



August, 1998

Vol. 15, No. 8

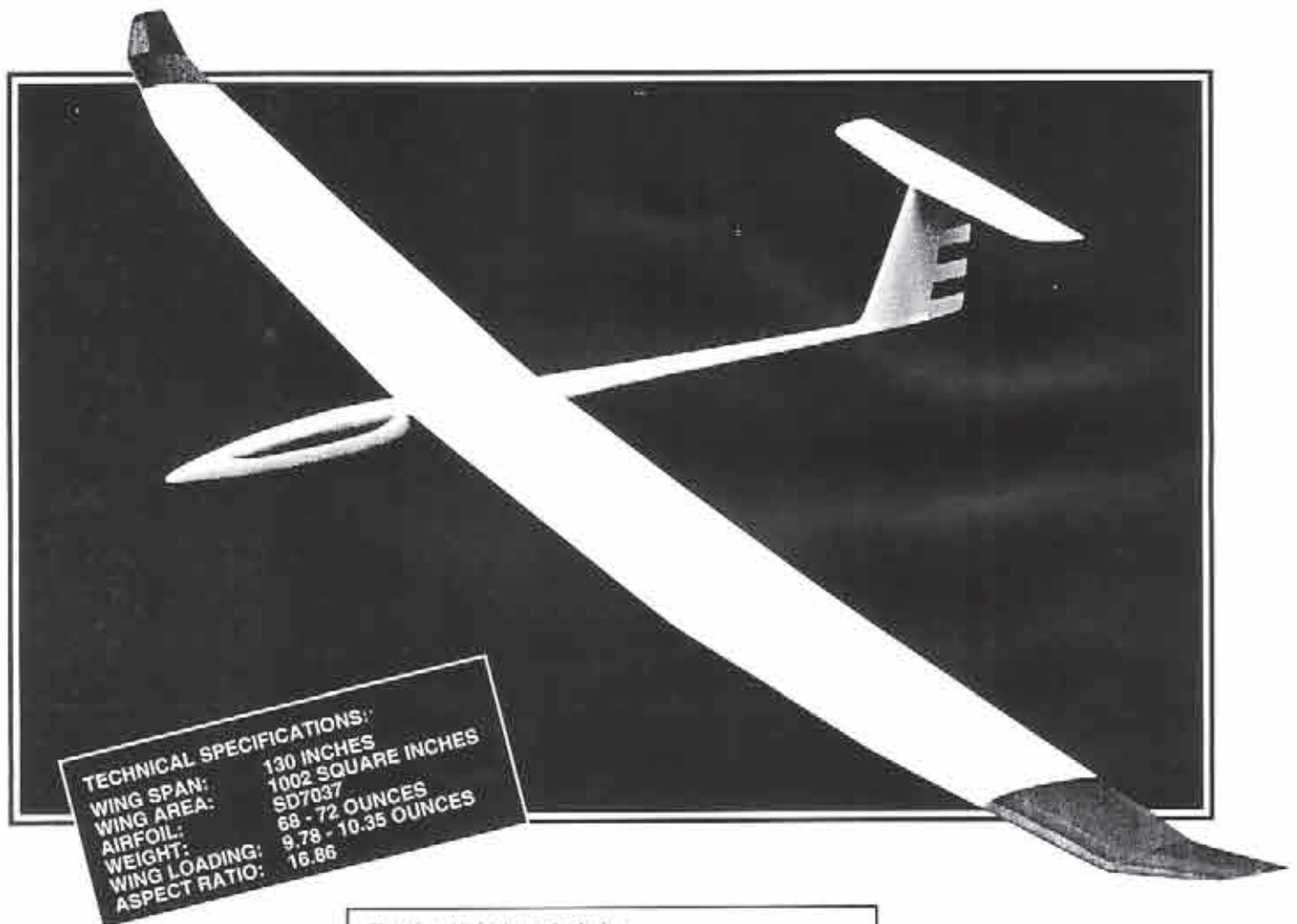
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Have Sailplane, Will Travel!

As Dave Register said last month, coming up with a column title is not easy. He selected "Tech Topics", which seems quite appropriate for the subject matter he plans to cover: soaring technology and soaring technique.

This month another column joins the ranks and it's called "Have Sailplane, Will Travel!" As this clever title suggests, travel is involved, and a sailplane is required. Some of you will undoubtedly have seen the first column, as it recently appeared on RCSE, but we're sure you'll want to read it again. It's a delightful story about Tom Nagel's group vacation, and the setting is near the Sleeping Bear National Lake Shore, in Michigan.

Tom, a lawyer in Columbus, Ohio, says, "I have a 10 year old son who hangs out at the flying field with me, but refuses to fly anything that goes higher than a Tyro hovercraft, a 21 year old son who produces records, and a wife who is an equiholic (one addicted to horses). It leaves me a lot of time to fly and write." The law articles Tom wrote were probably a lot less funny!

All the RCSD columnists/technical editors are always looking for input and suggestions from each of you, and Tom's new column is no exception. "Have Sailplane, Will Travel!" is but the first in a series of articles on soaring vacations; if any of you have a favorite sailplane saga, you can send it in to Tom at

tomnagel@freenet.columbus.oh.com for gentle editing and suggestions. This column will only appear as new travel stories surface; however, in the next issue of RCSD, we're already scheduled to travel from Michigan to the Sierra Nevada Mountains overlooking Lake Tahoe in California.

