Radio Controlled Soaring Digest

June 2010 Vol. 27, No. 6

CONTENTS

June 2010
Vol. 27, No. 6

Front cover: The geodesic structure of an RC-DLG is silhouetted against the sky in this photo provided by Marco Aurelio S. Fração - F3XBrasil. "Believe it or not, this picture was taken accidentally. I was landing and told (my friend) to take a closer shot of my Steig. He wasn't ready, so he just turned the camera to his back and took only one single photo. He came to me right after, saying ''You won't believe it...'' 23°26'28.76"S, 47°18'1.16"W, 791.0m
Sony DSC-HX5V, ISO 125, 1/500 sec., f8.0

Back cover: Sherman Knight (R), Team JR, helps Dave Friant (L) program a JR/DSM transmitter for his Bob Dodgson Anthem which then flew beautifully with the modern equipment.
Konica Minolta Maxxum 7D, ISO 100, 1/800 sec., f6.3, 30mm

R/C Soaring Digest

Managing Editors, Publishers — B² Kuhlman

Contributors — Seth Arlow, Ken Bauer, Peter Carr, Tony Condon, Larry Eich, Dave Friant, Brian Keeffe, Glauco Lago, Joe Nave, Andy Page, Loren Steel, Andrew von Berky

Photographers — Ken Bauer, Pete Carr, Tony Condon, Glauco Lago, Joe Nave, Greg Pinaud, Andrew von Berky

Contact — rcsdigest@themacisp.net
Web: http://www.rcsoaringdigest.com
Yahoo! group: RCSoaringDigest
AIM screen name: RCSDigest
Microsoft Messenger: rcsdigest

R/C Soaring Digest (RCSD) is a reader-written monthly publication for the R/C sailplane enthusiast and has been published since January 1984. It is dedicated to sharing technical and educational information. All material contributed must be exclusive and original and not infringe upon the copyrights of others. It is the policy of *RCSD* to provide accurate information. Please let us know of any error that significantly affects the meaning of a story. Because we encourage new ideas, the content of each article is the opinion of the author and may not necessarily reflect those of *RCSD*. We encourage anyone who wishes to obtain additional information to contact the author.

Published by B2Streamlines <http://www.b2streamlines.com>
P.O. Box 975, Olalla WA 98359

RC Soaring Digest is published using Adobe InDesign CS5

In the Air

Some notes regarding the contents of this issue...

Ken Bauer's KB18 integrates RC soaring technologies and techniques into a free flight airframe, and so should be of interest to more than a few *RCSD* readers. We received permission from Don DeLoach, Editor of *Free Flight* magazine, to reprint the article in *RCSD*. Our thanks to Don for the permission and to Ken for providing original color photos.

In addition to Joe Nave's showcasing of the Zenith 3.7, this issue includes the introduction of a canopy hinge for large scale gliders from Premier Pilots (page 17) and a neat little LiPo battery pack suitable for small airframes and soon to be available from Kennedy Composites (page 49).

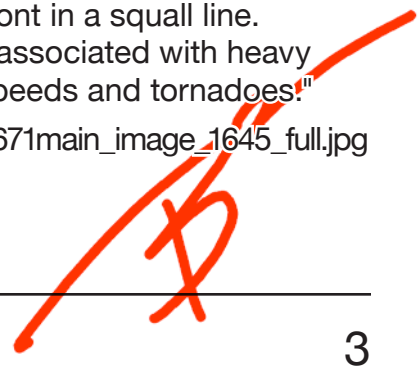
Greg Pinaud's Wihok 60 has appeared in *RCSD* previously, the last in the April 2010 issue. This time the Wihok 60 is flying along the southwest France sand dunes in a photo on page 63.

And the background image on the Contents page, "Cumulonimbus Cloud Over Africa," is courtesy of NASA.

> "High above the African continent, tall, dense cumulonimbus clouds, meaning 'column rain' in Latin, are the result of atmospheric instability. The clouds can form alone, in clusters, or along a cold front in a squall line. The high energy of these storms is associated with heavy precipitation, lightning, high wind speeds and tornadoes."

http://www.nasa.gov/images/content/445671main_image_1645_full.jpg

Time to build another sailplane!



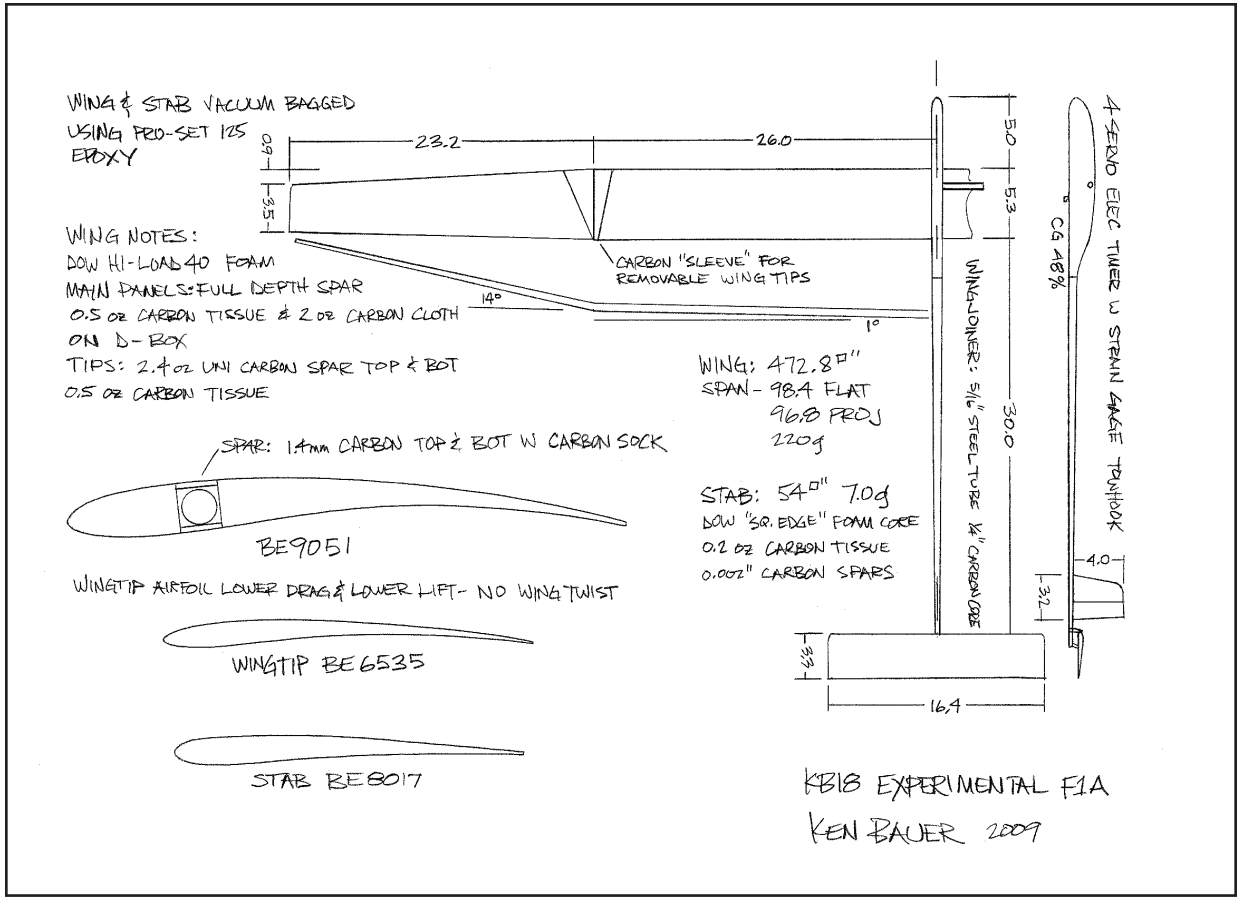
A NEW APPROACH TO F1A DESIGN

Ken Bauer, airtek@verizon.net

F1A is a FAI free flight glider class. It is also known as A/2 or Nordic Class. The model must have a projected area - wing and stabilizer - of between 32 and 34 dm^2 (496 - 527 in^2), and a minimum weight of 410g (14.46 oz.). Launch is by hand tow using a 50m line. F1H is the smaller glider class, also know as A/1. These gliders are rquired to have less than 18 dm^2 (279 in^2) total projected area and weigh at least 220g (7.76 oz.).

Around the summer of 2008 I began to think about how to take the next step in design and construction of F1A gliders. Flappers were coming on the scene and it was clear that the bar was being raised and something more than a conventional glider might be needed to compete at the highest levels.

Just before this time Brian Eggleston had begun publishing a series of papers introducing some radical new F1A airfoil designs. His premise was that traditional airfoils are extremely high drag during the acceleration and launch of modern



gliders and that it is possible to design a lower drag section with only a small sacrifice in glide performance.

This approach greatly intrigued me and I was also impressed with the performance of a few of the models of some of the early pioneers of the BE airfoils. I decided that I wanted to experiment with some of these new fixed airfoils before jumping into the flapper world.

The next problem was how to approach the construction of new wings. In recent years all of my gliders have been assembled from pre-built Ukrainian parts and I briefly investigated having some custom parts built but I was not excited by the response I received.

I was also not much interested in the traditional construction techniques.

I began thinking that true airfoil accuracy could be important and it is something that gets neglected with the current D-box structures since the covering sag over the rear of the wing can significantly distort the profile. Why go to all the trouble of modeling and designing the next great airfoil if the rear two-thirds of the wing will not accurately duplicate it?

It seemed that the best approach would be some type of solid molded wings probably based on foam cores. Allard Van Wallene in the Netherlands has been leading the way for some time with this approach and has built what are reportedly some of the strongest F1A wings around.

I began toying with the idea of actually doing all this work myself as it was becoming clear that it would be tough to get anyone else to do it and I really began to like the idea of having control over everything. I hesitated worrying that I did not have enough personal time to get this involved in building, but then realized that after an initial investment of learning time that I could actually produce model parts much faster than the traditional D-box techniques so I began to explore further.

I knew that making foam core composite wings was not hard, as all kinds of RC guys have been doing it for years, but I

worried if I could really make them light enough for F1A. Most of Allard's wings used foam core composites only for the main center panel and the tips were built up with the conventional D-box. I really wanted to go solid foam core for the entire wing, but would this be too heavy?

To get the weight down I started considering using pre-preg carbon material with a refrigerator for storage, machined aluminum molds, had thoughts of autoclaves, etc. This was looking very expensive and complicated, but after further consultation with Allard and Matt and Gail Gewain of CST (<www.cstsales.com>) I decided that all that stuff was not necessary. With some special methods to get the epoxy weight out of the wetted cloth one can make some very light structures using techniques very similar to RC glider wings.

Ken doing some programming during a morning session at the Croatia World Championships.

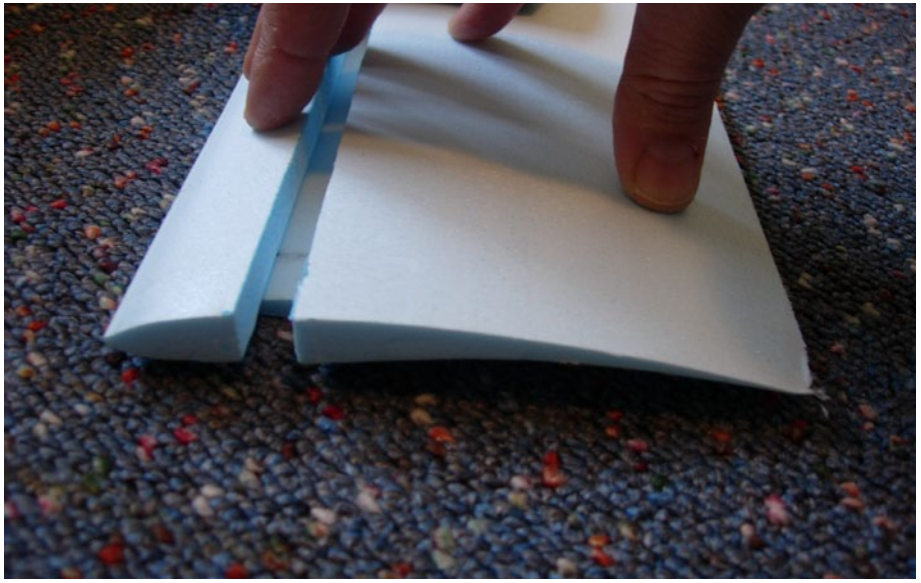
Finally I took the plunge, starting with Allard's advice to order a DVD set titled "Vacuum Bagging Made Easy" featuring Phil Barnes who is one of the best at producing RC glider wings. In six hours of video Phil shows every detail of the building process from cutting the foam to inserting spars to wetting the material, painting the molds, vacuum bagging, etc. I highly recommend this to anyone interested and it is available here: <http:/home.paonline.com/hayman/video.htm>.

I then bought most of the materials from CST and began experimenting based on Phil's techniques.

During the 2008 holidays I molded a bunch of 16" test panels based on the BE9050 airfoil. The lightest available carbon cloth is 2 ounces/square yard which seemed a bit too heavy for light structures like wing tips, so I immediately started playing with some lighter stuff. I tried some 0.7-ounce glass cloth and compared it with some 0.5-ounce carbon tissue that I had purchased to experiment with. The panel with the carbon tissue seemed slightly stiffer and I found the material very easy to work with. so I focused my efforts on that. I also tried various makes and colors of paint to cover up the black carbon and weighed a bunch of paint samples to find the spray can that gives the best coverage/weight ratio.

The method I arrived at starts with Dow Hi-Load 60 or Hi-Load 40 blue foam which have 60 and 40 psi compression strength. This is virtually the same stuff as spyder foam which is 60 psi. Density is in the range of 2 to 2.5 pounds per cubic foot with the Hi-Load 40 being the lightest. The amazing thing about this foam is that it has a vertical cell structure because the sheets are designed to lay flat for construction insulation so the strength is focused in the vertical direction to prevent the sheet from compressing. This is like having a sheet of end cut balsa where the grain is not along the length of the sheet as normal, but rather from the top to the bottom side as would be desired to make a web between spars. When this high strength web is combined with a thin composite shell the result is a stressed skin structure which is very strong and light.

Metal templates for the root of the KB18 wing tip. BE 9051 airfoil, 5.3" chord. Spar location marked forward of 30% chord.



Foam core of KB18 wing panel with cutout for carbon fiber spar system. Text provides more details.

The Dow foams come in 8 by 2 foot sheets 2 inches thick and can be purchased at home improvement stores in cold climates but are hard to find in California. Rene Limberger discovered a foam distributor in Burbank where I travel to pick up the stuff I need.

I've played around with ordinary white beaded foam which is only half the weight at about 1 pound per cubic foot, but its compression strength is almost nothing at 6 psi and I have not had much luck with it. I tried molding a very light stab and even with low vacuum it ended up looking like a potato chip.

I use a "feather cutter" type rig to hot wire cut the cores and don't see any need for expensive CNC foam machines. I use 0.018" braided steel cable from old control line combat lines for the hot wire.

After some experiments and some bad cores I found that 2 amps of DC current provides the right temperature for nice cuts.

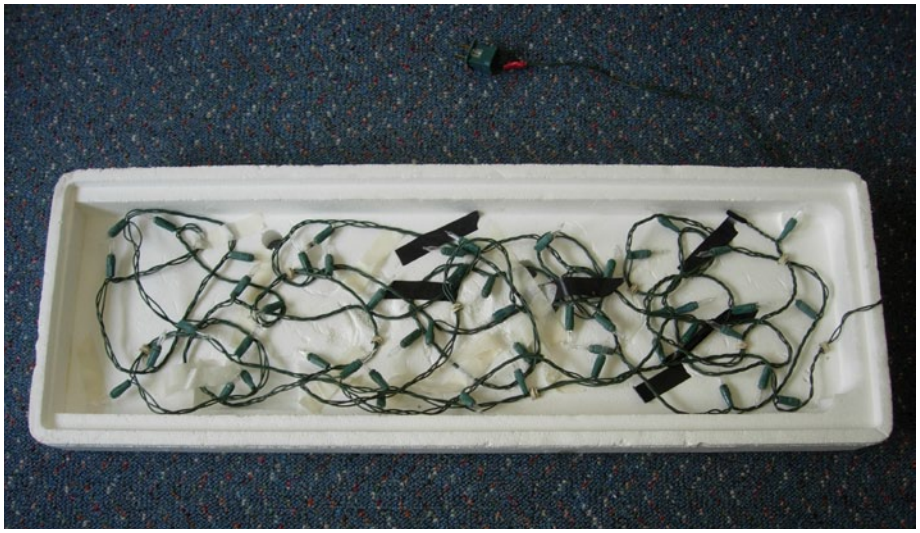
My biggest problem was getting a nice cut around the small radius of the leading edge of the wing where the wire would tend to hang up or hesitate causing an ugly low spot of excess melting. I solved this by making the templates oversize at the leading edge (L.E.) and not cutting the very small radius and by making sure the templates are extremely smooth. I make the templates from some laminate material purchased from CST, cut on a band saw and then sanded smooth. The final LE shape is obtained by sanding off the small corner of excess material which is very quick as the foam sands easily.

