensioning device, determine its location. It might be screwed to the front bottom edge of the table or to the front edge of the table. We placed ours on the front edge of the table using a couple of screws. We remove it when it is not needed. We have never had the fabric catch on the tension device. However, the fabric running over the attachment can change the spring tension. We counter this problem by stretching a rubber band between the two outer screws.

Figure 8: This photo shows details of the 'guide plate' which mounts on the sliding attachment plate in front of the presser foot.

10a. Construct the tape guide plate (*figures 8, 9*) which is nothing more than a plate, about 3 inches square, with a slot. The tape runs through the slot. As already noted, the guide can be made from a variety of materials. I chose to make my plate from $^1/_8$ inch thick acrylic plate (Plexiglas™). I cut my slot by running the plate over a cutter on my router table. The slot could also be made with repeated passes on a table saw, followed up with some sanding. The edges are then rounded off and any rough spots sanded or polished off.

The completed slot should be sized so that if you press down on the plate with the tape running through it, the tape will move back and forth with minimal resistance.

If you don't have access to machine tools, the plate could be glued up from pieces of either $^1/_{16}$ inch thick acrylic or birch aircraft plywood. The plywood can be cut to size with a utility knife. Three pieces would be cut. The top piece would be the full size of the finished plate. Two bottom pieces would be smaller, so that when glued to the top piece, a slot remains in the middle. This concept is shown in the 'bottom end view' in *Figure 9*.

10b. My guide plate is mounted to the sewing machine sliding attachment plate using screws. While I could have used countersunk screws, I prefer to be able to adjust the position of the plate to ensure the tape is evenly centered under the needles.

My preference is for a couple of Phillips head screws with shallow heads. Your local hardware store should have such an item.

I grabbed from my junk box AN526 truss head machine screws in $^3/_{16}$ inch diameter by 3/8 inch long. This screw is number AN526-1032-R6. These screws have 10-32 threads and were originally purchased from a local aircraft supply store. The holes in the guide plate are drilled $^1/_4$ inch in diameter, giving me the adjustment I need.

10c. To center the tape feed, run about a foot of tape through the machine and check to see that the stitching is centered down the tape. If necessary, loosen the screws in the guide plate and adjust the position until you are satisfied with the results.

If you are sewing with a rented sewing machine you may be reluctant to drill and tap the attachment plate. You might try gluing the guide plate to the top of the slide