Welcome on board, Tom. We're ready to travel!

Happy Flying!
Judy & Jerry Slates

READY TO FLY!

Almost three years old, Alyssa already has an eye for a good thing! Here, she shows off a 1/2A Delta, built by her grandparents, Bill and Bunny Kuhlman of Olalla, Washington, who discuss the project in their column this month.

Photography by Bill & Bunny Kuhlman.

OTHER GOOD STUFF

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R/C Soaring Digest (RCSD) is a reader-written monthly publication for the R/C sailplane enthusiast and has been published since January, 1981. 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 all articles, model designs, press & news releases, etc. are 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. RCSD was founded by Jim Gray, lecturer and technical consultant. He can be reached at: 210 East Chateau Circle, Payson, AZ 85541; (520) 474-9815; <jimgp@netzone.com>

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Steve Savoie, Jerry Slates, Gordy Stahl

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Gene Zika is the graphic artist
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Jer's Workbench

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Only 5 Grams Per...

Of late, I've seen the phrase "Only 5 Grams Per..." on a great many labels. I'm sure that many of you have, as well.

A while back, I talked a bit about the marvels of iron-on film, which arrived on the market scene some 30 years ago. The film was wonderful, easy to use, and came in a variety of flavors. It only took a couple of days to cover a model. And before film? We used silk and dope.

Recently, I needed a set of stabilizers for a new model. Instead of using one of the new methods which calls for foam cores, and obechi sheeting, I opted to construct a set of built-up stabilizers, which took me twice as long.

Built-Up Stabilizers

First step required a set of plans. Once drawn, the computer plotted a set of NACA-0008 ribs, and the wood box yielded enough wood scraps to complete the project. It took three days to build the stabilizers, having only a little extra time between other pressing projects, such as watering the garden.

Once constructed, the iron-on film scrap box yielded white film, which I had selected for the top covering; however, black film, which I wanted for the bottom, could not be found, requiring a trip to the local hobby shop, Texas R/C. They did not have any in stock, but I was able to purchase a package of SIG, light weight silk, catalog number LS-001. Dope and dope thinner was on hand back at my shop.

Covering with Silk & Dope

One of the most important ingredients required for those contemplating covering with silk and dope is patience, and plenty of it. If you're not the patient type, stop here, and turn the page. For those that want to give it a try, you'll need a high quality, soft, 1" paint brush, scissors, modeling knife, clear dope, dope thinner, a pan of water, and a towel. Ready to begin?

Stage I

- First, brush a coat of clear dope over the entire stabilizer surfaces. Let dry.
- Next, apply a second coat of clear dope. Let dry.
- When dry, sand smooth.
- Using scissors, cut 4 oversize pieces of silk. Approximately one inch should be hanging over each side of the stabilizer.
- Very carefully, pick up a piece of silk holding it by the corners, and dip it into the pan of water. Don't let the silk fold over or wad up, or you'll have one heck of a time unfolding the wet silk.
- After wetting the silk, lay it on the

towel, allowing the towel to soak up any excess water. Then lay it on one side of the stabilizer.

- Use one hand to hold the silk in place, while the other pulls out the wrinkles. Don't remove the hand holding the silk in place.
- With your free hand, brush clear dope around the edges of the stabilizer. At the same time, before the dope dries, pull the silk edges tight. Set aside to dry.
- At this point, follow the same steps for the second stabilizer.
- The first stabilizer should be dry enough by now to trim the edges using a modeling knife.
- Repeat the steps until all 4 sides of the stabilizers are complete.
- Hang the stabilizers to dry, which should take several hours.

Stage II

After the stabilizers are dry, it's time to apply another coat of clear dope. Remember, we're not painting the barn, but rather a simple set of silk covered stabilizers.

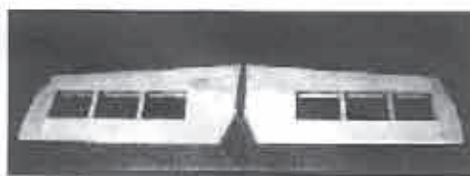
- Continue to brush the clear dope on lightly, making sure that it doesn't drip through the silk. Several coats will be required to fill the pores of the silk. Once filled, do one more coat.

I required 4 coats in order to complete my stabilizers. In all, it took 1 week to design, construct, and cover the set of stabilizers.

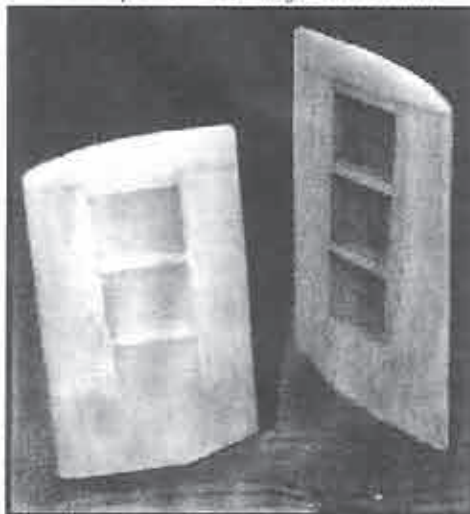
Weight

And, now, how do the grams line up?

The package of silk contained one square yard with a weight of 7 grams. The



Built-up stabilizers ready to be covered.