The foam core is prepared by lightly sanding, adding a strip of material around the L.E., and adding some carbon strips over the top and bottom to create spars as needed.

For F1A main panels I completely cut out a section of the core the width of the spar and glue everything back together

Above: Resin and hardener, vacuum pump, hot wire power supply, and vacuum bag.

Below: Heat is produced by a string of Christmas lights.



with the full depth spar inserted. Hard mylar drafting film either .014" or .010" thick is used as the female part of the mold in conjunction with the female foam pieces left over from the core cutting procedure.

The mylars are cut slightly larger than the panel size, waxed as a mold release and then painted if color is desired. I tape the top and bottom mylars together at the L.E. with about 1/8" space between and lay them waxed side up on a bench.

One piece of carbon tissue or other cloth is then cut to size and laid over the mylars and secured to the bench with tape at the corners. The epoxy is then mixed and spread over the tissue using an old credit card as a squeegee until all the tissue is wetted out. Then the most important step is to remove as much excess epoxy as possible to get the weight down.

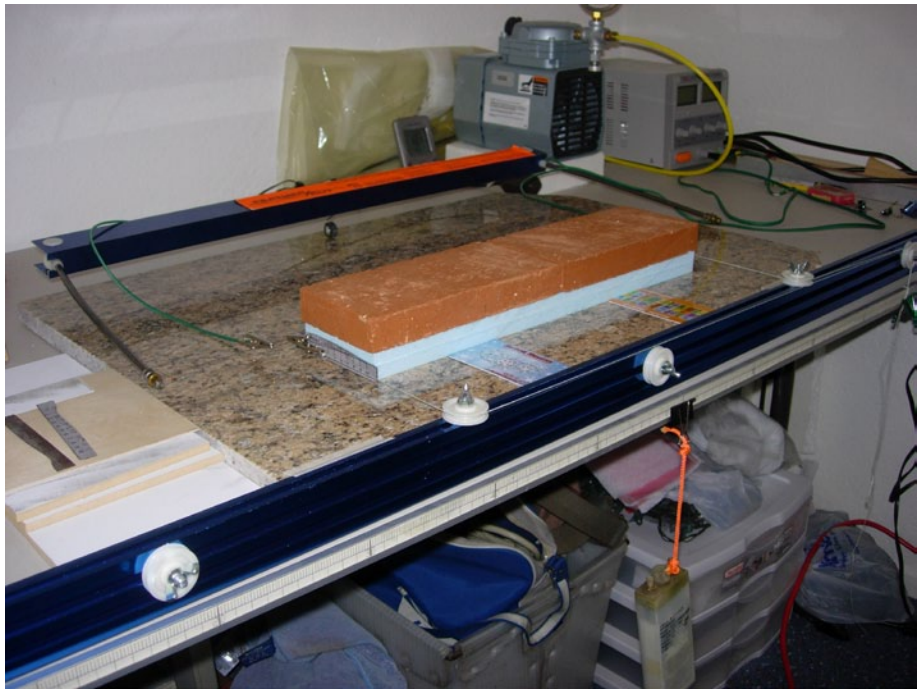
I lay paper towels or toilet paper over the layup and compress everything very hard using a roller tool meant for applying wallpaper. I do this process twice, forcing the epoxy to soak into the paper towels until I can't get any more.

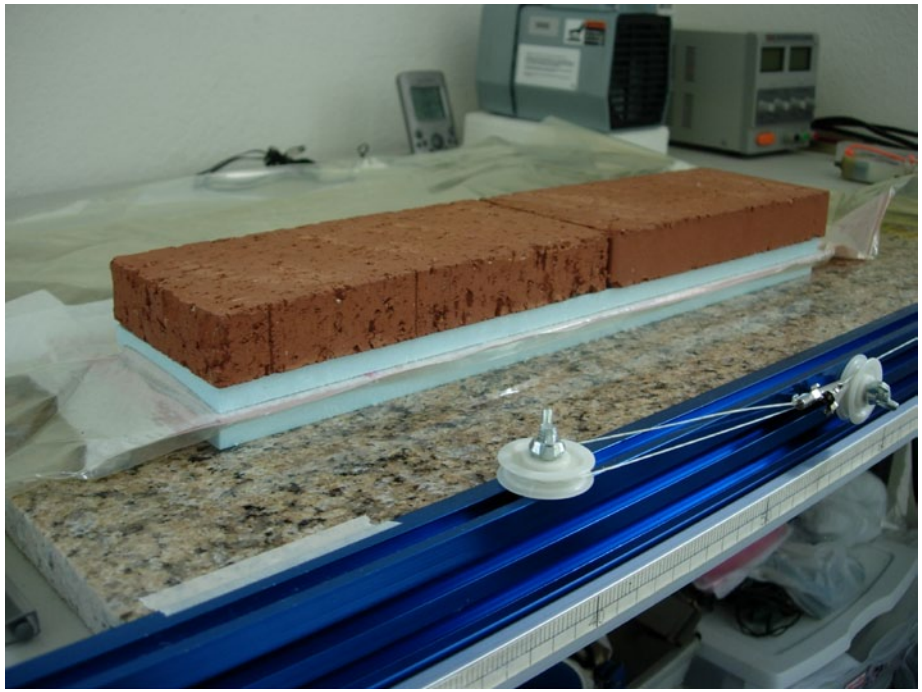
I then grab the core and add some epoxy to the fabric around the leading edge, remove the mylar layup from the bench and fold the layup around the leading edge of the core.

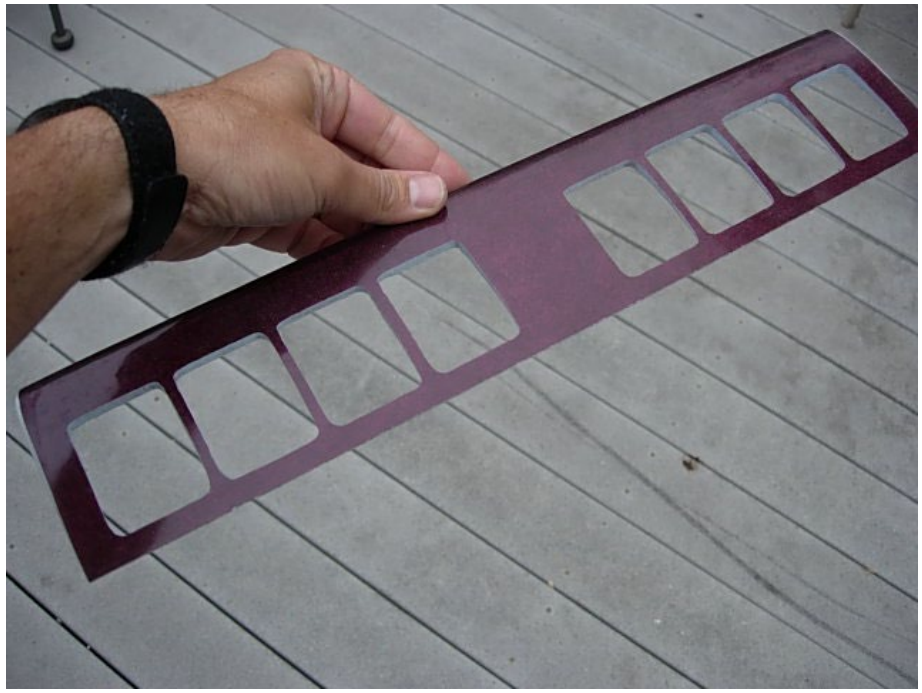
A few pieces of tape are used to secure the floppy mylars around the core and this sandwich is then placed inside some breather material and into the vacuum bag. This assembly is then placed between the two female foam pieces from the core cut and everything is placed on a flat bench and weighed down with bricks on top.

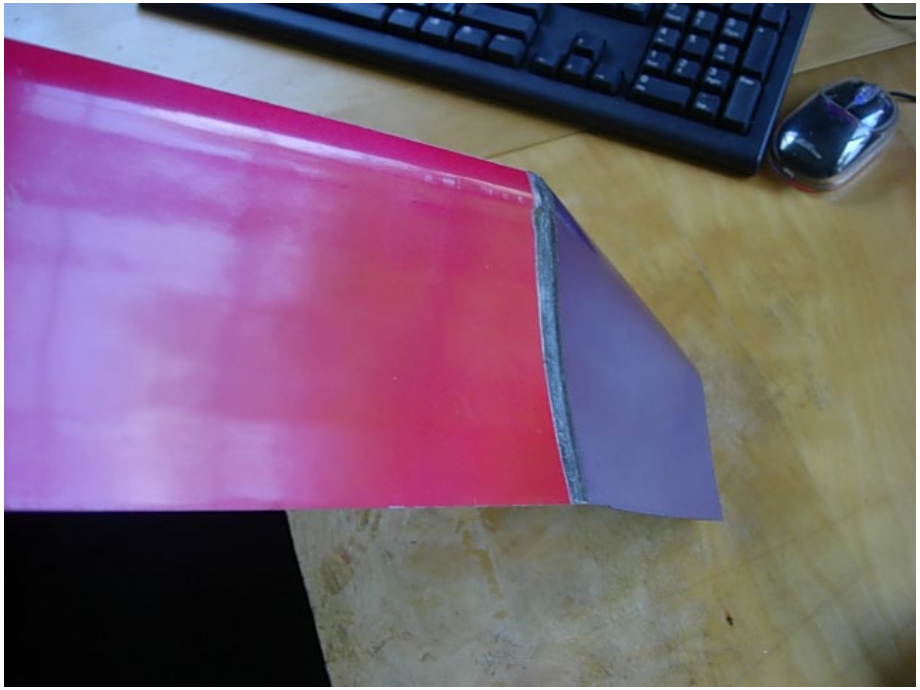
Opposite page:

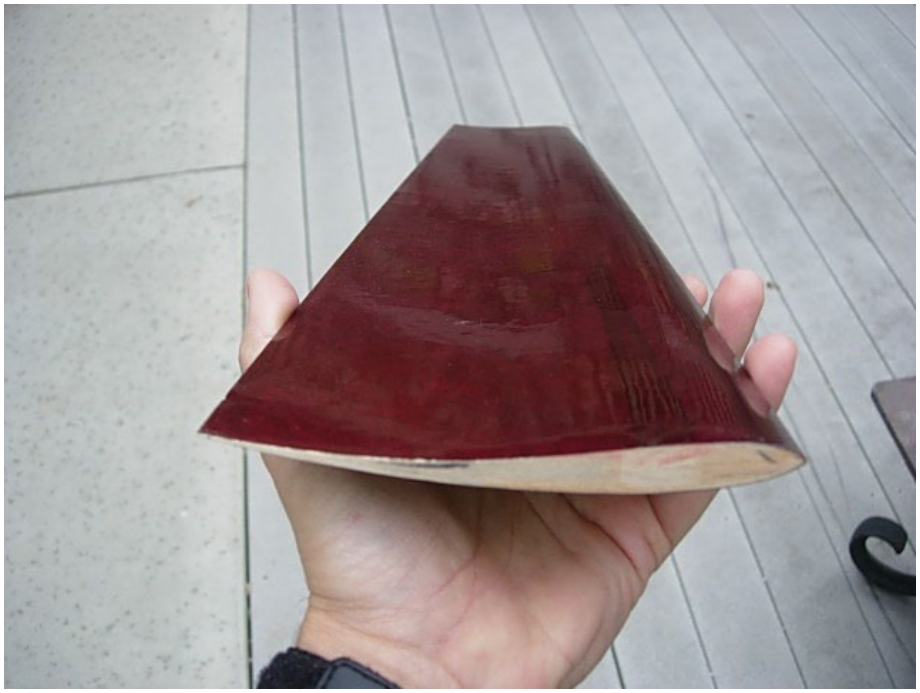
Upper left - "Feather cutter" ready to cut upper stab surface.
Upper right - Stab in vacuum bag.
Lower left - Heat curing the stab, still in the vacuum bag.
Lower right - Finished stab, ready for covering.











Upper left: Bottom side of the TLG wing.

Above: Top of the TLG wing.

Left: Bottom of the KB 18 Wing tip.

The vacuum pump is started and after a final check to make sure everything is lined up flat I place a foam heater box made from an old string of Christmas lights over the whole thing to speed up the epoxy curing

After about 10 hours at 100 degrees F the whole thing is taken apart and a new part emerges. The most exciting part of the whole process is peeling off the hard mylar sheets revealing a shiny finished panel, especially neat when paint was applied to the mylars and now is part of the new wing.

Some final sanding is needed for the excess material around the leading edge and I always trim back the trailing edge to get the exact chord after cutting the initial core about 1/8" oversize.

So, happy that my new building technique was showing promise, I started to build some new models.

The first was a 32" span tip-launch glider using the BE9050 templates I had made for a F1H glider. The heavy undercamber of this airfoil was pretty radical for a TLG, but the airfoil is also designed for low drag at high speeds as the first third of the section looks virtually symmetrical so I thought I would give it a go.

This first wing was pretty heavy at 40g mainly because I used way too much paint, but the 80g glider flew very well when I first tried it at the 2009 SWR at Eloy, Arizona.

When thinking of a DT timer for this glider, I realized that there was really no need for a timer at all if I simply installed one of my remote dethermalizer (RDT) units. This turned out to make the glider more fun and easy to fly than ever and when witnessed at the SWR started an entire trend of using RDT for small gliders.

Next in my plan of developing this new building process was a F1H glider. I had most of the parts coming together and had a stab built but had not gotten to the final wing details yet. Things had slowed a bit because during this process I had earned a spot on the U.S. F1A team and so was committed to getting my present fleet of F1As in order for the upcoming World Champs in July.

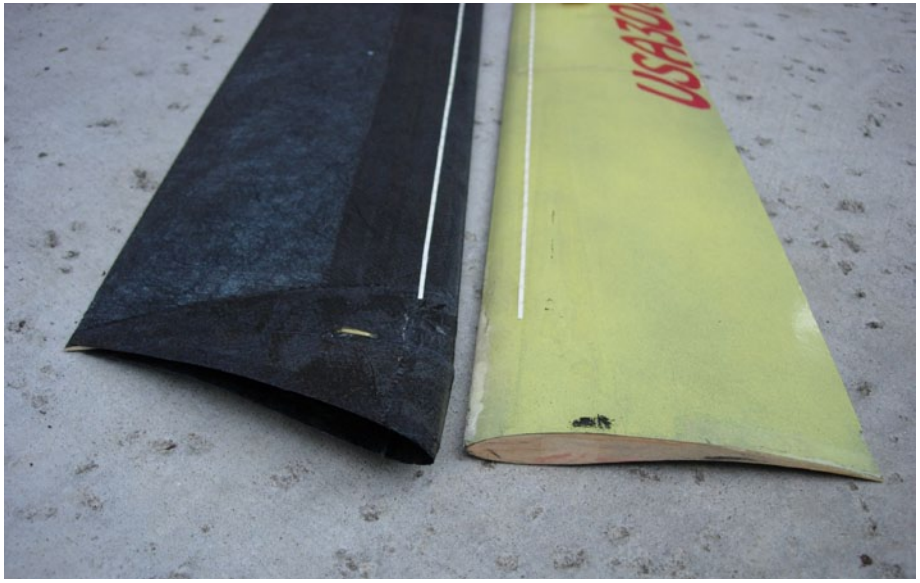
During the Spring of 2009 the preparations were looking good so I was thinking about continuing the building experiments.

At this point I decided to skip over the F1H program and roll the dice on a high performance long FIA model since one only gets so many opportunities to fly in a WC. On the chance that perhaps I would be fortunate enough to make it into the flyoff rounds I might as well put all my resources into making something that might compete against the new flappers. With only months before the WC this seemed like a pretty crazy idea, but with all my other models ready I didn't have much to lose so I decided to go for it.