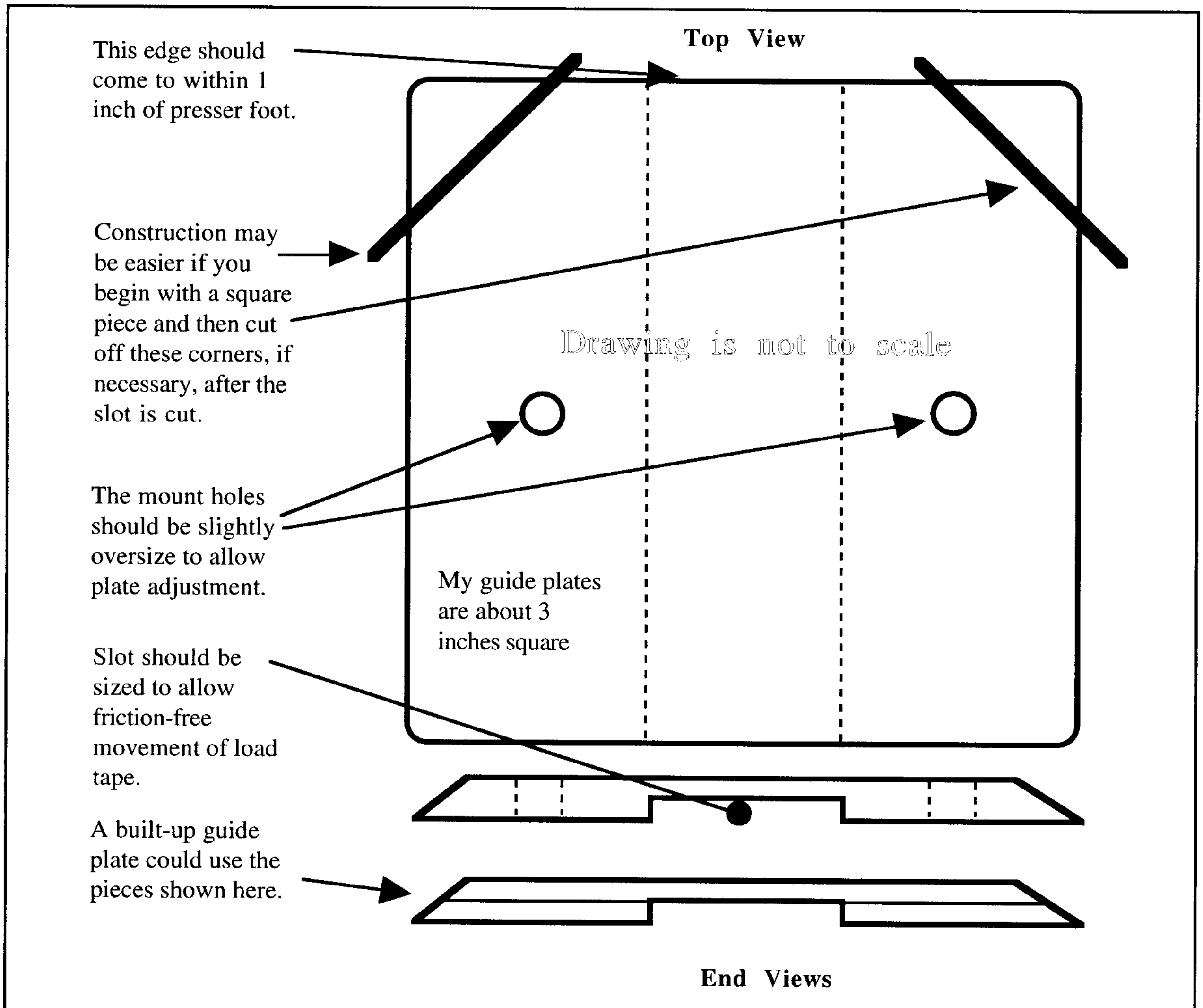

Figure 9. Construction details of the Guide Plate

attachment plate with epoxy glue or a hot glue gun. You can find your placement by holding the guide plate securely in place and sewing a short length of tape. Adjust the plate placement until the stitching is centered down the tape. Then mark the placement of the guide plate on the attachment plate with a felt pen. Remove the plate and apply some hot stick or epoxy glue to hold the two plates together. To get a good bond, both plates should be lightly sanded in the glue area.

Some Suggestions

Some tension should be kept on the tape, but not enough tension that the sewing machine labors. Also keep the tension low enough you have no problem with broken needles or needle strikes on the sewing machine hooks.

Check each roll of tape before running it through the machine. Some tape rolls may have breaks which may or may not be joined to the next section with a bit of adhesive tape.

With this system, bobbin replacement is a bit awkward. On my smaller balloons I can run a full vertical gore length if I start with a full bobbin set. Give some thought to the planning of your bobbin use to minimize replacement mid-seam.

With a bottom tape feeder, the balloon is constructed upside down. The tape is on the bottom of the seam construction with the fabric interior on the top. You might want to take a moment every so often to look at the bottom of the seam to ensure consistent construction. This is the view your public will see.

Mathematical Relationship Useful in Resizing Envelopes

By Bob Hanway

5533 Birchhill Rd., Charlotte, NC 28227 CompuServe 71613,313

A simple mathematical relationship allows resizing envelope designs to different volumes.

A useful tool in resizing an envelope is to recognize the geometrical relationships between linear dimensions and volume calculations. Recently, a friend of mine was getting the dimensions for a hot air blimp that had a known shape he liked. He wanted to change the dimensions he had and build a larger blimp, but didn't know how much to change the dimensions to give the desired volume. With some help from my son (the smart one in the family), we determined how much the dimensions of the panels needed to be changed to produce a desired change in volume. It turned out to be a rather simple task and one I would like to share with other home builders who may someday do something similar.

The basic relationship is that all linear (one dimension) distances in an envelope pattern change by a factor 'x' when the volume changes by a factor of 'x cubed' (x^3). This is true regardless of the shape of the envelope. In other words, if you want to increase the volume of an envelope by a factor of two (double the volume), simply increase all the linear dimensions of the panels by a factor equal to the cube root of two.