Covered stabilizers hanging out to dry.

amount of silk used to cover my stabilizers was less than 1 gram. Adding in the coats of clear dope, the total weight added was 5 grams. Using iron-on film would have increased the weight by 16 grams. So, if one is weight conscious, the extra time is certainly worth the effort. What do you think? ■

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From Whence Cometh The Unexpected Lift?

By Lee Murray
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This has been a very unusual year for soaring in Wisconsin; last Saturday was so very exceptional, I'm hoping someone will be able to add some light to the event. We fly off a sod farm in the middle of a vast low area known as the Great Medina Swamp of Wisconsin. Typically, the sod farm becomes dry sometime in August to the extent that strong thermals will start to come off the sod itself vs. coming off the roads, grassy areas and tree lines which border the farm. Early Saturday saw colder temperatures than we had been having. We had some showers before noon followed by sunshine. By the time I made it to the sod farm, the sky had cleared and the grass was pretty dry. The first launch and flight were typical with a 5+ minute flight. By this time other club members arrived and started to launch. It seemed everyone was having long flights and even the beginners with basic 2 and 3 channel floaters were getting long flights and fighting to keep them in sight. I had a day we all dream about. It seemed like we had the ability to stay up as long as desired. I had people I wanted to help, so I was choosing to come down at 10 minutes. Even so, I spent much of each flight doing aerobatics. The lift was so reliable that it was like flying on the slope. Whatever was different, it was different to a very significant extent. People there with years of experience knew it was different. What was responsible for the exceptional lift?

- The cold night and warm day?
- The fact that it had rained and the field was one of the first areas to dry?
- The adjacent field recently had been made brown with a dose of Round-Up?
- The humidity from the rain decreasing the density of the air?

The last statement seems strange that humid air is lighter. Typically, people talk about humid air as being heavy. It only feels heavy. Actually, water vapor takes up volume and only a certain number of molecules fit into a given volume of air. Theory says that the density of the gas is a function of the molecular weight of the gas. Nitrogen being actually N_2 has a molecular weight of 28, O_2 - 32. Water (H_2O) has a molecular weight of 18. So, in theory, moist air is less dense than dry air. This would suggest that a bubble of moist air surrounded by dry air of the same temperature would rise.

There is another phenomenon that a number of people have noted regarding flights in the morning or just before sunset at night. The flight times get longer and, without any control input, your model would start having longer flights. Is this a 'humidity driven' process for air rising off the ground where condensation may be occurring? Is the heat of evaporation (condensation in this case) heating the air and causing it to become lighter than the colder saturated air around it? ■

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Nearly a Success Story!

Dennis Weatherly's JackWabbit (RCSD July 1997) was all the impetus we needed to get seriously involved in electric power. Without having a firm design in mind, we purchased a "Rocket" Speed 400 motor, Graupner 5x5 CAM prop and SoftStart speed control, and two seven cell battery packs.

Greg Doe's 1/2A Delta

Equipment in hand, we set about designing the "killer" e-machine. Several days at the drafting board yielded a beautiful swept wing mounted on the beginnings of a fuselage. That basic layout languished on the drawing board until November, the month we traveled to Portland, Maine for the New England RC Soaring Convention sponsored by the DownEast Soaring Club. There we met Rick Hallet who, knowing our love of tailless aircraft, presented us with a large box filled with wing plans. We couldn't wait to dig through the pile and see what treasures might be buried. We didn't have far to go. One of the smaller plans was of Greg Doe's 1/2A Delta, originally published in the November 1978 issue of *Model Airplane News*.

Back home, we went through all of the plans again, this time with the idea of perhaps finding something more suitable for the Rocket motor, but we kept coming back to the delta. It looked like it would build easily, be large and robust enough to carry the equipment we had already purchased, and offer the performance we sought. This was not to be a thermal soaring machine — no, it was to be a real speed demon!

Looking over the details of the design, we found five areas which we felt needed modification:

- In 1978, airfoil design was not what it is today. Greg's delta used an airfoil with a thin trailing edge and a large amount of reflex. Our experience has been that such sections are not efficient. We exchanged the original airfoil for the EH 1.0/9.0 section. We've included the original airfoil within the planform drawing so readers can get an idea of how the sections differ. The two airfoils have nearly identical thickness in this application.

- The entire trailing edge, consisting of a central elevator and two ailerons, was constructed of trailing edge stock. We would cut the control surfaces directly from the wing.

- The fin seemed large and too far forward, and there was no ventral fin. We decided to make the fin a bit smaller, move



Alyssa

it rearward, and ensure about 3/4 inch protruded below the wing so that during landing the wing would be driven to a negative angle.