After studying Brian Eggleston's papers it seemed clear to me that his new thick airfoils would give the greatest advantage when used on a very high aspect ratio wing. His estimated total flight duration numbers derived from both bunt altitude analysis and glide performance calculations increased directly with aspect ratio. A very long wing with one of these new airfoils would in theory have similar performance to a flapper. At 9% thick these airfoils seem to go against conventional wisdom, however the extra thickness would be a great structural advantage and should allow a very long wing to be strong enough to work well, something that might not be possible with a 6% section even with composite technology.

So the approach was set: the BE airfoil would provide the low drag to obtain a high launch which fact was already well established by other modelers, a high aspect ratio would win back the glide performance of the BE airfoil as compared with conventional thin sections, and the extra thickness of the airfoil combined with foam core composite techniques would make it all strong enough.

I quickly drew up plans for a model with 98" flat span which was dubbed KB18. I checked with Brian Eggleston and decided to use his latest creation, the



Left: End view of the KB 18 tip joimt.

Above: Turbulator made from 1mm segments of 1 mm monofilament fishing line spaced at 1cm intervals.

BE9051 for the main panels, and the tips would taper from this to a 6% BE6535 at the very tips. As I did with my TLG, I would not design any twist or washout into the wingtips but would rely on the change in airfoil shape instead, which according to Brian was equivalent to 3 degrees of washout. This was actually the same approach I used on my old wood F1As back in the 1980s as it always seemed silly to take a highly undercambered high-lift section and then use extreme washout as this just creates extra drag.

Because of the short time left on the calendar, I called on my Danish friends Henning and Jes Nyhegn to make some spars to my specifications. They use a method with a carbon sock over rohacell for the core/web which is then sandwiched between the pulltruded carbon top and bottom spars and then everything is placed in a mold to cure. The spars arrived and were a bit on the heavy side because the main panel spars were not tapered but rather a constant cross section for simplicity.

To achieve reasonable weight I elected to use the spars for the main panels only and just go with unidirectional carbon on the top and bottom surfaces of the tips for strength.

The main panels were cut from HiLoad 60 and I used Hi-Load 40 for the tips. I molded all the wing panels using the 0.5-ounce carbon tissue and just enough paint to try and cover up the black. The main panels weighed about 75g each with the tips about 29g each so my initial wing weight was about 208g which I was happy with, but the wing tips were not attached yet.

Because a 98" wing would not fit in my model box and because there was a natural break at the dihedral joint, I really wanted to come up with a scheme for detachable wing tips. Initially I looked at some conventional joiner rod ideas to carry the strength from the main panel spar into the tip, but because the tip was now a stressed skin structure with all the load being carried in the skin surface none of these ideas looked very good.

I finally came up with a carbon “sleeve” design where the entire end of the wing

tip would slide into a female section attached to the main panel and would use masking tape to secure everything. The penalty would be a slightly thicker wing section around the dihedral joint, but the loads would be carried on the surface and the scheme should also offer nice breakaway protection in the event of a crash.

The model came together and was ready for first flights in June. Other details included a stab with a new BE8017 airfoil molded from Hi-Load 40 with cutouts in the rear section covered with standard quarter mil mylar. This ended up weighing about 7g. I didn't want to use a solid steel wing wire because of the weight, so I decided to try a 5/16" (8mm) diameter steel tube with a solid carbon 1/4" pulltruded core epoxied inside.

I used a purchased nosepod and tailboom and installed my typical four servo electronic timer system using one servo for stab, one for rudder, one for wing wiggler and one for the dual strain gage electronic towhook, and of course included a RDT receiver.

I put the C.G. at the standard 52% and the towhook the typical 18mm ahead of this point. On top of all the electronics it still needed another 41g of lead in the nose and the whole model ended up at 436g, or 26g overweight. Not as good as hoped, but pretty reasonable for my first composite model. And some say this is no issue at all for a long-wing model.

First flights were on a plowed field near my house with the timer bunt/stab settings at the typical positions I use for my other models just as I usually begin with a normal model.

But I quickly discovered that this model was anything but normal as the first launch yielded a complete outside loop when the bunt came in! After a few flights I realized I should not even be thinking about the bunt yet, but simply try to get the thing pointed towards the sky at launch.

I also realized that because this model moves so much faster than any glider I have ever flown that my standard procedure of removing my RDT transmitter from my pocket, turning it on, then pushing the button, would not be fast enough to save this model from an errant launch. After ten years of flying with RDT this method has always been enough to save gliders, but I told myself that I need to fly this new model with the transmitter already armed in the "on" position ready for quick action.

Just a couple flights later the model turned on me too quickly as I setup for launch and right after release was pointed into the ground. I pulled the RDT from my pocket and immediately squeezed the button but nothing happened and the model smashed into the ground breaking the tailboom and the wingtips. I looked at the transmitter in my hand and realized that old habits die hard as I had not remembered to turn it on before that flight. Oh well.

The next thing I learned was that these foam core wings are very easy to fix. The removable wing tips had limited the damage to just a couple simple breaks and these were easily fixed by gluing the pieces together with foam safe CA and then adding some strips of glass or carbon tissue and epoxy over the cracked spots to effectively join the skins together.

Over the next couple weeks I repeated this process again, smashing the glider two more times and putting it back together again. There were many times when the RDT was used to save the glider, but I was still a little late on the button a couple times.

The issue was that when the glider pointed its nose down the speed built very quickly due to the low drag airfoil and at that stage even with glide settings it acted like there was very little incidence and would dive almost straight in. The glider was rather squirrelly and fast on tow as well which complicated things.

I then went through a process of moving the C.G. forward to 48% by re-drilling the wing hole in the nose pod to move the wing back and also had been moving the towhook to various positions. The C.G. change was a big help in making the glider more stable and dramatically cut the crash rate as the model now had

enough decalage to recover from most dives. Towing improved as the towhook moved back until it ended up about 5mm ahead of the C.G.

With only eight days to go before leaving for the WC in mid-July I was again flying the model but struggling to get it to tow straight when I figured out that my plug-in wingtip system was not strong enough and the tips were moving too much. I also had realized by this time that my wings were not stiff enough and were twisting under launch loads causing the towing irregularities.

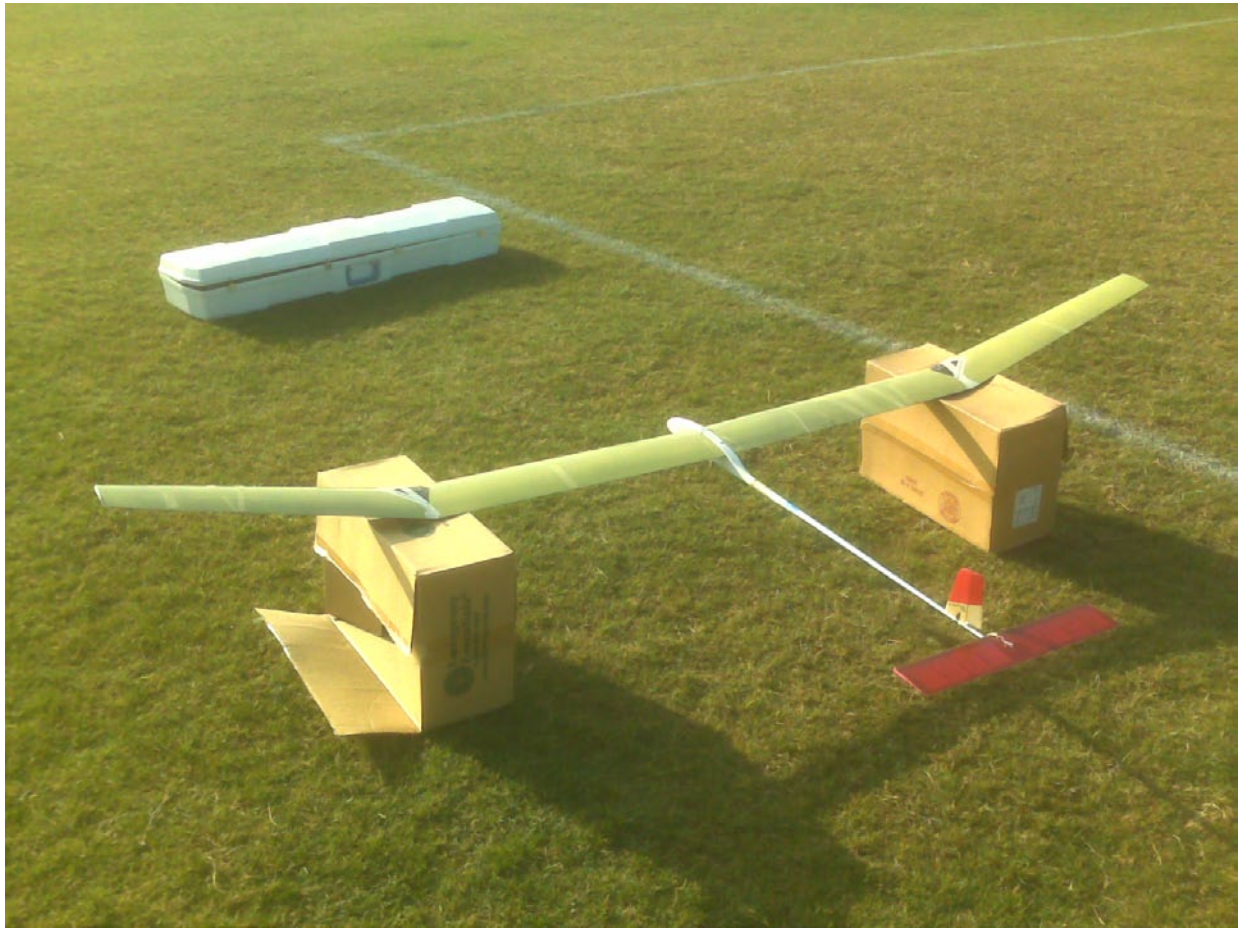
At this point half of me was saying to just put it all away and focus on the WC as this whole thing is nothing but a big distraction and it is not smart to even think about flying an experimental unproven model at the WC. But the other half was telling me that I have a second set of spars already built and there is still time to mold a newer much stiffer set of main panels with better tip joiners which might solve most of my problems.

The second half won.

So I went into action on the new main panels. This time I used Hi-Load 40 and no paint to save some weight and instead put the weight into laying 2-ounce carbon cloth on the bias over the first third of the wing chord to act as a D-box and stiffen the wing. The same 0.5-ounce carbon tissue was used over the rest of the wing although I added a bit of unidirectional carbon on the bottom of the T.E.

I pulled out so much epoxy trying to save weight that there were some blemishes in the finish, but about 3 days later I had some new main panels that were much stiffer than the previous version and were the same weight. The redesigned tip joiners were much stronger although heavier than before.

Two days before travel time I was at my local park flying and trimming the model. It was definitely much better than before and for the first time I was starting to get it to launch the same way twice! I flew it again the next morning and finally felt



KB 18 at the park.

like I had some trim settings where it could bunt with some consistency so the final decision was made that it would be included in my model box for the trip the next day.

We arrived in Croatia in time for some flying on a Wednesday evening. After checking out a couple of my primary models I decided there was time for one flight on the new model just before the sun went down. I warned everyone to be prepared for anything as this model has a tendency to be either spectacularly good or spectacularly bad. This flight happened to fall into the good category with a launch much higher than my usual and the crowd was cheering. At that point I told my son Brian that we would get up early Thursday morning and put up back to back flights with this new model and my conventional Stamov long model and try to time each to the ground and compare. If the new model still looked good I would consider processing it for the WC, otherwise I would stick with my well seasoned gliders.

Thursday morning arrived and I put both models together but after several flights could not get a good launch with KB18 as it was not towing and tracking straight as it did the previous evening and so I was not able to compare models. I finally figured out that my steel/carbon composite wing wire was no longer straight but had taken on a bend probably from the previous evening's flight. As it was not inserted into the fuselage in the optimum direction it was causing the wings to be mis-aligned. At this point with the Vilim Kmoch contest the next day and the WC only a few days after that I decided it was finally time to put the new glider away and just focus on the flying at hand with my normal gliders. This strategy which worked out well for me as I made the flyoff in both contests.

Some time after this trip I got back to playing around with KB18 at my local park again. I decided to keep using the same wing wire and just insert it the correct way and fly with a bit more dihedral. It seemed that the slight bend would not get any worse as the stiff carbon center was working against the steel tube. With more trimming and towhook adjustments launches were getting to benchmark the current performance against my Stamov long model.

When a series of a few days with total dead calm morning air conditions arrived I measured an average multiple flight sink rate of about 0.25 meters/second with KB18 as compared with 0.22 m/s for my Stamov long model.

In these conditions I measured a launch height of 73 meters with KB18 vs 65 meters for the Stamov.

These numbers don't sound very good in today's world of 80 or 90meter launches, but even a slight breeze or air movement has a large effect on an F1A launch to say nothing of a little wind and the important thing here was a comparison in the same conditions. The total potential flight time can be computed by dividing the altitude by the sink rate so the KB18 was 73 /.25 = 292 seconds as compared with the Stamov at 65 /.22 = 295 seconds. So, considering the margin of error involved the models were about dead even in these conditions!

One other experiment going on during this whole process was an investigation of whether this new airfoil needed turbulation. I did many tests with that first TLG using conventional chart tape turbulators of various thickness placed at various points on the chord but without significant effect. Then I decided to try "pin turbulators" based on the 2004 Symposium article by Rudolf Hobinger. I created strips of pin turbulators by cutting 1mm lengths of 1mm diameter monofilament line and then gluing them at 1cm intervals on a thin strip of chart tape which could then be stuck on the wing at various locations.

These seemed to work very well on the TLG as it was able to glide with greater incidence and curiously the rather loud "swoosh" noise that had always been noticeable during the high speed launch completely disappeared! Less noise would seem to equal less drag so the pin turbulators seemed to be a benefit

for both climb and glide. When pin turbulators were tried on KB18 I got very much the same results with the complete elimination of high speed noise and a slightly slower glide and the test data above was taken with these turbulators.

In conclusion I was very happy that my first try at building a composite FIA glider yielded a machine with performance about equal with my best Stamov long model.

As expected for the new BE airfoil the glide was not quite as good, but the extra launch height compensated giving about the same flight time.

Moving forward, launch improvement is needed to get closer to the 90 meters that should be possible and at that point the extra launch height benefit would be greater than the loss in the glide. Then a following step would be even longer wings which would put the performance in flapper range.

The wings still need to be stiffer both in bending and twisting to enable higher launches. The next version will use a tapered spar in the main panels and the weight saved will go into full 2-ounce carbon cloth covering and the tips will use more carbon as well.

The removable wing tip system is too heavy and I'm thinking about a lightweight removable tiplet about 6" long to solve the model box problem and create 6-panel wings. A solid carbon wing rod may be tried as well to reduce the bending of the steel/carbon version.

I'm also experimenting with a new technique recommended by Allard where virtually weightless "somers film" (about the same as indoor microlite) is used in the mold between the mylars and the carbon cloth and stays on the wing to provide the outer finish. The idea is that even less epoxy is needed in the layout because the epoxy no longer needs to fill all the holes between the fabric and the mylar mold in creating the surface finish. Experiments so far look good as I have molded a solid foam F1A stab using a lighter Dow Square edge foam (25 psi) and achieved a 7g weight without the cutouts. I also molded a wing for a 32" indoor TLG using this method which resulted in a flying weight of 40g.

I'm totally converted to foam core composite techniques for model building and I'm convinced they can be made light and strong enough for almost any type of FF model. It has enabled a person like me with very little building time to do things that I never thought I could do. I am not limited to store bought F1A wings anymore and the thrill of experimenting and searching for new paths to higher performance is for me one of the things that I most love about Free Flight.

The author, Ken Bauer, participates in a number of free flight events and flew for Team USA in the Free Flight World Championships in Croatia, July 2009. Ken is also involved in RC soaring, hence the many direct and indirect references to design concepts and construction methods familiar to *RCSD* readers..

This article originally appeared in the February 2010 issue of *Free Flight*, the National Free Flight Society Digest. Our sincere thanks to Editor Don DeLoach for permission to reprint Ken's material and for his cooperation in getting the necessary materials to us for publication in this issue.

Free Flight is published monthly except for two combined issues. National Free Flight Society dues for U.S. membership are $48 for two years or $25 for one year, including mandatory 50 cent annual NFFS membership fee. Dues for those younger than 18 are $18 for two years, $10 for one year, including the same 50 cent mandatory annual membership fee. Email for subscription information <carlbakay@hotmail.com>.