As an example, assume that you have an envelope with a pure cylindrical shape. You know that it has a volume of 40,000 cu. ft., a length of 127.32 ft., and a radius of 10 feet. You want to resize the cylinder to produce exactly the same shape but with a new volume of 50,000 cu. ft., so how much should the linear dimensions for the length and radius change? The ratio of the two volumes is 1.25. The cube root of 1.25 is 1.077. Thus, the new radius would be 10.77 feet, and the new length would be 137.12 feet. Check it out and see for yourself (the volume of a cylinder is equal to pi times the radius squared times the length).

Although the example is for a perfect cylinder, the relationship exists for any three dimensional shape. It also is true for individual panel dimensions, not just the overall shape dimensions. It also works in the opposite direction. That is, you can figure a new volume from changes in the linear dimensions of resized panels (that keep the same shape except for their size). For example, changing the length and width of panels by a factor of 1.2 changes the volume by a factor of 1.728. Remember, all linear dimensions must be changed by the same ratio to keep the shape the same and to make this relationship work.

Letters to the Editor and Other Bits of Information

Bill Arras off to Antarctica

Bill has put his other record attempts on hold as he will be making the first-ever hot air balloon fights above the interior of the Southern Continent. Bill will be operating from the Patriot Hills encampment between early December and mid-January. The Patriot Hills camp is operated by a private company, Adventure Network International (ANI).

Weather conditions in Antarctica are famously hostile, but the interior areas offer a mix of weather in the summer. The encampment experiences gentle or calm surface wind conditions with temperature reaching a balmy 32°F.

All balloon equipment, including propane, must be flown in from Chile. To help reduce the costs, Bill will be taking one of his lightweight takedown balloon systems.

Bill reports that ANI is an adventure outfitter specializing in expeditions to Antarctica. The Patriot Hills camp is the only private camp on the continent. Programs originating from this point include climbs of Mt. Vinson, and other peaks, plane flights to the South Pole, photo safaris and ski tours. This year, beginning December, visitors will also have the opportunity to take hot air balloon flights.

A Question on Fuel Systems

August 10, 1995

Bob,

Question: Any advise on fuel hoses as sold at Aircraft Spruce [and Specialty Company] (or anywhere else)? I need to know pretty soon as I am beginning to fly more with two tanks.

Still enjoying the hell out of the BBJ. Keep it up!

Phillip MacNutt,
4909 Great Divide Drive
Austin, Texas 78736

Editor's Response:

The materials in the *Aircraft Spruce and Specialty* catalog are typically intended for gasoline, oil and hydraulic lines, not for propane (LPG). When it comes to fuel systems I prefer an approach which 'doesn't reinvent the wheel'. This is my approach:

To survey the market use a rally propane refueling line to took over other pilots' fuel systems. That gives an opportunity to look over different makes and vintages. Ask questions and decide on a system which best meets your needs. Then copy it in detail.

For my own systems, I copy the *Aerostar* fuel components from a 1990 fuel system. I use the following items:

Hose: In spite of a few quality control problems over the last 11 years, I still like the *Aeroquip* FC-321 propane hose in $^5/_{16}$ inch size for main fuel line. The end fittings are 1/4 inch male pipe thread. When I make up my hoses, I go to a local *Aeroquip* dealer and have him prepare the order. The hose assemblies are fabricated at the factory, including pressure testing and UL labels. Delivery could take up to a month. If you use a vapor pilot light, you might want to use the $^1/_4$ inch hose for the vapor feed. This is in very limited supply and may be available only from the factory.

The local *Aeroquip* dealer may be able to prepare these hoses on site, but is unlikely to have the pressure test equipment. Given the criticality of the hose assemblies, I think the test and UL certification are a good idea.

My hose connectors, are standard *Aeroquip* steel fittings, often used for hydraulic assemblies. These can be purchased locally. I use an elbow at the tank which runs the hose up to the burner and a 'T' at every tank. These steel fittings are intended for high pressure hydraulic systems and are more than adequate for a propane system. This extra strength provides an extra margin of safety from possible fitting fractures due to something hard or heavy bumping against a hose assembly.

Many propane tanks use a POL valve as the liquid feed valve. My male tank connectors are the proven *Fisher* M388's. These are brass hand-tighten units which utilize an 'O' ring seal They are a good choice for the builder who regularly disassembles equipment. Some builders prefer wrench tightened connectors, in part, to reduce the possibility of the fittings working loose. If you are one of these take a look at the fittings used in *Balloon Works* products.