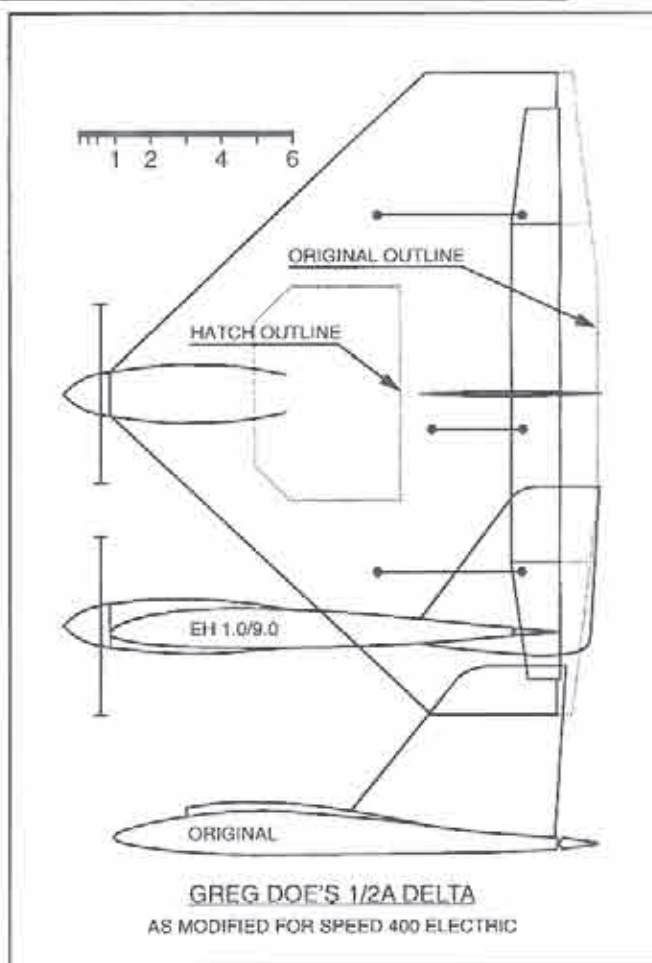
- The carved balsa cowl would be replaced with a lighter foam and fiberglass structure.

- The two ailerons were shown linked to a single servo. Our concern was that the micro servo we would be using (18 in. oz. torque) could be overloaded at high speed if forced to drive both surfaces.

Our first task was to cut the foam cores for the wings. We have a large plywood sheet set up as a single pivot jig. A 4-40 machine screw is screwed into a blind mounting nut in one corner, and the template is held to the end of the blue foam with large T pins. The 1/2A Delta wing cores can be cut fairly rapidly, due to their small size.

Per the original, the foam core was sheeted with 1/16th inch balsa. After the control surfaces were cut free and faced with 1/16th inch sheet balsa, the two elevator halves were connected using a small piece of 1/16th sheet spruce. This modification reduced the projected wing area from 170 to about 160 square inches.

Using the face of the motor as a guide, we made a 1/8th inch plywood motor mount. This piece was then glued to the front of a motor tube made from 1/16th inch balsa. The nearly completed wing was blocked on the building table so that the airfoil data



line was parallel to the surface and at an appropriate height. Being careful not to get CA on the exposed foam, we then used micro-balloons and CA to mount the motor tube in a cut out at the leading edge of the wing.

We made the fin smaller and moved it rearward, as planned. Since the control surfaces are now a part of the wing instead of "add-ons," the trailing edge of the fin

wound up well behind the trailing edge of the elevator. Installation of the fin entailed deflecting the elevator 90 degrees upward so the elevator connector would slide through a thin slot cut in the fin. It is free to rotate in an arced cutout. Once in place, the fin was firmly mounted using CA.

The entire airframe was then covered with MonoKote, as using 0.75 ounce fiberglass cloth would have meant painting and then determining a suitable hinging material.

The foam cowl was created from segments of the foam wing beds. This made matching the surface of the cowl and the surface of the wing relatively easy. Sanded down to an aerodynamic shape, the cowl was covered with three ounce fiberglass cloth. Three servo wells took just a few minutes with a Dremel MotoTool router, and brass tubing quickly cut out the short tunnels needed to carry the wiring. Direct linkage from servo to control surface was easy.

Final assembly was fairly simple. The motor slid into the motor tube and was mounted to the plywood bulkhead by means of two machine screws. The plan was that the motor could be slid out of the tube through the main compartment and out the large access hatch if it ever needed to be replaced. The servos were lightly glued in place using a drop of Shoe Goo. The two battery packs each got a strip of Velcro on one side, and the matching Velcro strip was glued to the inside of the upper wing skin.

We programmed our JR PCM 10 to use four channels: throttle, aileron, rudder slaved to aileron, and elevator. The transmitter was also set up such that three rates are available for both aileron and elevator function, each from a single switch. The 1/2A Delta construction article provided control surface throws, and the middle rates are set for these maximum deflections. The other two switch positions give slightly more and slightly less throw.

Greg's plans show the original weighing 12 ounces (approximately 10 ounces/ft²), less fuel. Ours comes in at just under 16 ounces (under 14.5 ounces/ft²), ready to fly. The seven cell 600 mah battery pack and third servo make up the difference.

Our first attempts at flying this little beast came during the Puget Sound Silent Flyers Fun Fly in Lacey, Washington in May, one year after the appearance of Dennis' JackWabbit at the same event. From the outset, things did not go well. Hand launching is nearly impossible because there is nothing to grip below the wing. Grabbing the ventral portion of the fin is scary because it's well behind the CG and somewhat flexible. Still, Bill managed some good tosses in high grass to check the CG location. The CG was right on for a flat glide, but despite the tall grass the CAM prop broke on the first landing.

Several more attempts were made at hand launching with the motor turning a 6x3 folding prop donated to our project by Dieter Mahlein. As is usually the case with deltas and high torque motor-prop setups, the airplane rolled spectacularly into the ground on each attempt. The MAN construction article, sent to us by Mark Nankivil, recommends an underhand tilted

launch, but prefaces that by saying, "This little delta may provide some heart-stopping excitement." After several tries, we were still rolling into the ground and not finding it very exciting.