Canopy Hinge
from Premier Pilots
http://www.premierpilots.net

This canopy hinge is designed for 1/3 and larger sailplanes and is made from machined aluminum and stainless steel.

It allows the canopy to be raised and removed to allow access to the sailplane cockpit.

The main body is glued to the interior of the fuselage and the receiver is glued to the underside of the canopy.

Available through the Premier Pilots web site, $95. This item is currently on sale at $85.

The premier Pilots Canopy Hinge mounted in Angelo Orona's ASH 26.

Receiver portion glued with shoe Goop to the underside of the canopy.

Canopy removed to show the canopy hinge in the up position. The hinge is glued to the fuselage interior with shoe Goop.

EXTREME slope expedition

Andrew von Berky, vonberky@optusnet.com.au

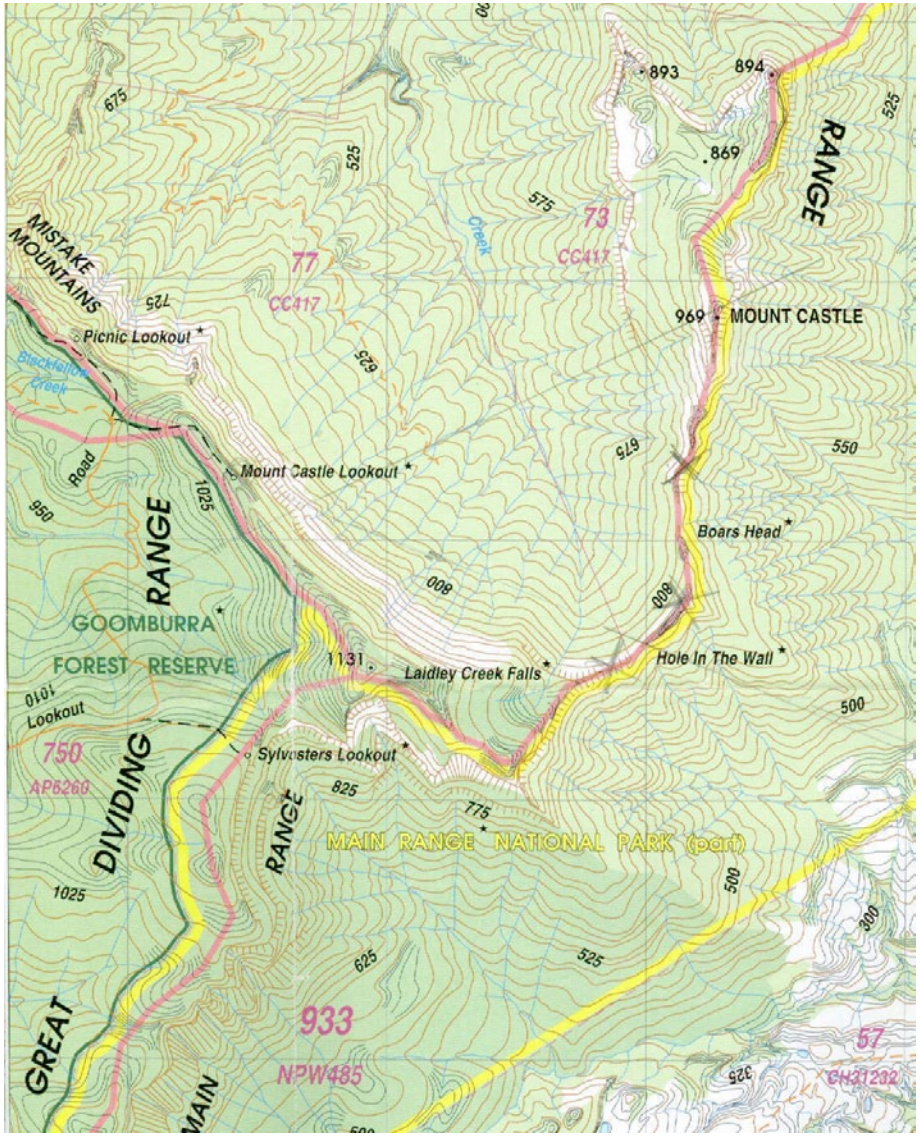
I had this crazy idea which kept bugging me, but I had no idea whether it would work out.

Dynamic soaring is very addictive, and you crave for perfect shaped hills and windy days. We love watching the Californians with their world record flying hills like Weldon, Mars Hill and Parker and wish like heck that here in South East Queensland we could find a place like that! Although we don't get a lot of strong wind we do have some perfect geography for DS; the only problem is that it's all covered in thick forests!

For several years now I've gained a reputation as a site-searcher, smooth talking farmers into letting us onto their properties to fly their ridges. There have been some successes but I've lost count of the number of disappointments we had because the wind split around the hill shape, there wasn't a good (dead air) backside zone, the prevailing wind was off-angle, the upwind geography swirled the air, trees were in the way, or many other reasons.

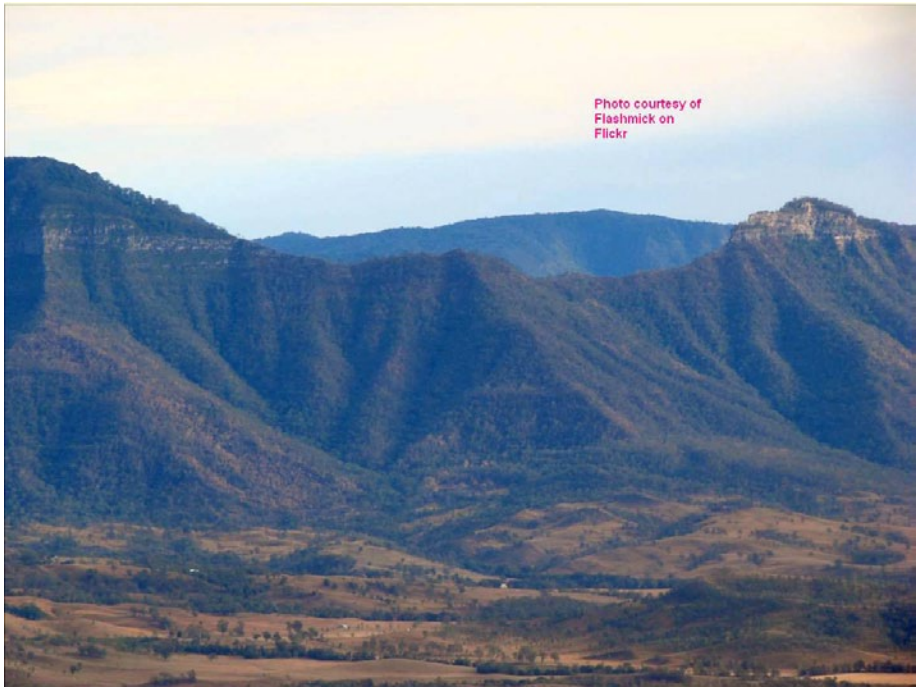
I used to do a lot of bushwalking many years before the DS obsession and all this searching made me recall some of the high places I'd been. I racked my brain trying to remember where there might have been a potential DS spot: strong lift on the front, narrow crest on the ridge, dropping steeply away to calm air on the backside. Our failures had firmed my resolve that we were hunting for a ridge on a long range, or in a saddle between two peaks, where the air is forced through the saddle smoothly and solidly, like milk pouring from the spout of a jug.

One spot kept coming to mind. It was a remote place we'd hiked to a couple of times called "Hole in the Wall." It's a spectacular rough ridge between Laidley Ck Falls and Mt Castle on the Little Liverpool range in the area north-east of Cunninghams Gap. Sections of the ridge have rocky, narrow razorback and at one spot, there's a hole where you can look through… hence the name. Most of the



Above: Topographical map of the area

Above right: A distant aerial view of the ridge with Mt Castle on the right and the spur above Laidley Ck Falls/ Hole in the Wall on the left. Boars Head in the middle.



ridge has a cliff dropping vertically on the east for hundreds of feet, and on the north there are smaller cliffs and impossibly steep slopes, dropping into an extremely steep huge valley. I got out the maps, and looked at Google Earth pictures. Hmm, exciting, but a major effort to check it out.

This scan from the topo map shows the ridge. It's a lot more spectacular than this looks! I've marked the three potential "flying spots" with a pencilled cross.

More recently I stumbled upon a gallery of photos of the area on Flickr and contacted the guy who posted them.

<http://www.flickr.com/photos/21625419@N06/sets/72157608674840554/>

Michael is a very keen bushwalker who knows the area intimately and when I explained what we were trying to do, he was optimistic that we might find a spot on the ridge which had good visibility for flying, a small landing spot, a view of the backside, and reasonable safety to stand!

So in theory, the ridge had the credentials for an amazing DS spot. It's divided by a pinnacle called Boars Head where it also bends, so there appeared to be two options for flying: to the north which would work more in E winds, and to the south which is better for SE. But it was all guessing really. We had to get there to see whether it was actually possible to fly at all. And the risks were high. If you bombed out and crashed, it might not be possible to retrieve the plane. It was a scary but exciting thought. I couldn't help myself having visions of heavy DS planes thundering over the ridge at huge speeds!

About a month ago we were organized to go, and the area was closed by the National Parks people. Then they opened it just for three days over the Anzac Day weekend and I scrambled to get organized. None of the serious local DS culprits were available – Nick G was still madly getting his strawberry farm back on track after the late rain and Sean and Eric were at the State Thermal Champs. Everyone else was busy, too. Hmm. It was too dangerous to do it myself, and I needed people to help carry gear. Finally I snaffled my two sherpas: my 16 yr old son Nick (who agreed to come if he could drive and get lots of hours logged for his new Learners' licence) and an old friend called Bruce (who agreed to come because he's addicted to Geocaching and hoped to bag a couple of remote caches!). We were all set to go.

I have to apologise for not having a comprehensive set of photos. We concentrated on taking video and I've posted a short video on Vimeo, which tells the story and gives a good feel for the country.

<http://vimeo.com/11415704>

This story is based on a brief summary report I posted on our local "Windsock" forum <http://www.windsock.net.au/> on our return.

****

Sunday 25 April 2010

In the morning I packed up the planes and the gear as well as food, clothes, etc and of course most importantly the radar gun, UHF radios, video camera, tools in a lunchbox, billy and foldup gas burner, water bottles and more. I have a hopeless memory so I have to use huge checklists.

After some thought I packed

• Reaper (DS foamy essential for sussing out a site)

• Ditza (homebrew 70"span vac bagged moldie, tough and very fast, and if the Reaper went OK I'd be busting to fly the Ditza)

• My repaired, beefed up, heavy Wizard Compact BPV. I know, I know, I can hear you all groaning about that, but I reckoned that after going so far, if we got the holy grail of an awesome spot and decent wind I'd kick myself for not having it.

The Reaper stayed in one piece but I strapped the fuses of the Ditza and Wizard together with padding between. I left the Wizard wings in their bags and strapped them together with the one piece Ditza wing as one parcel.

4pm: Leave home – Nick driving to get his learners hours up. Freaking us out at times.

7:15pm: Arrived at Yangan, a tiny one-pub town east of Warwick. I would have liked to stay closer to Goomburra but all was booked out for the long weekend. But despite the distance, Yangan was great. It was very warm for an April night. Had a great pub meal and a cheap but great little motel room with three single beds. Perfect! Then Bruce's snoring sorta ruined the sleep factor, and then an overzealous rooster started up at about 4am.

Monday (Anzac day public holiday)

6:30am: Up for coffee, tired, slow start, stuff around, pack up the gear in the backpacks.

8:10am: Leave and drive cross country to the Goomburra Valley. This place is about 10k's north of Cunninghams Gap but requires a huge detour to get to it if coming from Brisbane. We drive up the valley heading back east, right to the end of the road at the base of the western

Lugging the planes through the dark rainforest.

This view as you come out of the forest shows Mt Castle and Boars Head, and the saddle in between where I later flew.

side of the Main Range. Then a long steep climb to the top of the range.

9:05am: Backpacks on, pick up the planes, lock the car and start walking. All seems fine – easy to carry the planes. The first part is about 5 minutes on a well-made track to Sylvesters Lookout. WOW!!!! Excitement plus! There was heaps of WIND! I was stoked. We turned onto the vague wilderness track and into the rainforest.

I could rave but will be brief – the walk is really varied. Firstly a steep uphill in the rainforest, including a turnoff to a super-spectacular lookout.

Then every 50 metres the scenery changes. Rainforest, a thicket of scratchy wild raspberry, beautiful soft field of ferns, open grassy forest, dark steep slippery muddy descents, treefalls to skirt around, track sometimes hard to find, then finally to the campsite above Laidley Ck falls. Drop the planes and walk a minute or so out to the lookout at the “nose” above the Hole in the Wall rocky razorback. Really spectacular.

Navigating below the cliffs just after the waterfall.

Posing with the Reaper at the Hole-in-the-Wall.

10:30am: At the Nose. We clambered to the beginning of the rocky ridge. Airy stuff. The wind seemed lighter now but still reasonable. Man, if you had balls and nerves of steel, you could have a lot of fun DSing at that spot. But landing... I think challenging would be an understatement.

At this point you get a view of the ridge and Boars Head, which had seemed the likeliest flying spot. But I was a bit dismayed seeing it... extremely steep slopes, cliffs/ rocks, and dotted with trees it didn't look great.

The route then involves backtracking a little and descending the spur to the northwest just past the cliffline, then contouring back just under the cliffs. You cross a small creek on the way down, then you have to cross it again below the cliff. There's no clear track and various false tracks, so we wasted about 20 minutes and exhausted ourselves trying to cross the creek too low, risking slipping down small cliffs, before realizing that you have to stay right up next to the

cliffline and take a shower as you walk (precariously) under the main waterfall. The Wizard wing bags got soaked (and heavier!). It hadn't been difficult carrying the planes through the bush but this some of the steeper, trickier bits required us to pass the planes to each other as it was dangerous trying to do it one-handed.

Suddenly we were below the Hole-in-the-Wall. Climbed up and wrote in a Visitor book and poked our heads thru the hole to gaze along the cliffline. Not many people pass this way lately. Getting overloaded on spectacular-ness by this stage.

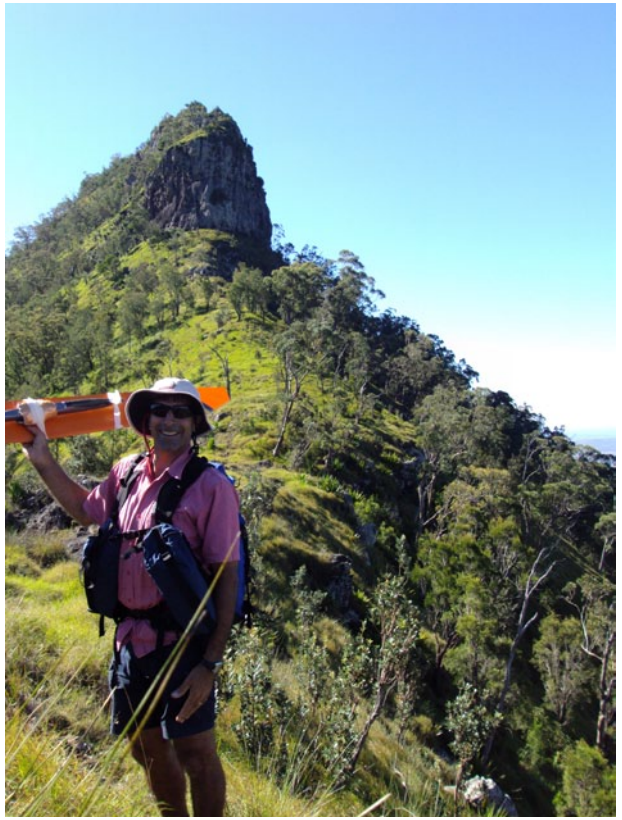
We mucked around there for a while, then took a few dead ends getting off the rocky ridge to the lower slopes, then back to the ridge to avoid cliffs, and up onto the ridge to start climbing Boars Head. Found one spot there that was fly-able and had a grassy patch, but only had holes in the trees to fly through and DS visibility would have been bad. Finally up onto the top of Boars Head around 12:15pm. This was brilliant. A 360 degree panoramic view. The views really are fantastic – all along the Ramparts, Cunninghams Gap, the Main Range/ Scenic Rim, Mt Barney etc and peaks including Mt Greville around Moogerah Dam. We took a long break, made a billy of tea and had some lunch. I considered flying off this incredible spot but didn't have the nerve – sadly the wind had almost totally died out and the landing opportunities looked... well... scary. A noisy helicopter flew towards us flying slowly around the cliffs of Mt Castle and we realized it was actually a small gyrocopter.