Whatever fuel line fitting you buy, examine it to ensure you can see all the way through the fuel flow channel. Some male POL fittings contain an excess flow valve. This is typically a spring loaded ball bearing mounted in the bottom of the fitting. Never allow an excess flow valve to remain in your fuel system. Literally, you could open up your blast valve and completely shut down fuel feed to the burner.

I highly recommend the BFA handbook *Propane Systems*. It is a well researched and written document, though written from the perspective of the factory-built balloon owner.

It does contain a mistake or two. A drawing of a tank valve, identified as a *Rego* product, is really a *Fisher* 3250 valve. The drawing also shows an excess flow shutoff installed in the valve. This shutoff is a little spring loaded plate at the bottom of the valve. If you make up your own balloon tanks, this shutoff is another item to avoid.

I have been advised (not yet confirmed) that the POL fitting is no longer approved for use in liquid feed systems. If true, this would mean that newly manufactured equipment would be eliminating the POL except for vapor applications. If you have more information on this, please share it with our readers.

This is my system. Other builders have differing views. Bill Arras flies over an area of sharp and abrasive volcanic rock and would like to have Thunder & Colt quarter turn shut off valves on his fuel tanks. While I like having all my tanks hooked together, with a manifold, Brian Boland uses quick disconnect fittings, moving his burner fuel line between tanks.

I would like to publish an article on propane systems for the homebuilder. I haven't yet had the time to put the material together. Reader input is invited on this topic.

Editor-

NW Championship Taken in Homebuilt Balloon

Marianne LeDoux, flying an amateur-built balloon, won the Northwest Balloon Championships, held in Salem, Oregon, The competitions, held September 15, 16, and 17th, are remembered for ceilings as low as 650 feet AGL, and windy evening flights. Marianne won by scoring consistently on 6 of the 7 targets put out during the event.

Mari was flying the *Sewhappy* balloon, a 24 gore 77,500 cubic foot system of which she was a major builder. A photo of this balloon was printed in *Balloon Builders Journal*, Issue number 9, page 2.

The BBJ Editor offers (unbiased) congratulations to the new Northwest Champion.

Part 103 Challenge and Burner Comparison Comments

Bob -

I really enjoyed the article on the FAA 103 Challenge [Issue 13]. I would also like to make a suggestion for a minor change in the worksheet. Step 2A is the initial weight estimate for the envelope in which you suggest three values. Instead, I would use the allowing calculation:

155 lbs - Basket Assembly (Step 1e)

This would give the maximum envelope weight and still qualify as under FAA 103. Example, if your basket assemble weights 104 lbs, your envelope can not weight more than 51 lbs and still qualify.

I have really enjoyed the two issues I have received and look forward to upcoming issues. One possible suggestion for an article. I would like to see something about burner technology. The majority I understand; you 'pull' the blast valve and it shoots flames. Some possible questions to answer are as follows:

How do the vapor coils work in comparison to the 'whisper' mode.

What are some differences between the various burner systems (Avian, Balloon Works T3-017, Aerostar Aurora, Cameron Mark-IV, etc.). Are there possibly alternate sources for burners other than the commercial balloon market?

Thomas C. Jones
176 Barney Blvd
Battle Creek, MI 49017

Gas Balloon Project Coming to End

Bob,

I think we are finally finished with building our BC kit gas balloon which we stared in May of 94. We've learned a few things along the way, and may even try a second balloon. Perhaps hot air this time. Our appointment with the FAA for inspection is scheduled for Sept. 13 and we hope to fly it soon after that.

I'm very happy with your newsletter and look forward to each issue.

Peter Cuneo
1209 Florida Ave.
Albuquerque, NM 87110

Balloon Perspective View Program?

Bob,

Are you aware of any programs that permit you to see what a balloon will look like before you build it. Possibly it could take input from your gore pattern spread sheet and do the calculations for perspective etc. to show it from a given vantage point. Ideally it would let me change the colors of different gore panels also.

Thanks,
Ted Horton
CompuServe 73021,52

A Tip on Choosing Tape and Thread

Choose a load tape and thread which are of different colors. For example, don't choose white thread on white load tape. A color contrast makes it much easier to locate bad or failing stitching. This becomes more important as the envelope ages as wear and stress taking their toll.