Dieter, who was flying an extremely fast all molded P-51 using a zip start for launch, suggested we install a tow hook well forward of the CG and use his zip start to get our delta up to flying speed. A piece of 1/8th plywood was quickly epoxied to the inside of the bottom wing in front of the hatch area. This eliminated the possibility of removing the motor through the aft end of the motor tube, but there were really no other options.

We were making pretty good progress at launching from the zip start when the elevator trim somehow got messed up and the delta went nose first into the ground right in front of the bungee stake. The sudden stop forced all of the internal components out the top of the wing. What a mess! And Dieter's folding propeller was broken, too. This marked the end of flying attempts for the day.

Everything is now fixed, but, as the title of this column suggests, we haven't yet achieved the success which we know is within reach. We'll keep RCSD readers informed of our progress on the road to success.

We're always on the lookout for materials to be used in future "On the Wing..." columns. If you have an item which may be of interest to RCSD readers, please let us know.

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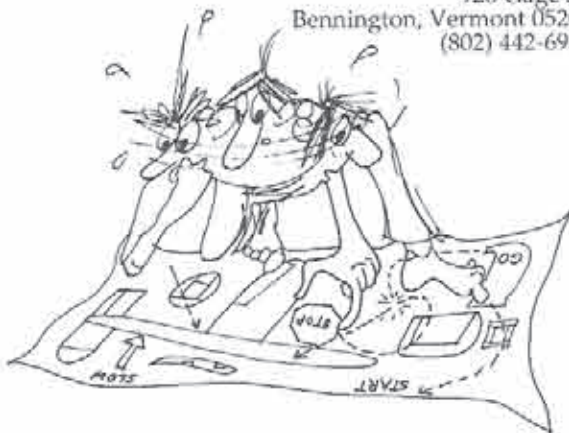
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"SHORT CUTS"

Steve Savoie
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Carbon D-Light 70" Hlg

Photography by Vicky Savoie

Yes, I'm back. The job hunting and ultimate 4 hour weekend commutes from Portland to Bennington, Vermont have taken their toll on free time for writing, as well as flying. Now that I'm settled in, I have some time to write about my spring building project.

I began looking around for a highly prefab HLG that was a bit different from the rest of the pack, and soon remembered Icare's Carbon D-Light that was highlighted at the '97 NERCSC Convention last November. I called Etienne Dorig at Icare and inquired about plane. It is offered as 60", as well as 70" versions (available with a 2 piece wing option, as well as a 1 piece for the 70").

The price for the 70" 1 piece wing version surprised me, but I was told it could be built and flown in 2 hours by the average builder. Two weeks later the kit arrived in

perfect condition. The fiberglass fuse had an automotive white finish and the canopy was sky blue. The control tubes for the V-tail were pre-installed and the .030" music wire fit smooth and snug. Plywood hold-downs for the wing were also pre-installed and threaded for the two nylon screws.

My first building task was to bond together the V-tail halves that were already beveled at their joint. The V-tails are built up balsa and pre-covered in an assortment of transparent colors. The fit-up was excellent, so I taped the bevel edges flat, mixed up the 5 minute and placed a piece of masking tape between the tips to hold the proper angle while the 5 minute set up. The fuselage has a nicely molded recess notch to accept the V-tail assembly, which was roughened to improve the bond. The covering did not extend into the bonding area which was nice. After test fitting the V-tail assembly, I mixed up some more 5 minute and bonded it in place, no jigs required. The control surfaces (pre-covered and beveled) were attached with hinge tape from Slegers International and control horns were fabricated from 1/32 ply.

The built-up wing comes pre-covered and in 3 pieces. The center panel is pre-drilled for the hold down screws and has the proper dihedral angle at the outer poly joints. The tip panels also have the corresponding angle to match the center panel. Center panels and tip panels were also pre-covered in a choice of transparent colors to mix and match with the V-tail and control surfaces. The wings come with the S4083 airfoil, which is quite thin; the planform has a triple taper, with washout built into the tips as well as the outer taper joint.

The wing can be classified as built-up construction, but the similarity to built-up ends there. The section forward of the spar is comprised of a 6 mil unidirectional carbon fiber skin that's set into shape using a CNC mold and filled with a foam core. This combination yields a very light, stiff wing structure. The balsa spar is assembled onto the carbon fiber/foam D tube assembly and the aft rib sections are attached to the spar. Balsa trailing edges complete the assembly. The design gives a strong, stiff 70" wing that weighs 5 ounces. Did I mention that the hold down screws pass through aluminum spacers fitted into the center panel? A nice touch.

The wing tip panels were bonded to the center panel with 5 minute epoxy and the wing was assembled onto the fuselage to check alignment with the V-tail. The fit and alignment were perfect, a great design aspect, no jigs required. I did have concern over the small, contact bond area between

the center panel and tip panels, which is due in part to the very thin airfoil. But I didn't want to fool around with the building techniques during a construction review article; this decision would haunt me later.