Castle from Boars Head

1pm: Wondering what to do next. From Boars head we got our first good view into the next big saddle which then rose into the slopes of Mt Castle. There looked to be more grassy patches at the far end of it and although it was hard to tell how far away it was, some of the ridge looked clear of trees, so I was keen to get down for a look.

I reckoned that we'd have to be heading home from Boars Head by 2:30pm to be safe, which didn't leave a lot of time.

Carrying planes over the rocky ridges.



This is as far as we needed to go. You could camp here!

But Nick and I decided to have a go. Bruce was pretty tired so he stayed up top with a UHF radio. Nick and I packed the essentials, including the Reaper and the Ditza (restrapped in one lump). The descent was quick and we found ourselves on a good track beside an old cattle fence. Narrow ridge, beaut views, even a campsite. A classically inspiring walk.

Soon we got to the west end of a narrow rocky razorback, and my heart leaped. There were no trees rising anywhere near the top. On the frontside a huge bowl rising from the lowlands about 800m below to the razorback outcrop, and dropping away in impossibly steep grasstree-studded slopes on the northern backside. There was a steep, but climbable grassy slope below the “standing spot” on the backside; a perfect foamy landing zone. I was tongue-tied, trying to express how excited I felt! This seemed like a place that, with strong wind, could be a record-breaking site! The thought gave me butterflies... not just with excitement, but with fear! Would it even be possible to land a big heavy molded plane on a crag like that?!

That's the spot where I later flew! Right above the grassy patch (which is the backside).

Nervously waiting for a breath of wind to launch the Reaper off the razorback.

This was the best spot by miles. But just to be sure, we kept going (it was easy going over the razorback) and skirted/climbed our way to check out those lower slopes on Mt Castle.

Although there were some nice, open spots it didn't look promising for DS so we turned around and headed back over the razorback.

2:05pm: We were about to head home, but I couldn't face the idea of leaving without having flown something! I just wanted to be able to say I'd done it! This was crazy. There was barely any wind!

I switched on the Cockpit transmitter and checked the Reaper. All working OK. Nick gets the video ready and I was ready to launch, so the air stopped moving entirely. Bruce was visible as a white spot on the hill, keeping in touch on the UHF.

I waited and waited till I felt a breeze stir and threw it out, ignoring the fear in the pit of my stomach! The Reaper soared beautifully and held height but only just, so I turned very gently. Got a bit close to the lip so I bailed into the back for a quick landing on the hill. No problems!

But I hadn't tried to DS. So I launched again but it was a wobbly launch and lost height, and the Reaper didn't come up. But I stayed calm, soared well out and kept hunting for lift, barely moving the controls and coaxing the Reaper up carefully. The Reaper doesn't like to fly slowly – they're built for speed - so you have to walk a fine line between up trim for lift and risk of stall. It was a tense couple of minutes, wondering if I was going to lose the Reaper in the forest below the cliffs, but then it gradually picked up enough lift and soared back up to the horizon. I have to praise the Reaper! Finally it even got enough height to consider trying to DS (which was pretty silly considering the lack of wind) so I dived it in over the back. It was a very conservative effort – I wasn't going to pull a top turn unless I could see that the plane was accelerating – and it didn't! On the second attempt I turned wide and the plane came out over my head... and I was so scared on that ledge that I couldn't look up! I just waited till it reappeared on the frontside and

fortunately it did! I tried a few more times including top-turning to try and slingshot it back in, hoping it would accelerate, but there really wasn't any DS effect, and I landed it again OK on the back.

WOOO-HOOO! It sounds crazy since there was no wind and no DS, but I'd had two flights and two safe landings in this rugged, remote spot. back to me and I was stoked. It really made the whole thing worthwhile.

So although I didn't get to DS, the expedition was really successful. We now know that there's a flyable spot there, with very inspiring shape. I reckoned if I'd had my big Caracho/Fazer combo (my favourite light wind DSer) I would have had it DSing nicely! I felt sure that if we could get back to that spot on a windy day, there was a lot of fun to be had.

2:40pm: We left the saddle where Bruce had ferried the gear down to, re-strapped the planes up, and made our way back

home. But Bruce and I were tired. Not as fit as we used to be, and whenever we lost the track and had to climb uphill on the slippery grass, even for a few metres, we were exhausted. Needed a few rest stops along the way.

4:35pm: Back to Sylvesters Lookout. No wind this time!

4:45pm: Back to the car.

Huge hamburger and coffee at Aratula. Nick did a great job of the driving.

9:00pm: Back home.

Tuesday: Tired and stiff. Back to work but with many memories of a good day!


Seattle Area Soaring Society
Wing Tips Clinic
RC Soaring Fundamentals

The idea is a response to feedback that some SASS members do not fully participate in soaring activities at Carnation Farm due to lack of familiarity/confidence/skill in certain areas.

In order to help improve that situation, several SASS members set up a skills clinic for such people, with expert pilots on hand to provide targeted, one-on-one coaching.

Wing Tips is for those who lack a specific skill or set of skills which is preventing them from participating in SASS activities as much as they would like. This event was not designed for experienced pilots to refine their skills.

The concept is not just to help out those who need some coaching, but to try a slightly different approach than is typically found at a fun fly or contest. That basic idea is one-on-one coaching for the whole (half) day.

Who: Open to SASS members with access to Carnation Farm who would like to work on basic sailplane flying skills. New members and new pilots welcome and encouraged to attend. There is no minimum skill set required to attend. It is expected that you will bring a sailplane in ready to fly condition.

Why: It has been noted that there are SASS members who would participate more in soaring activities at Carnation Farm if they felt more comfortable there. Specific reasons vary by individual. Someone may wish to fly on fun fly days, but could use a spotter to help get more comfortable with flying among other planes. Someone else may not be comfortable with winch launching, or landing in a marked landing zone. One might be perfectly comfortable with a hectic environment, but would like to learn how to spot lift and work it. The examples are endless but the goal is the same for all. After a day of low-key, dedicated coaching, we hope that more people will engage in soaring at Carnation Farm.

What:

- This is not a contest, nor is it intended to prepare participants for contest flying, unless that is an individual's goal.

- There is no cost to attend.

- This is a full day when the field will be set aside for those wishing to improve some specific basic soaring skill or technique.

- Experienced pilots will be on hand to offer one-on-one coaching on the topic(s) of your individual choosing.

- Spend as much or as little time as you like working on whatever you would like to improve.

- The more experienced pilots will not be flying, they will be coaching. We can show you new techniques, and/or help you refine what you already know.

- Lunch provided for preregistered participants.

Preregistration not required but encouraged so we can team you with an appropriate coach.

When: Saturday, May 8 with a rain date of Sunday, May 16. We will start at about 11am and run until 3pm or later as needed.

Where: Carnation Farm. See <http://www.seattleareasoaringsociety.com> for map and directions.

How: Preregistration is recommended but not required. Preregister by sending an email to Larry Eich at <l.eich@verizon.net>

Menu of topics (pick one or more):

Hi-Start Launching

Winch Launching

Winch/Retriever Setup and Operation

Sailplane Trimming

RES Flying Techniques

Full House Flying Techniques

Wing Tips Clinic organizers:

- Larry Eich
- Brian Keeffe
- Andy Page
- Loren Steel

Landing safely in a non-contest environment

Contest Landings

Reading the Air to spot lift and having a flight plan before launch

Working Thermals: Search Patterns, Recognizing a Thermal, Centering, Drifting

Basic Contest Strategy

Contest Timing

* Radio use and programming

** Sailplane Airworthiness

Work on something that is limiting you from further participation in and enjoyment of the hobby. The topic titles are just guidelines to get you to think about what you need, and to help pair you up with a coach. It is likely that you will cover more topics than you select. Although this is not a formal orientation to Carnation Farm, basic field etiquette and operations will be covered as needed.

* Radio Programming: While it is ideal to have a model programmed before coming to the field, if programming is keeping you away from the field, bring it out and we will get it set up!

** Sailplane Airworthiness: We cannot work on models at the field except to correct very simple issues, but if problems with your build or radio installation are keeping you from flying, bring it out and we will figure out what it will take to get it in the air!

Wing Tips Clinic Report

Larry Eich, l.eich@verizon.net

The Seattle Area Soaring Society put its first Wing Tips Clinic on May 8 at Old Carnation Farm. This was a four hour event that focused on helping pilots improve their fundamental soaring skills. We had a total of seven students and seven coaches and several people that showed up just to help the event run smoothly. We could not have asked for better weather: mid 60's temperature, sunny and the lift was incredible. Students worked on skills such as winch launching, thermaling techniques, landing approaches/patterns and plane setup.

Once again Chef Doug Brusig prepared an incredible lunch for us, serving BBQ chicken and accouterments. During lunch, students shared with one another what they were working on and the improvements they had already made.

When the event ended, students and coaches joined several club fliers for open flying well into the evening - the perfect end to an incredible day.

We saw a lot of smiles from the participating pilots after making significant improvement to their soaring skills. Over all we had a great turn out and the event was deemed a success. Kudos and many thanks to Andy Page and Loren Steele for conceiving and planning this event, and to the coaches and additional volunteers that participated in making this event successful.

Right: Mark Vance coached Archie Campfield who wanted to work on landing approaches, air reading, and thermalling.

Below: Brian Keeffe helped Carl Scandella get more comfortable using a hi-start to get his Bird of Time into the air.

Scenes from the RC-HLG area where Ole Skotvold (on the left in the above photo) tutored Richard Petters (shown at left) on finding low level lift, thermal centering and landing approaches. A bit of man-on-man competition with other RC-HLG enthusiasts expanded the knowledge base.

Right: Rick Commo launches his Gentle Lady under the watchful eye of Andy Page. Rick learned a lot about pre-flight planning and thermal search patterns and discovered he's ready to step up to a full-house sailplane.

Left: In addition to the expert guidance facilitated by one-on one coaching, participants learned from each other as well. Sharing experiences and providing feedback were the highlights of the lunch break, facilitated by Brian Keeffe.

Above: Jim Laurel helped Jon Malmberg perfect his winch launching technique and improve his overall flying skills.

Left: Lorenzo Townsend took advantage of the opportunity to fly a “real” RC sailplane after spending significant time at home on a simulator. Sherman Knight guided Lorenzo through the RC control system, ground checks and pre-flight planning and finally into the air for some flight time.

Mike Wood picked up the skills he needed to successfully launch his Olympic II off the winch, starting with a consistent and rythmic "tap-tap-tap" on the pedal for appropriate line tension. By the end of the day Mike was launching his Oly II like a pro.

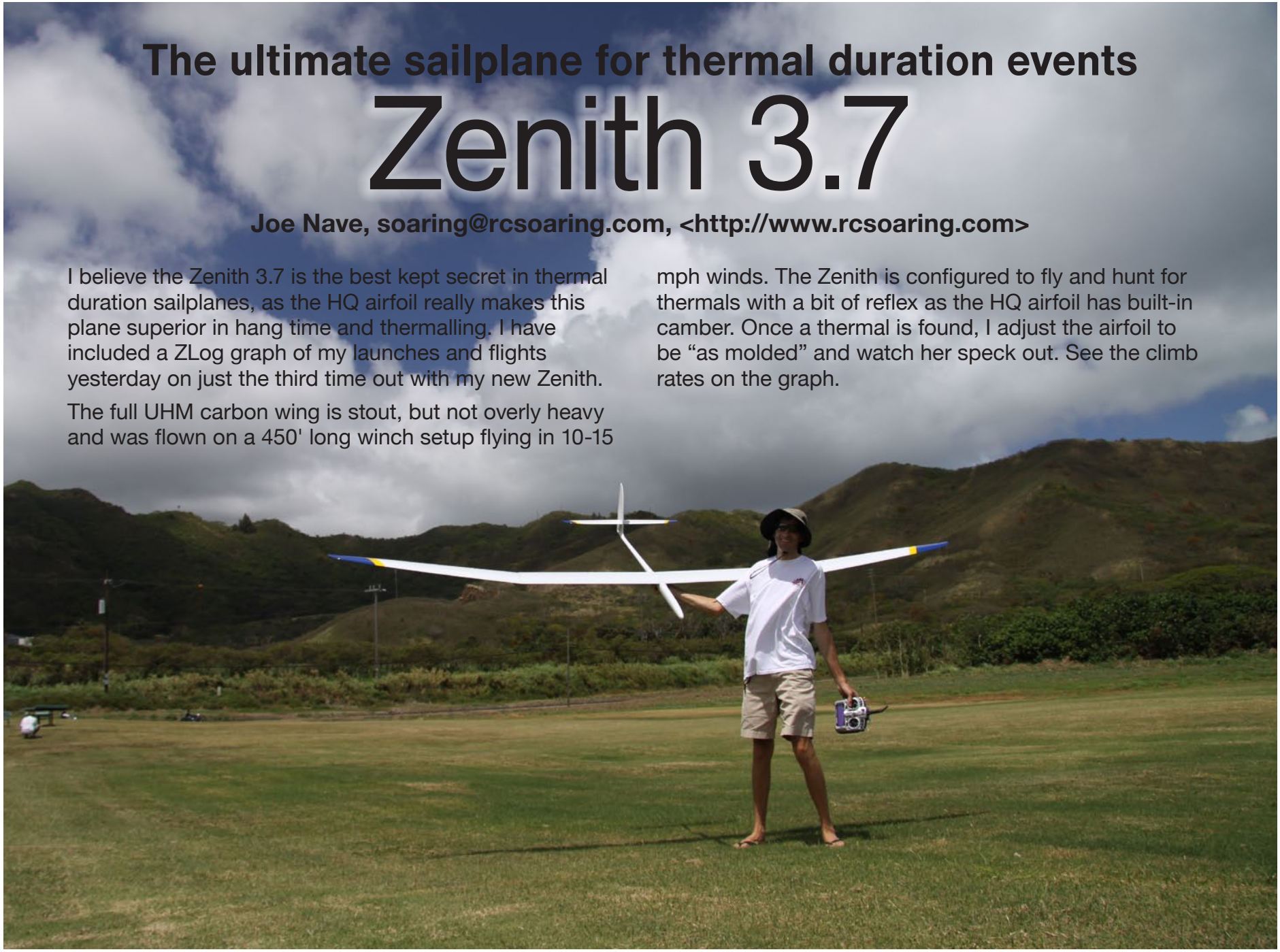
The ultimate sailplane for thermal duration events

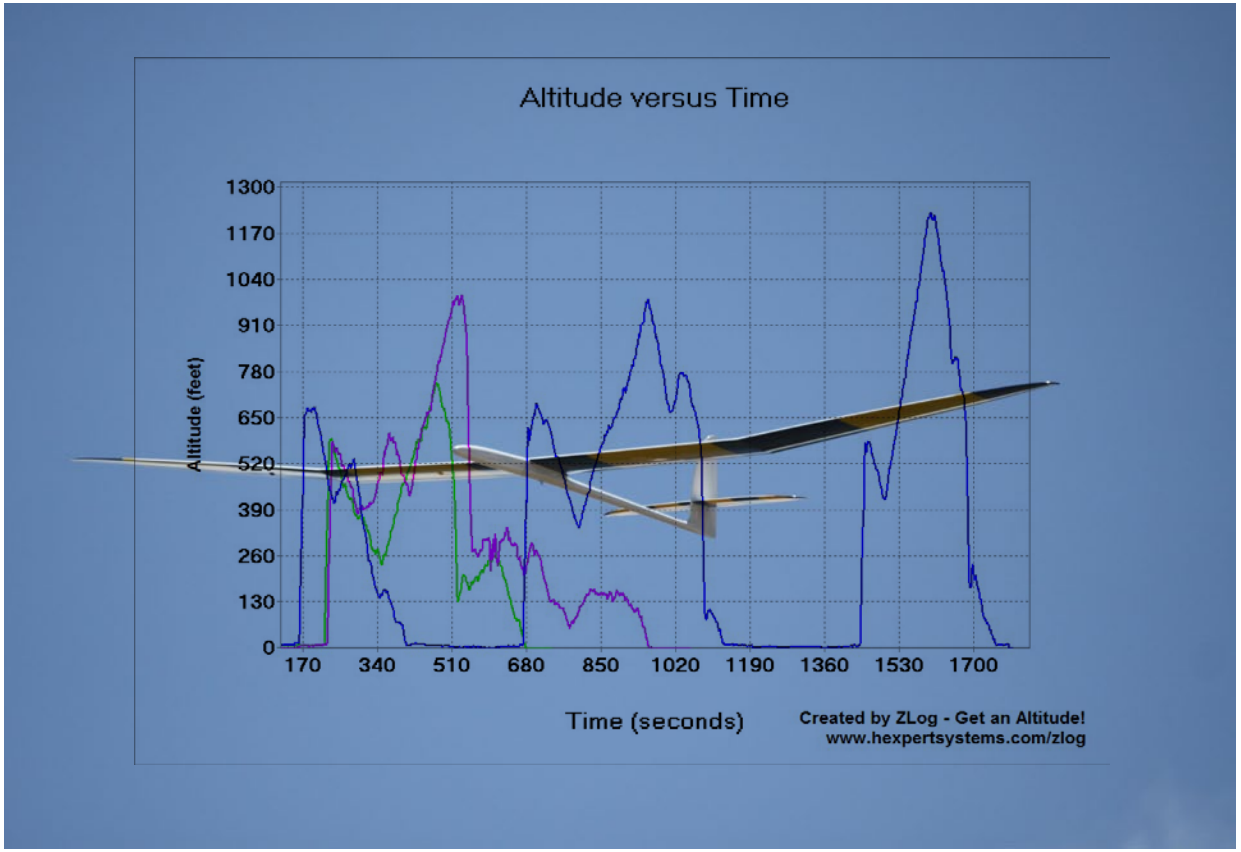
Zenith 3.7

Joe Nave, soaring@rcsoaring.com, <http://www.rcsoaring.com>

I believe the Zenith 3.7 is the best kept secret in thermal duration sailplanes, as the HQ airfoil really makes this plane superior in hang time and thermalling. I have included a ZLog graph of my launches and flights yesterday on just the third time out with my new Zenith.