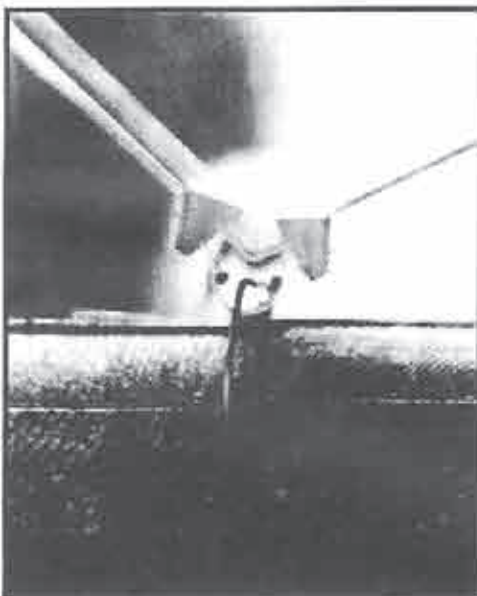
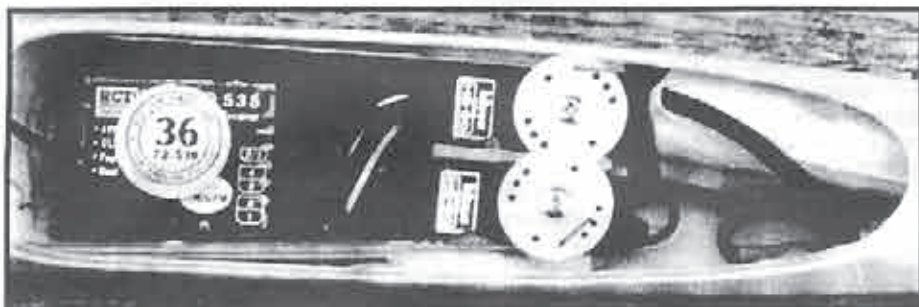
The only remaining work was to install the battery (270mAh) pack and HS-60 servos that were also purchased along with the kit from Icare. The battery was bonded inside the nose with hot glue. The two servos were separated by a thin piece of .5mm Rohacell 51 and were staggered vertically, so the servo wheels would not foul each other. Rohacell spaces were used between the fuselage and the servo assembly, as well as to create a pocket for the Hi-Tech 535 Fm receiver. The Rohacell was bonded to the fuselage with, you guessed it, hot glue, which does not melt the foam.

The only thing left to do was to attach the music wire to the servos and control horns. I took the lazy way out and used Z bends on both. I did not have a .030" drill bit so I cut 3/8" off the music wire controls, chucked it up in the drill, and used the wire as a drill for both the nylon servo wheels and the plywood control horns. It worked great and there was absolutely no slop or binding, plus the price was right.

The plane was balanced at 2 3/4" from the leading edge as per the plans; only a small amount of lead was needed in the nose. The flying weight was 12.75 ounces, which wasn't that bad for a 70" HLG. The plans do not give recommended throws for the control surfaces so I started out with about 1/2" for rudder input and 3/8" for elevator input, which was a good starting point. The battery was charged up so I took my favorite best friend with me and we went out flying. This was my first HLG and, fortunately, I remembered Peter Young's great talk about HLG trimming and CG placement during the 1997 New England R/C Soaring Convention (NERCSC); his advice was right on the money. The plane launched well for a HLG novice, even though I had not yet installed a throwing hole in the fuselage.

The triple taper and triple dihedral allows the plane to dance around nicely on the wingtips and, though a tip stall could be forced, it was very predictable and easily recoverable. What was not recoverable was what happened next. I was flying in a small park for about an hour when the **last launch** occurred. The plane launched up quite well and was gaining height when the right tip panel went vertical and left the plane. This is a most upsetting sight on the first day of flying a new plane. The apogee was at about 40' and the uncontrolled landing was 125' away into the corner post of a tennis court; not a pretty sight. The V-tail was fine, servo's not stripped, but the center panel had a bite out it down past the spar; a complete loss. I checked the left tip panel joint and it also was just about to fail, but that may have been induced by the crash.

Inspection of the failed joint indicated that the balsa fibers were torn from the joint



and the 5 minute epoxy was a bit rubbery (2 year old stuff). I did not have a lot of faith in this joint design from the beginning and should have modified it by at least putting hinge tape along its bottom. Later that evening, I called Etienne, who said that the joint could be prone to failure during hi start launches. He recommends the two piece wing for hi start launches. The two piece wing uses a joiner at the center joint and the tip panels are integral to the inner panels, as well as having a different joint design (all pre-built). He and I worked out a deal for the failed center panel and another was in the mail shortly. I must admit that the epoxy did not set as it should have and did contribute to the failure.

Etienne recommended that I reinforce the joint with light fiberglass tape and epoxy along the bottom face of the ribs, but first the covering would have to be peeled back. The replacement center panel came in and the U.S. Postal Service decided it should be a three piece center panel; thank goodness for insurance. I called Etienne and the second replacement panel was soon on its way. Two weeks later it arrived and was fine, except for 2" of the leading edge that was slightly crushed in and splintered.

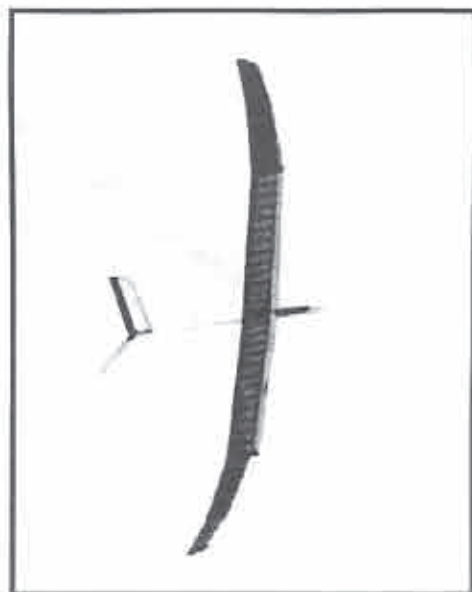
Enough was enough; I wanted to fly this plane now! I informed Etienne about the damage and let him know I would make the repairs myself. I drilled about 15 .040" holes in the damaged area and slobbered it up with thin and medium C.A. I then took a mylar peel and stick decal backer and

shot it with kicker. The backer was held firmly over the leading edge duplicating the profile of the undamaged wing section on each side of the repair area. The CA began to kick which caused the crushed foam and carbon to heat and expand to the profile of the mylar backer. The repair was virtually perfect and added very little weight.

I made the tip panel joints to Etienne's recommendation and also placed hinge tape on the bottom face of the joint. Etienne also recommended shimming up the trailing edge of the wing assembly to improve the launches. The trailing edge was gradually shimmed to about 1/8" (actually .140") and, with some re-trimming, I was getting excellent results; even my favorite best friend (to my surprise) noticed the difference. The plane was a pure joy to fly. I did spend a bit of time setting up the Airtronics Infinity 600 to match up the channels of the HiTech 535 receiver. Seems that to fly on one stick I had to mix aileron to rudder (100%); then use the bi-directional mixer and feed rudder into the gear channel, which is channel #4 on the receiver. The rudder channel on the transmitter is channel #6 on my 6 Channel Airtronics receiver and not picked up on the HiTech.

Down to the chase

This is an excellent plane for hand launch at good flying sites. The light weight, combined with a thin airfoil, provides for very good launches. The assembly was simple and could be ready to fly in less than two hours. The fit up and workmanship were excellent. I would not recommend this plane for rough landing sites, or slope landing sites with a lot of obstacles; the wing is just too delicate and difficult to



repair. This however is a reasonable trade off for the light weight and stiffness. I do not like the tip panel joint design, especially if I were ever to consider using a small up-start. I would go with the stronger, two piece 70" wing for those launches.

The joint design should at least be modified to include hinge tape on the bottom to reduce the possibility of a peeling failure at the bond line. I do believe the consumer is getting their money's worth for the plane and Etienne did quickly re-ship the damaged components and stood behind his product. I would also use fresh epoxy (dummy!!!). I do enjoy this plane a lot and often fly on my lunch break, away from the tennis courts. The Carbon D-Light excited me with its design and use of advanced materials and construction. I hope I have it for many years to come; it's a lot of fun.

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Web site has lots of pictures

TECH TOPICS

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I've received several comments via e-mail on last month's design column. Your suggestions and ideas are very much appreciated and have generated some thoughts for future discussion. I appreciate the feedback whether or not you agree with what's discussed. Sometimes differences of opinion can lead to new ideas, so any dialogue on "Tech Topics" is always welcome.

I had intended to move into the 'technique' stage of building a HLG this month, but will have to beg your indulgence until September since several trips threw me off schedule. The best of which was:

Nats Notes

Went to the LSF/AMA Nationals for the first time this year. Been trying to get there for 25 years, but something always got in the way. If you've never been, don't pass up the opportunity to go. I'd like to comment on some of the neat things I saw as I'm sure others will provide more in-depth reporting.

First of all, the LSF did a great job of running a very competitive contest all week long. Too many people to name but a lot of great flying, a lot of good volunteering and very few hassles over rules. The respective CDs spelled things out first thing each morning and stuck to what they said every day.

AMA is also to be complimented. The soaring field is turning into a great site. Grass was mowed in the pits, launch and landing area and for quite a few acres around. Rocks are gone and the field is very well leveled. LSF and AMA have plans for further enhancing the site and it will eventually be the finest flying complex in the country. You just have to go there and see for yourself what's happening. It's really neat!

Although there was a lot of really great flying (myself excepted!), Daryl Perkins is still the man. He put himself in the hole early in 2 meter with a blown landing or two (Yes, mortality comes to us all eventually!). But then he kept on scratching and flying until he made it back to the top by the last round. Unlimited was his all the way.

Now I spent some time in the scoring trailer and from that perspective you get to see things that other folks don't. Every now and again there were inquiries about some of the scorecards of the more competitive pilots. In every case, everything was recorded properly. No exceptions. No rules violations. No special treatment. Not even any attempt to shave it close. So guys, if you want to compete with this crowd there's only one thing to do - go learn how to fly better! 'Nuff said on that.

Unlimited soaring is starting to be dominated by the high performance 3 meter ships. These planes are using very efficient

platforms, very clean airfoils and can cruise vast distances to find lift. They also launch like a bat out of h***, so they have the advantage all the way around. I'd mention some names but I'd be sure to leave an important one out and get in trouble. Although several all molded ships were in evidence (unlimited was won with such a plane), the more conventional foam core/composite layups are still very competitive. If you've got the bucks, the molded variety is probably the way to go. But I don't think anyone is at a real disadvantage without them.

The most significant factoid I can remember about 2 meter is that you better check your wing span before going to a major contest. There were a number of 2 meter ships, composites from manufacturers included, that had to have the tips sawed off to qualify. 2 meter is measured straight across from wing tip to wing tip. The event director had a gate set up. If the tips didn't pass the gate, it wasn't legal. This applied to anyone who trophied, but it was a good idea to check before flying. There were a bunch of guys trimming their tips to make it through.