The full UHM carbon wing is stout, but not overly heavy and was flown on a 450' long winch setup flying in 10-15 mph winds. The Zenith is configured to fly and hunt for thermals with a bit of reflex as the HQ airfoil has built-in camber. Once a thermal is found, I adjust the airfoil to be “as molded” and watch her speck out. See the climb rates on the graph.





The Zenith 3.7 (or also known as the Zenith XXL and Corado in Europe) is the latest version in the evolution of the Zenith model line which began in the early 1990s. Since then, many improvements have been made to make the Zenith 3.7 airframe lighter, stiffer and stronger.

The Zenith 3.7 features a UHM (Ultra High Modulus) carbon wing suited for competition thermal duration flying and strong enough for F3J competition.

With an increased aspect ratio over its predecessors, the Zenith has an increased hang time during dead air conditions.

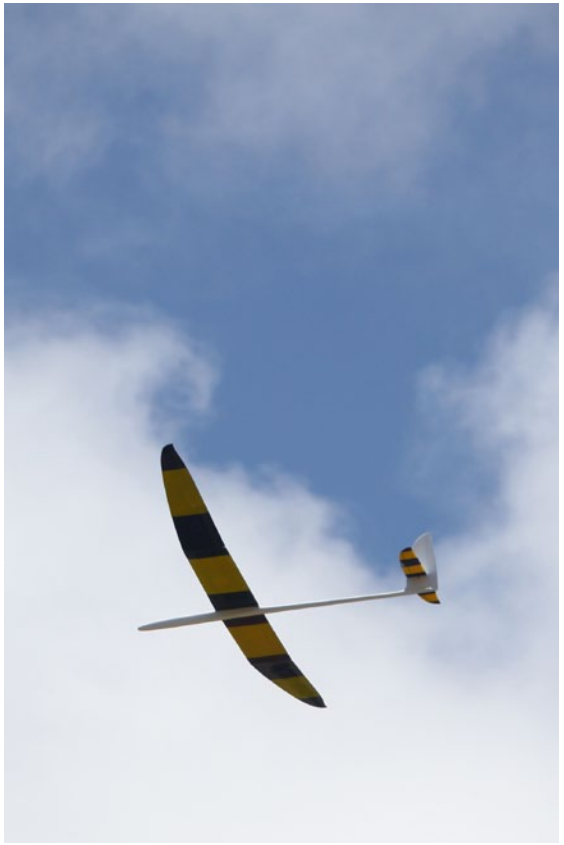
Due to its low weight and cambered airfoil, landings are slow, allowing extra time for the perfect approach.

Each Zenith 3.7 is custom-built in the Czech Republic and given detailed attention during layup and construction to ensure the highest quality.

The Zenith 3.7 is 2.4 GHz friendly, as the nose does not contain any carbon..

Additionally, the Zenith 3.7 features built-in rudder/elevator pushrods, flap/aileron brass control horns and a ballast tube. Each hardware package includes solid carbon joiners, servo covers, fairings and flying stab carbon rods.

RC Soaring LLC is now the proud distributor of the Zenith 3.7 for the USA, Canada and Australia.



SPECIFICATIONS

Wing		Fuselage	
Span	147 in.	Length	64.5 in.
Area	1,116 sq. in.	Height (at fin)	13.5 in.
Aspect Ratio	19.43		
Airfoil	HQW 8.5/3 mod., HQW 8.3/2.7 mod., HQW 8.1/2.4 mod.	Ballast Tube ID	15 mm
		Ballast Tube Max. Slug Length	47 mm
Empty Weight	54-55 oz.		
Flying Weight	72-77 oz. *		
Wing Loading	9.3 - 10.0 oz./sq. ft. *	* may vary due to RC equipment selection	

Flying the **Aero Sport 5** 2.4 GHz Radio

By Pete Carr WW3O, wb3bqo@yahoo.com

Many years ago H. Warren Plohr of Ohio had done some experiments with 800 MHz R/C radios with an eye to finding an interference-free band for model flying. This was in conjunction with the AMA and was the subject of a very interesting article in *Model Aviation* magazine.

I'd flown with Warren out at the Canfield Fairgrounds near Youngstown when the Tri-State Soaring Society held contests there. At the time there were so many problems with multi-path reception and fading at the R/C receiver that reliable control was not possible.

The key to reliable operation on these frequencies was the use of diversity antennas. If two or more antennas are used with a receiver the chances are that one of them will have a clear signal all the time. Some R/C radio manufacturers go one step further by using several receivers, each with two antennas to ensure a solid signal/data path. References to this receiving technique are listed at the end of the article.

Hobby People has been advertising the Aero Sport 5 radio for a while for a very reasonable $59.99 so I bought one.

The radio comes with only a transmitter, receiver, switch assembly and instruction booklet.

Trim range of the four main channels is fixed.

It has mixing for V-tail and delta wings but doesn't do any other mixing. The booklet suggests adding a "Y" harness to couple aileron to rudder for aileron equipped planes if you want to control both channels via the right stick. There are several PIC chip based mixing circuits available from other vendors that could mix channels in the aircraft. This might be a good choice for mixing "up" elevator with deployed spoilers. The Ace Christy Mixer is an early example of this. The manual for the circuit is available on the web from several sites if you do a web search.

I had not used "bind 'n fly" radios before so I carefully read the booklet.

The transmitter uses only 4 AA type dry cells. Current draw was listed at 180 ma so if you divide the current by the AA cell capacity you get a rough number of minutes of operation. The transmitter has a low voltage alarm. The problem with that is that if you go to rechargeable NiCad or NiMH (1.2 volt) cells the alarm may not trigger at the right spot on the discharge curve. This is covered in the booklet.

The aircraft already had a 250 ma NiCad pack installed so I just charged that up. Once the system had power I followed the instructions to "BNF" (bind 'n fly) and the receiver recognized the transmitter signal without a problem.

All the controls are located on the front of the transmitter. Mixing and servo reversing switches are at the bottom while the Bind button and channel five toggle switch are at the upper right.

Left: The rear battery cover is removed from the transmitter and four AA size dry cells are installed. The low battery count makes the transmitter very light and easy to hold.

Below: The Skeeter uses piano wire pushrods so I was concerned about their effect on reception. No problems were encountered with this method of installation.

Next, I removed the channel 04 receiver, an old FMA unit, from the aircraft and dropped the new one in. The servo connectors plugged right in and the front panel servo reversing function on the transmitter got the two surfaces going in the right direction.

I had decided to test fly the radio in a very experienced DynaFlight Skeeter sailplane. Some of you may turn your noses up at this ship, but it has served me very well over a long time. It winch launches, slope flies and does acceptable hand launches. Its flight characteristics are easy and it responds well to lift. It's very far down the list of high performance planes but fits this application perfectly.

The booklet spent considerable ink on positioning the two antennas. These are coaxial antennas where a length of coax cable is stripped to the center conductor to expose a resonant length of wire. These are connected to a voting circuit that selects the best incoming signal and processes it.

The key element is to position the stripped section of the two coax antennas at 90 degrees to each other. The idea is that the receiver will pick up a clear signal no matter what angle the transmitter has in relation to the aircraft.

There was also considerable discussion about positioning the two antennas away from metal and carbon materials inside the ship. At this frequency the wavelength is

short enough to reflect signals or absorb them easily.

Further information about coaxial antennas is referenced at the end of the article..

There is also a procedure where range checks can be accomplished by running the transmitter at reduced output. Since you can't shorten the antenna as with the older telescoping units, this should give 50 or so paces of solid control from the ship for range testing. The transmitter reverts to full power after a specific time period or when the transmitter is cycled off and on.

On 50/72 MHz radios, at maximum sight range, a thermal circle will show if there is signal drop out. This usually happens when the ship is going directly toward or directly away from the transmitter.

I've also had glitches when the ship is far away and quite close to the ground as when stretching the glide to get home. In all of these cases I could not make the 2.4 GHz Aero Sport radio fail.

Since the transmitter only uses the four dry cells its weight is very light.

The sticks are quite good for an inexpensive unit and the antenna is the same as used on the more expensive radios.

The antenna is really the only complaint I had with the radio. I'm used to flying transmitters with a piece of ribbon tied to the antenna tip as a wind sock. Some of the antennas I use could easily double as

On a beautiful Spring day in Pennsylvania I decided to slope fly the Skeeter. Winds were SW at 14 MPH and remarkably steady. Without any ballast added the ship easily pushed out over the valley to chase lift and fly with the local birds.

The slope site is a reclaimed coal strip mine. While there are Pine trees just behind the launch area, landings are generally not a problem even without spoilers or flaps. Thermals generated by the tree line in the valley are an added attraction.

Because of the small fuselage width the receiver is mounted under the wing. I punched small holes in the sides and routed the two antenna through them. One antenna is taped to the side while the other is taped to the bottom of the wing at a 90 degree angle.

fishing poles, especially those for 6-meters. Now, the Aero Sport has this stubby little thing that makes it impossible to fly a ribbon. How the heck am I supposed to hit the landing spot without a wind sock?

The flip side of the antenna issue is when flying at the slope. In winds of 20 MPH and higher the long antennas with their frequency tag and ribbon do make it a chore to hold the transmitter. The tag oscillates in the wind and shakes the antenna so it can be a distraction when flying for long periods. The Aero Sport is much easier to fly in these conditions.

The receiver of the radio is an Airtronics RX500 using FHSS-1 technology. While these are available as separate items their cost is nearly the same as the whole Aero Sport system.

It may be that, as time goes along, that these receivers will come down in price making it more economical to fly more than one ship with the same transmitter.

In my opinion, the radio is very well suited for 2 and 3 channel woodies and can be used with aileron ships, too. Obviously, flying wings and V-tail ships would also be a good match.

I feel that it was money well spent for the great fun of flying the old Skeeter with the latest technology.

Resources:

Hobby People web site for the Aero Sport radio <http://www.globalhobby.com>

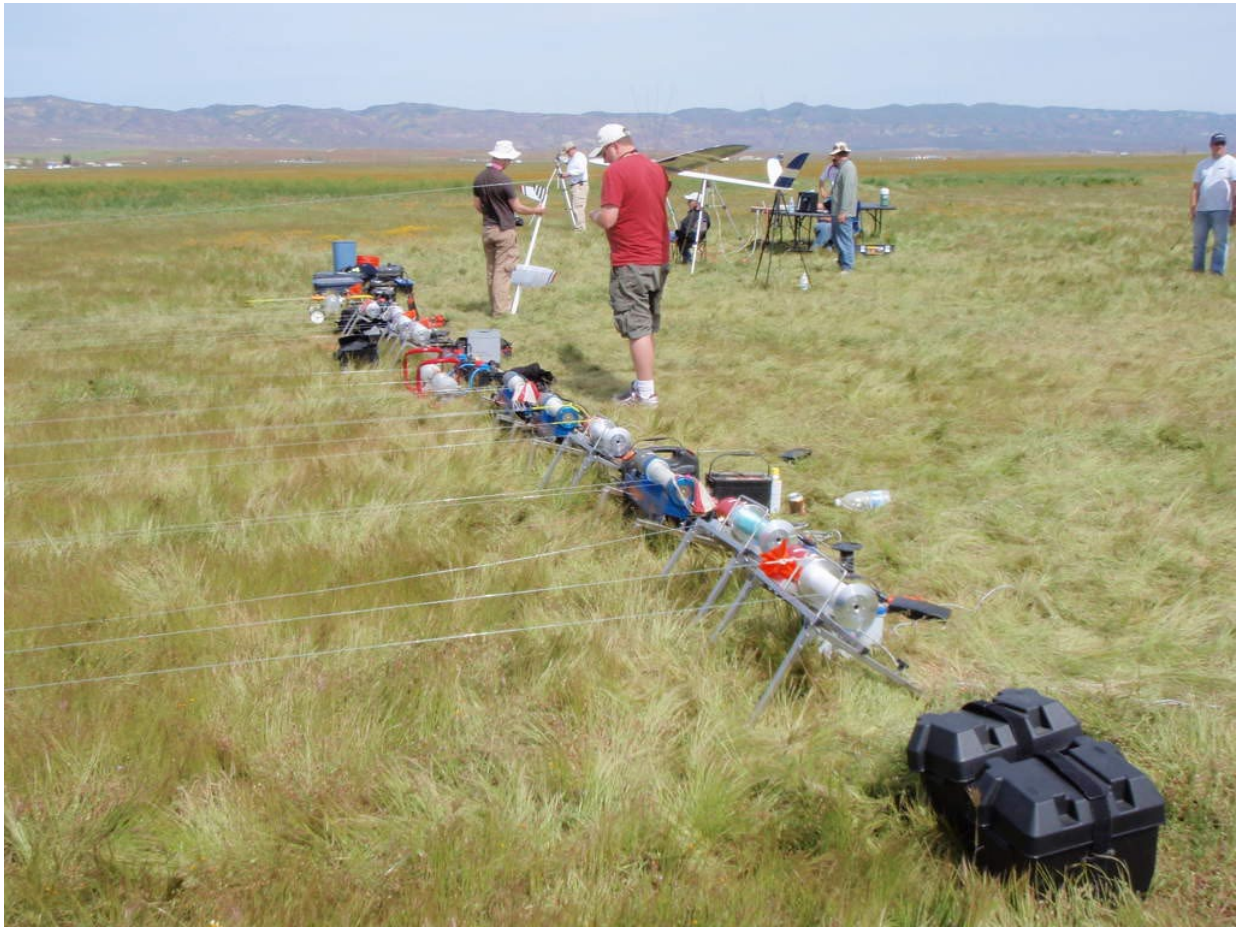
Search the following sites for Diversity Antennas:
<http://www.wikipedia.org>
<http://www.cisco.com>
<http://www.ansoft.com>

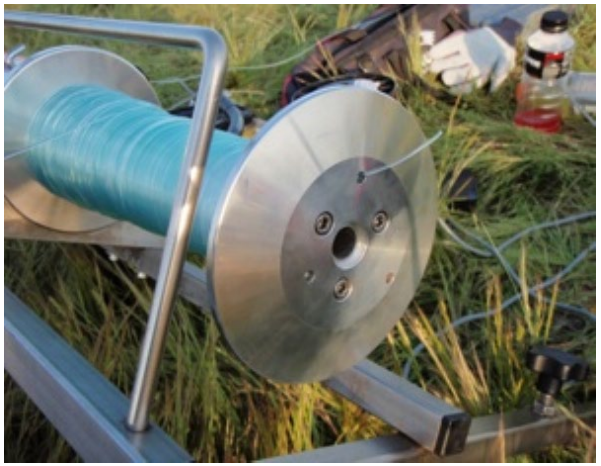
Search the following sites for Coaxial Antennas:
<searchmobilecomputing.techtarget.com>
<http://www.benelec.com.au/pdf/NK_Cable_Coaxial_Antennas.pdf>

CALL VALLLEY F3B

Glauco Lago, glago@alberici.com

Back from the soaring camp in California and man did I have a good time. Three days of nonstop action among all the best F3B pilots this country has and learning with them was priceless.





Above: Winches set up and ready to go.

Left: Typical F3B winch drum - wide and with a small diameter so the motor torque pulls consistently as the line reels in. Monofilament line stretches and F3B launches can be quite spectacular.

I really stretched my comfort level by taking the planes with me by plane to a strange place with mostly unknown people to fly an event where I'm a complete newbie. But you set your standards low and celebrate each milestone like not paying excess baggage for taking a heavy and long sportube, going thru security with a transmitter, a bunch of cables and two v-tails without being stopped, getting TSA to inspect your planes without breaking them, getting to your destination with all your belongings and being able to actually fly your plane since you didn't forget all the screws, modules, chargers, joiners and ballast.

Must say I was completely surprised on the drive to Cal Valley. From Los Angeles, it is a 2:30 drive to Cal Valley through I-405, I-5 and then a bit of 58 along some other minor road but the view at least now on Spring is awesome. Don't know if it is because I got used to flatland America but all those green hills and valleys were really a neat change. Also Hwy 58 is a fun twisted road for a 25 mile stretch if you like to drive, no way to reach the 55 speed limit, just both hands at the steering well for the lefts and rights.

Cal Valley is in the middle of nowhere, literally, no town, gas station or anything else on a 40 mile radius other than the famous Cal Valley Motel and all its 13 rooms built in the '60s and kept as built.

But all those yellow flowers mixed with green pasture surrounded by distant mountains make one perfect post card and better than that, we will be going to fly there.

This place was found out by the cross country guys since you can easily fly 50 mile courses without any problems but it works well for small gatherings of any type of RC soaring.

I arrived at 10 AM on Friday and almost everyone was at the field for practice day. A bunch of winches setup, I believe 15 of them, and everyone flying which only ended by 7 PM. The weather was fantastic, no clouds, warm weather and not too much wind. I did a few trim flights with both Tools and a few speed runs with some ballast. I only knew a couple of guys but felt at home right away, everyone was extremely friendly, even got a hug right when I came off the car since I was wearing a 12X hat and Alan aka Terminator said he loved JR too. :)

Kyle launching a 'styler.

Saturday the contest started. We had 16 pilots including a bunch of US team members like Mike Smith, Tom Kiesling, Mike Lachowski from the last team plus Aaron Valdes from the previous, Steve Condon has also been in the team along a bunch of other really good guys like Kyle Paulson that will be one of the next US team members. The pilots were divided into two groups, the A guys or the ones that knew what they were doing and the B guys which included myself plus 5 others that were newbies or had not flown much F3B recently.

The pilot I knew the most was Mike Lachowski from previous Nats and also for buying his red Tool so due to my request he ended up stuck with me for the whole contest. Mike won the unlimited Nats in 2008 and has placed in the top 10 for the last six or seven years. He has plenty of F3B experience and while I almost gave him a heart attack with my flying he was nice to point out my main problems and give me good advice.

Most F3B contests start with the duration task which is basically a TD flight with

Mr. 13 seconds Reto Fiolka

10 minutes task and a precision landing sans skeg but with a generous tape. The idea is that early in the morning is much harder to make your 10 minutes with your favorite lead sled aka B plane. Well, for my flight Mike asked the assistance of the other pilot I knew and previous owner of my blue Tool Tom Kiesling. So I had Tom and Mike, both previous Nats winners, by my side commenting the Tool isn't a fast plane but thermals really well. Well, in their opinion because my opinion is that plane doesn't go up after launch. So I started with a bunch of pressure to at least not to screw big time. Launch was fine but then with their skills it was easy to feel comfortable right away and it indeed worked with a 10:00 flight and a 100 landing.

Couldn't start any better but then came the problem, a distance round. If you don't know, you have to go as many times as possible between two bases called base A and base B, 150 meters apart from each other, in four minutes. Every time you pass base B a helper pushes a button and you hear the signal, base A is in front of you but there is also a helper that pushes a button. This is a man on man task since you fly with another two or three pilots and the one with more laps (how many times you went from A to B and from B to A) get the 1000 points. Use of ballast at this task is a fine science but since Mike had experience with the Tool and with the current air he just told me how much to use. So to start I forgot to turn at base B and cut base A three times for a whopping of eight laps against 11 and 13 from my competitors. Now I learned that while most of the new guys that don't have much launching or thermalling experience know all about those 180° turns due to their slope skills. And man they are important, it is a fine art to keep your momentum without losing altitude.

Then came a round of speed which consists of four laps on the 150 meter course as fast as possible. This is also fun and there is a great chance of breaking your plane since the last two laps are very close to the ground. Depending on wind conditions you also ballast your plane a lot and Mike suggested I ballasted the Tool to the max meaning the plane would have to launch and fly at 125 oz. As mentioned before, these F3B planes have 110 to 115" of wingspan, so not much wing area along with small V tails and you have the recipe for disaster. But believe me or not, the thing launches with a strong throw and it can fly. My first speed run of the contest was actually my personal best at 19.47 seconds which I'm very proud of it. This event is scored man on man too and the best time was Mike Smith with 14.57. There are so many details to think about and it only lasts 20 seconds, it is an adrenalin rush for sure. Mike Lachowski noticed I was flying the transmitter and that is one of the points to improve, can't be precise on the sticks if I keep moving the transmitter.

So we kept flying alternating the B guys with the A guys on the tasks. On one of my speed runs I came really close to hitting the ground at the last turn, had to use full elevator, close call. By the way, the weeds, grass and flowers were about 1.5 ft tall

which made a nice way to stop the 120 oz planes after a speed run. I remember at the Nats two years ago the problems making the planes to stop sliding on short wet grass so the weeds were your friend at this contest.

I believe we stopped flying by 6 PM so the Condon brothers could start their cook out. They are professionals in the art of cooking and hard to believe I had a gigantic juicy steak on a pre-warmed porcelain plate in the middle of nowhere. This combined with all sorts of sailplane conversations up to 11 PM along with pizzas and oysters made up for a perfect end of the day.

By 8 AM (call hardcore group) we were at the field rearranging the winches. Since we were on a valley the forecast wasn't always correct and the wind blew from all directions making launches and reading air very interesting. One characteristic of F3B launches is that every pilot performs the zoom into the wind even if we are launching downwind. May not make sense how this happens but right after the throw the pilot steers the plane so the fuselage on tow is parallel to the ground and stays there until upwind, this can be a 180° complete rotation and the climb and zoom is made towards you. It is a very neat and unique sight.

Distance runs are very tactical since you try to find lift while going from A to B. This sometimes means at every turn you are flying away from you and getting closer to the ground so the result is a landing far far away from where you are since usually there are no field boundaries. I had one of those and took about 10 minutes to walk to the plane and bring it back. On the other hand at my last distance run I was about to land, this time nearby, when out of nowhere a fence post jumped and grabbed the wing. Hard to believe that was the only ground based object on a mile radius and I managed to hit it. It made a nice 6" square dent on the blue Tool up to the spar, an easy repair but had to switch to the red Tool for the speed task and end of the contest.

So Kyle Paulson won, Tom Kiesling was second and Steve Condon third. Steve's brother Scott finished first on the B group and I was third just because the other three behind me didn't finish the contest.

The plane to have is called Freestyler 3 designed and flown by the Herrig brothers, current world champions.

It was fun, so much I can only think about flying more F3B. There will be an unofficial B contest at the Nats this year during the 2M event. We are trying to see how many people will come and how many we can find to help. If you are at the Nats and are not flying 2 meter please let me know so you can push some buttons for us.

I had the Tools to do well but not the skills, have to buy some skills too.

Wave Flight

Old Carnation Farm, April 19, 2010

Seth Arlow, arlow2@msn.com

About 2:30 in the afternoon, grey skies, and wind coming directly out of the west at a steady 15 m.p.h., blowing hard enough that the only way to carry the plane, a Shadow V-tail, is nose forward. I'm out with Sherman Knight, and we're using a standard high-start to launch.

After a two minute first flight, and walking back a hundred feet to pick up the plane, I launch again, the wind blowing harder now.

With launch flaps set, the plane goes up like a kite, almost directly above me, slowly moving forward as it gains altitude.

Off the line, I fly straight ahead into the wind, and as I approach the road, I'm gaining altitude and put in some camber.

Two minutes later, still not having made a turn, the Shadow is approaching 1000',

which I've learned is the altitude where I can no longer make out the broad stripes, blue and green, on the bottom of the wings.

I make some slow diagonals, north and south, parallel to the hill ridgeline a mile or so upwind.

Sherman takes the sticks now, and does some rudder-only turns to check the setup, makes some adjustments (including eight clicks of down-elevator), and finishes off with a few loops — and the plane is still gaining altitude.

I continue flying upwind, moderate camber, some turns and figure eights, and now I'm definitely in the "speck" territory — the Shadow is a small "plus sign" against the clouds, and now it's getting to the point where I can't be sure of its direction.

Slowly I add full landing flaps and start some big circles.

Sherman launches his Explorer, flies around for a while and lands, and now, flaps still at 90 degrees, I can start to make out the bottom wing stripes.

Flaps up, a few more turns, and it's going up again.

The transmitter is down to 9.6 volts, and I wonder how much juice is left in the plane, so it's time to land.

44 minutes since launch — a great day.

Soon to be available from Kennedy Composites

Dave Friant had this battery pack installed in an Elf 1m span mini-DLG. It's a single cell LiPo pack rated at 240mAh, as can be seen on the label, but it has some additional features which make it extremely attractive.

- The two prongs sticking out of the pack are actually the on/off switch. A shorting plug turns the battery power off. The battery is turned on in the photo.
- This battery pack has a built-in voltage regulator which takes the 3.6V battery output and pumps it up to 5.0V,/1.0A, appropriate for most small receivers.
- A charging circuit is built into the battery pack and charging requires only a DC source of between 4.8V and 18V and takes about a half hour.
- The orange wires coming from the front of the pack are connected to a small speaker which provides audible feedback by announcing the remaining capacity when the pack is turned on.
- The SmartLiPo 240mAh is $45 from http://www.kennedycomposites.com

Project CHEROKEE II N373Y

Tony Condon, abcondon@gmail.com

In 1964 Stan Hall wrote an article in Soaring titled “Project Cherokee – Final Report.” Forty five years later I’m proud to continue Stan’s work with my own Project Cherokee report. It really started in 2005 when I bought my Cherokee II, N373Y. Dave Schuur had done a good job getting it airworthy again but his new paint job really didn’t get along very well in many places with the old paint. After a few years the old paint was starting to crack underneath the new finish too, which didn’t look that great. It didn’t help that I kept landing the glider in dirt fields, pastures, roads, and pretty much anywhere but a nice airport, which was hard on the finish. After a few years of this sort of abuse I realized that the glider was going to need to be recovered sometime soon.

I was in my junior year at Iowa State at the time when I realized this, and money was tight. So it had to wait. More landouts, more paint chipped off the side of the fuselage but my mechanic would still sign it off. He noted in the last Condition Inspection that the fabric was in good shape but the paint job was poor. That was last spring and I was moving to Wichita, Kansas. Finally I was making some real money and could afford to do the work! One last season of cross country flying in a new state with some good flights logged and then the Cherokee went under the knife. Not before the great vintage rally at the end of September though, and not before we bought Leah her own Cherokee for her wedding gift.

Around the middle of November we started. Taking all the old fabric off was the first order of business. First I decided to open up the rudder. It had to be removed anyway as my rented garage was not long enough to fit the fuselage with it attached. Plus I could work on the rudder in the comfort of my living room! I figured it would be a good way to test my skills on the Stewart System recovery process by making mistakes on a small piece before messing up on the fuselage and then wings. The wood on the rudder looked great and I was hopeful that the wood in the fuselage was just as good.

I cleaned up the rudder and had new fabric on it in pretty short order. I found the process easy to work with. Up until this point I had only done fabric patches using Poly Fiber or Randolph products. However I had no problems using the Stewart cleaner and glue.

Now was the time to tear into the fuselage. The first cut was hard to make but the fabric started to come off very easy and within a few minutes my glider had turned into a wooden skeleton that only many months of hard work would fix. My wife Leah was a great helper although a bit timid to tear fabric at first.

One major benefit of moving to Wichita is that I am now in the company of some real experts in wood glider restoration. So with the frame exposed I had Neal

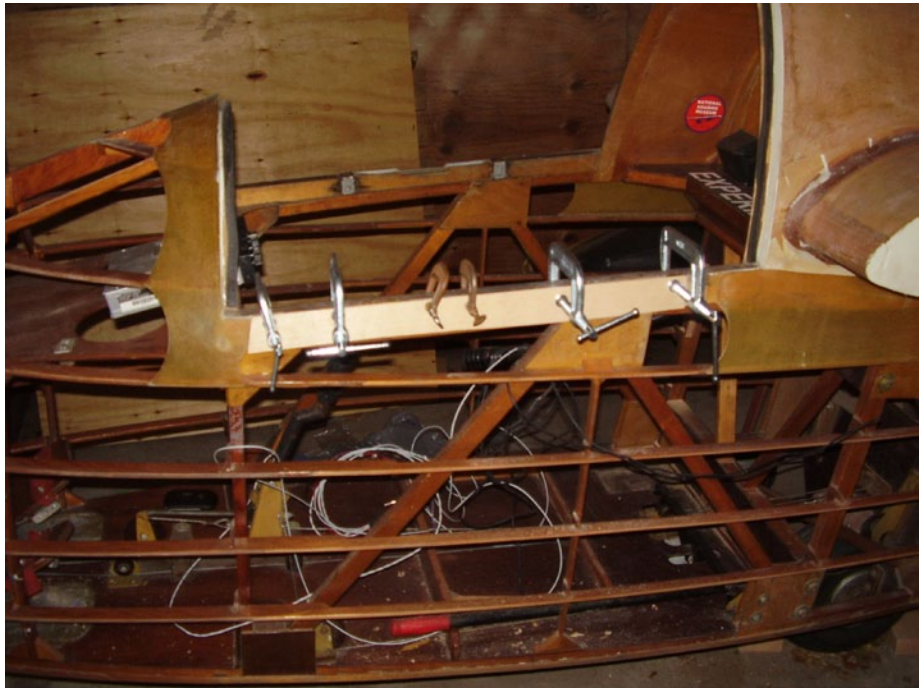
Here is the rudder with fresh paint on the rudder hinges. Looking good!

Pfeiffer and Harry Clayton come over to take a look at the frame and give me their opinion. There were a couple areas that were questionable as far as water damage but after a little more inspection it was determined that they were OK. Whew! I did identify a few pieces of wood that looked damaged and needed replaced. One was a piece of plywood in the tail that held the lower longeron in place. It appeared to be cracked; I suspected this was from the bottom

of the fuselage dragging occasionally when loading it on and off the trailer. The biggest area of broken wood was entirely my own fault. When I had removed the rudder I had forgotten about the massive return springs on the rudder pedals. Taking all of the tension out of the control system caused the right rudder pedal to snap forward into a frame and bust it up pretty bad. Lastly I had some water damage in a trim piece right under the canopy. An order of ½" spruce stock and mahogany/birch plywood from Aircraft Spruce and a little time at Harry's shop and the new pieces were ready. Late in January Wichita had a couple days with temps over 50 so I took advantage and epoxied the new wood in place. Harry gave me a sheet of 3-ply birch plywood to replace the 1/8" trim piece that had water damage. Leah did a nice job of cutting it to shape and we epoxied it in place as well.

After attending the SSA Convention and spending plenty more time oogling over Dean Gradwell's Cherokee (see page 62) and visiting with Dean, I decided to cut out the shelf on 373Y. The main factor driving the decision was that I think this will give me a little more legroom and a slightly more reclined seating position. Comfort is key in flying any glider and I want to keep flying my Cherokee for a long time. The first cut was a hard one but after a few hours of work with the saw, chisel, and sand paper the shelf

The filler piece next to the fuselage.



Well after inspecting Dean Gradwell's glider at the SSA Convention I decided to bite the bullet and cut out the shelf in my Cherokee. Getting to the point where about the only thing that I have left to do on the fuselage is some epoxying and new varnish on areas where there is new wood or we have sanded.

was history. Now I will be able to sit back all the way to the front spar.

I was about to start work on the wings. This was pretty risky in my mind. The main goal of my project was to be prepared to drive the glider to Marfa, TX on April 17. Initially my thought was to do the fuselage first and then if time allowed to do the wings. I was not against flying with a newly recovered fuselage and old wings for this season and recovering the wings next winter.

However, Wichita was in the middle of its coldest winter on record. Now, it really wasn't THAT cold, especially compared to the winters I had grown up with in northwest Iowa. But the temperature did not get above 60 degrees for a solid three months which has never happened here in recorded history. My garage is not heated and I needed warm air to do things like glue fabric and paint. So I was getting to the point where if I wanted to get anything done on the project I needed to start working on the wings.

I also realized that I should have enough time to uncover the wings, make minor repairs, and get them covered again. If major repairs were going to be needed I might run out of time, but if major repairs were needed I was going to be happy that I opened them up anyway and wasn't flying them anymore. So the decision had been made. The wings came to town and I started work on them immediately.

The wood underneath looked like it was in great shape in general. There were, of course, a few spots that raised flags, but that is to be expected of a 40+ year old wood structure that hasn't seen the light of day for 35 years or better. I was pleased to find that no ribs were broken. The trailing edges were really straight, especially when compared to some other vintage wood gliders which have suffered from years of shrinking dope.

There were a few places in the plywood leading edge that needed attention. Before I owned the glider it had spent many years sitting in the trailer in cradles. These of course had held moisture close to the wing and you could see in the leading edges where those cradles had been by discoloration in the wood. After close inspection I found that the damage was not too bad on the left wing. However I had some issues to deal with on the right wing tip.

The nice thing was that I knew this was coming. When Dave Schuur had my glider in his shop in 2003 he had replaced a rotted section of the right wing root and found damage at the right wing tip. Unfortunately the owner at that time didn't have the money to properly fix it and Dave didn't catch it until the paint job was finished. A couple squirts of epoxy into the wood with a syringe firmed up the soft wood as a temporary fix. Dave was always quick to remind me whenever he saw me that I would need to give that wing some attention when I opened it up. Well it didn't take me long to find the bad wood. And as I was poking at it to see how soft it really was, my finger poked through!

I got to work with my new chisel set and cleaned out the rotten wood. I was lucky that this plywood is non structural so I felt comfortable cleaning back to the nearest ribs and just butt jointing the new plywood into place. With the bottom skin removed and cleaned out, it was really obvious from looking at the inside of the wing that the top skin in that area was in bad shape too, so I removed it as well.

It wasn't warm enough to work in the garage every day but I had plenty of inside work to do. I spent two Sundays in a row covering ailerons. We did one a day. It was quite a fun time really. At first it was a fun personal challenge just to see if we could do it. Of course this was just getting the fabric glued in place and shrunk, no filler or paint involved. Also, we uncovered the Elevator and disconnected it from the Horizontal Stabilizer. My Horizontal is covered in fiberglass skin so I didn't have any fabric work to do to that. However I found that in a few places the fiberglass skin had broken free from the rear spar of the Horizontal. So with some West Epoxy, clamps, and stacks of old Soaring magazines I glued the skins back in place.

Rotten wood replaced on the bottom of the right wing.

When I did work in the garage there was not only the repair work to do but plenty of sanding. In fact for a few weeks I felt like Pig Pen from Peanuts as a cloud of sawdust seemed to follow me everywhere I went. But I just kept sanding the wings and eventually all of the old finish and sealer was off of them and they were nice and smooth.

Once I had the damaged wood removed from the right wingtip and everything cleaned up well, I got some 1.5 mm plywood from Neal Pfeiffer and using many bungee cords, clamps, West Epoxy, steam, and luck I managed to get the plywood glued in pretty close to its proper place. This brought me up to the end of February. The clock was ticking.

Of course there was still sanding to do. Plus I had one more repair to do to the Left Wing. The root rib on it was in really

Rotten wood removed from the top surface of the right wing.

And here's how the patch looked once I finished sanding.

sorry shape. Between constant handling during assembly and disassembly along with some water damage it was warped and looked somewhat rotted. So out it came. Neal had once again come through in a pinch and found me some Mahogany plywood that was the right thickness, 1/8" I believe, to replace the old wood. After spending a few nights carefully removing the old wood I cut a piece of the plywood and epoxied it in place.

The only other work left on the wings was to do some filler work on the right wingtip where the skin repairs had been made. Of course my rookie repair job wasn't perfectly smooth so I covered the area in Poly Fiber Superfill epoxy filler. This stuff is great! A very easy to use two part filler and super light weight. Of course the first time I didn't put enough filler so after sanding it to a rough shape I had to add more filler. I think I may have had to add filler again a third time but eventually I got the shape that I wanted and was satisfied with the job.

Lastly both wings were brushed with a coat of the Stewart Systems wood sealant. Now they were truly ready for fabric. Like I had done for the trailer, I decided the best way to cover the wings would be a weekend long workshop with friends. I managed to get the use of Nick Moore's basement to do the work and Jesse Angell agreed to come down from Lincoln to help out. So Nick, Jesse, Leah and I were the team.

We transported the wings to Nick's place at about 12:30 AM on a Saturday. We got started after breakfast that morning. I had covered the ailerons and rudder and it was somewhat intimidating covering the wings. Harry Clayton had some engine stands from Harbor Freight that

I knew the general Stewart's process from doing the control surfaces but had never covered anything nearly as big as a wing before. We started out by cleaning the wings with the heavy duty cleaner, and then painting glue around the perimeter of the wing and along each rib. Then, with the glue somewhat dry, we laid the fabric in place over the wing and used the iron to re-activate the glue and set the position of the fabric. This worked like a dream.

we had adapted as wing stands. It was nice to have my wings on a Rotisserie.

We covered the bottom of the wings first. The days work reinforced my satisfaction with choosing the Stewart System even more. The process is really easy and very forgiving. First step was to brush glue on everything you wanted to glue to. Then let it dry. The glue is heat activated so once the glue was dry we laid a piece of fabric in place and then used the iron to tack it down to the wing. Then we brushed glue through the fabric and let that dry to complete the bond. The great part about this method is you aren't racing the glue. At one point we were hungry so Jesse went out and got some pizzas and we just stopped in the middle of gluing and took a break. Wonderful!

By late in the evening on Saturday night the bottoms of the wings were glued in place and the initial shrink was completed. I would wait until the next morning to do the final shrink so that the glue had a chance to set completely. I did get inspection rings located and glued into place. We called it a night after about 13 hours of non stop work.

Sunday was much a repeat of Saturday. We just covered the top of the wings. With our experience from the day before the process went a lot faster. We were finished by 9 PM

So the weekend was a fantastic success. Both wings completely covered! Nick

We glued three inches either side of the leading edge and along the root and tip and both side of the trailing edge. The fabric laid in place pretty well. We would heat the leading edge in place first and then work the top of the leading edge in place.

With the rest of the fabric blanket free to move there were very few issues with wrinkles. Then we'd attach the trailing edge, root, and tip. Then flip the wing over and do the top of the leading edge and the top of the trailing edge.

even put together a really neat time lapse video of us covering one of the wings and put it on YouTube. Do a search for "Covering Glider Wing" and you should be able to find it. I had a few more things to do to the fuselage before it was ready for fabric so it was back to the garage.

The main thing I needed to do to the fuselage was varnish. I had the new wood pieces in place that needed varnished as well as the scars from cutting the shelf out. Of course there were a few other odds and ends like instrument plumbing, battery mount, and the oxygen bottle that needed my attention.

I used the Stits Epoxy Varnish for the areas in the fuselage that needed it. Worked really well but after getting used to the Stewarts stuff it was a drag dealing with chemicals. I also needed to remount the speaker and microphone for the radio, do some rewiring behind the panel, reconnect the rudder return springs, and attach the Pitot Tube and fresh air vent.

Since I knew I was going to Marfa with the glider an oxygen system was a must. Field elevation there is nearly 5000 feet and if lift is good at all climbs into the mid teens are expected. There is always the hope of wave in the spring which opens the possibility of soaring over 20,000 feet. With this in mind I purchased a nine cubic foot bottle with mask and cannula and attach clamps. I

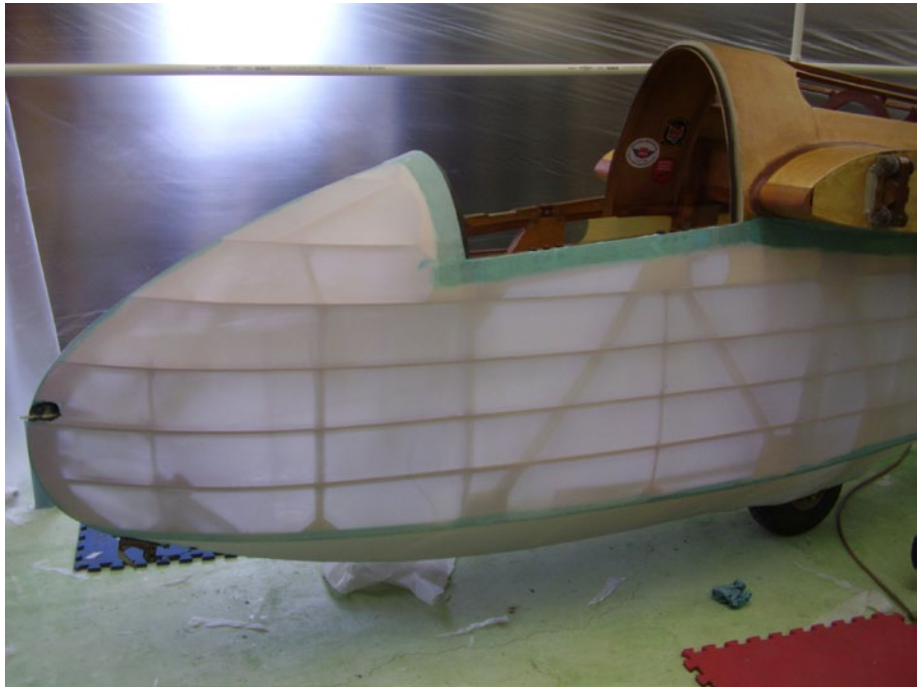
Right side of the fuselage skeleton, ready for covering.

Another shot of the fuselage skeleton; left wing on the right.

just needed something to attach to. With a little shopping at Lowe's I came up with a solution. I ended up bolting the bottle to the floor so it would be right under my left leg. I was careful to avoid the control cables in this area and make sure that it would be under my leg. It turned out to be a perfect location. One of my favorite parts about it is I have direct access to the valve and can monitor the pressure of the bottle. One neighborhood kid stopped by while we were doing some work on the fuselage and upon seeing the oxygen bottle mounted in the cockpit asked "Is that Nitrous???"

With this work completed we put Stewarts Wood Sealant on the fuselage longerons and stringers and anywhere else that we had sanded down way back when. Now the fuselage was ready for fabric. The problem was the temperature was still really marginal and I still hadn't really determined a good solution to a big problem. Where to paint?

Well once again, Neal Pfeiffer came through big time. If it wasn't for him I never would've finished this project. He had just finished painting the wings for his Ka2b and had a plastic tarp paint booth set up in his shop at the Gliderport. He told me to bring the Cherokee out and use the paint booth to get it finished. Wow what a relief! Not only that but it was great motivation to try to get the project finished to minimize the impact that it would have on Neal's own projects. We move the glider out there on March 25th and Leah and I decided to make a big push that upcoming weekend to get the glider covered and start the priming and painting process.



Covering applied to the left side of the nose.

And a close-up shot of the turtle deck. I liked this one.

Covering the fuselage started off pretty rough. It was covered using the same methods as the wings and done with two pieces of fabric, a left and right half. We got started fairly late on Friday due to other obligations and it wasn't going well. Finally at about 2 AM I threw in the Iron and went home. Thankfully the next morning I was getting along with the fabric a lot better and the left side of the fuselage was finished shortly after that.

Nick Moore had been helping out a bunch and he kept it up as we covered the fuselage. The right side went on really easily and I got to work on doing tapes and detail work. Leah started brushing cross coats of EkoFill on the control surfaces. EkoFill is a Stewart Systems product that fills the weave of the fabric and provides UV protection. It is a Charcoal color. The first two coats are brushed on with foam brushes. Nick did a great job covering the wing roots on the fuselage and by the end of Saturday the fuselage was entirely covered.

The next several days are still sort of in a fog. We were regularly working until past midnight every night of the week. So I'm just going to tell you what we did, generally in the order that it happened.

Leah and I started brushing EkoFill onto the wings. This went pretty fast really and before long my wings were gray. Then Leah, Nick, and I all brushed the fuselage until it was gray too. About the only thing that wasn't gray was the elevator. That was because we hadn't covered it yet! One night Leah and I covered it and the next day it was gray too.

Now it was time to spray. It was April 1st. 16 days to go. I hadn't sprayed paint since I was in high school so I had a

bit of a learning curve. It didn't go too bad though. I sprayed a few more cross coats of EkoFill on the glider first, to help completely fill the weave. I decided to spray white EkoFill, which does not have the UV blocking characteristics. I mainly did this because I was going to be painting the glider with a light topcoat and didn't want the gray base layer to darken it. The spraying went fairly well with only a few runs. I was pretty paranoid about putting it on too thick, almost too paranoid actually. I had to be careful not to put it on too thin! It didn't help that at one point I ran out of White EkoFill. I still had half of one wing left to spray and didn't know what I was going to do. Once again, Neal saved me by finding a gallon of White EkoFill that he had hiding around the house.

So now it was time to paint the topcoat. I had ordered Daytona White. I carefully followed the instructions for mixing the catalyzed paint and after reading the manual about 100 times to get the right spraying procedure down pat I went for it. With the Stewart Systems paint you spray two cross coats, or four coats of paint. Each has a little more paint than the last. The first two coats are pretty tough to see but the 3rd and 4th coats really fill in the gaps and bring out the shine. At least that is how it is supposed to work. And for the most part for me, that is how it worked. However, I ended up with a fairly thin paint job in the end. Everything is covered but it certainly isn't museum quality. One thing was I was hyper paranoid about runs and in general about spraying too much paint. There were a few warnings in the book about that which I probably took a little too much to heart. Plus, I was spraying off white paint onto a white surface and I was having some trouble just telling where I had sprayed at all on the first two coats.

Covered, painted and ready to fly!

All of this aside I ended up very happy with my paint job. We spent about three nights in the shop getting it finished. The base coat was done on April 7th. This just happened to by my 25th birthday and it also was the 88th birthday of William Ree, the original builder of the glider. The next day I painted the N numbers and trim. I decided to copy a scheme that Dave Schuur used on his Cherokee II, which is now Leah's. My glider got a chord wise stripe on the top

and bottom of each wing and a horizontal stripe on the vertical stabilizer and rudder. I decided on Pontiac Red for the stripe to have a nice contrast with the Daytona White. It turned out looking really nice.

The Condition Inspection was scheduled for April 12th and we were ready. After the paint was finished we only had a little work to do in the cockpit. Mainly things like bolting in the seatbelts, running wires, and hooking up the Pitot line. The Condition Inspection went off without a hitch and 373Y was legal to fly!

I had been working like mad in the background getting ready for the trip and didn't end up having time to fly the glider until we arrived in Marfa. I can report that it flew beautifully. The recover job resulted in at least a 20 lb weight loss and I could really feel the lighter weight in flight. I ended up with 13 hours in four days of flying in Marfa, including a six hour flight which was a duration record for me and for the glider. I also flew it to 12,200 feet, the highest it has ever been. And not only that but it looked great!

This project never would've been completed without a lot of peoples help and I can't thank many of them enough, but special thanks is owed to Leah Condon, Neal Pfeiffer, Harry Clayton, and Nick Moore.

Upon returning to Wichita I flew the glider on a 193 mile distance flight from Sunflower Gliderport to Falls City, Nebraska. This is the furthest distance ever flown by me or the glider and qualifies for Gold Distance. But that is another story…

You can follow my adventures with N373Y on my blog <http://cherokeesailplanes.blogspot.com>.

Tony and N373Y in Falls City, Nebraska. Photos taken shortly after flying 193 miles from Sunflower Gliderport, a record for Tony and the glider, and good for the Gold Distance.

The photo of the cockpit of Dean Gradwell's Cherokee II N72DG. After spending plenty of time oogling over this sailplane and visiting with Dean, Tony decided to cut out the shelf on N373Y. Notice the data plates and the wood finish.

A picture of my Wihok 60 flying over sand dunes. Photographed near la Palmyre, southwest France: 45°43’45’’ N, 1°14’19’’ W.

— Gregory Pinaud