Hand launch was the most fun for me to watch. Can't fly it as the shoulder can't take all that work any more, but it's definitely the place where the most design activity is going on. The kits by CR, DJ Aerotech, Maple Leaf, etc., are all excellent. But there are a bunch of guys messing around with new ideas and home brews that are capable of competing very nicely.

The most interesting ship at the contest was the Logic with its long spindly tail boom and almost infinitesimal tail surfaces. I did a rough check on Pat McCleave's and, as unusual as this design appears, the volume coefficients appear to fall about where we reported for average ranges a few issues ago. What the designer has done is used a very long tail moment to provide damping for pitch and yaw so you don't over-control (my opinion only). Although it looks very different in the air, it performs very nicely (won the contest if I remember correctly). Some of that is due to the all-up weight of around 9 ounces for a three-servo setup. It's definitely a design trend to watch.

I didn't get a close look at the RADS setup Harley Michaelis has developed, but did get to watch a Genie fly several times. It's pretty obvious this technique works and, in principle, is very clean. With Harley's permission, this might be the topic for a column in the not too distant future.

Another encouraging observation - I saw a number of young folks flying in 2 meter and unlimited. Some of them were father-son flyers. Some were the young person flying while Dad helped out. That's a good sign, but we need more of it. Those of us competing now are merely stewards for this hobby/sport until the next generation comes along and gathers it up. Anything we can do to encourage these young folks (and our lady pilots as well) needs to be supported.

Of course there is a down side. Such as round 5 in unlimited for me when I was in the air with the same plane at the same time as one of these younger folks and got soundly thrashed. Made me want to ask if it wasn't past his bedtime or something! (Just kidding, Chris. You flew a great round.) Well, so much for growing old with dignity and grace.

Finally, I've got to brag on the locals a bit. I've been telling folks on RCSE that some very good flying is happening in the mid-west and in the KS-OK-TX area in particular. Well, the guys from Tulsoar (OK) ran away with the team trophy this year with our flying buddies from Wichita (Kansas Soaring Society) in hot pursuit. We've still got two big contests in our area: TNT in Dallas in early September, and Tulsoar's Last Fling of Summer later in the month. KSS already ran a 2-day earlier in the year but watch for the schedule next year. Y'all come on down and fly with the top two teams in the country any time you think you can keep up with us!

Meanwhile, Back At The Drawing Board

Last time out we messed around with some design concepts on the way to putting together a HLG, which you could use as a simple platform for trying some of your design ideas. Due to some intervening activities (See above!), I haven't had time to write up construction details as promised for this month. But I have been refining a few things, so if you'll bear with me just a bit more, let's run through those results and then slap it together in September.

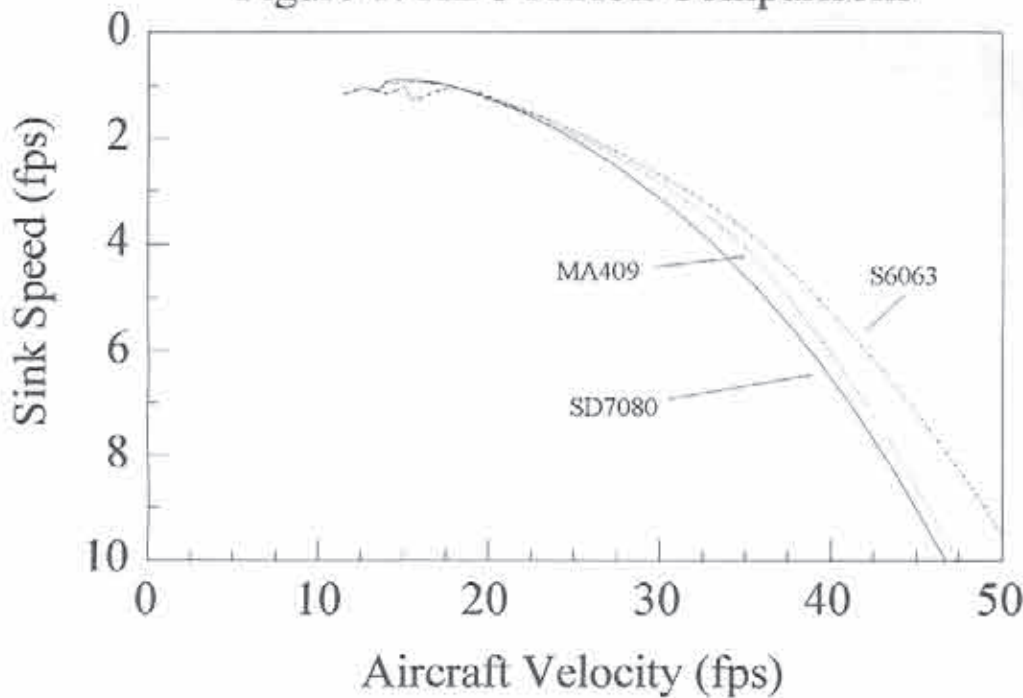
Some Additional Airfoils

A couple of other airfoils have been mentioned as potential candidates for HLG work. As summarized last time, the SD7080 looks like a pretty good compromise section. For higher speeds, both the S6062 and RG15 look attractive with the S6062 looking like a slightly better min. sink section than the RG15. Since that time, the S6063 has been receiving some press in RCSE, so let's look at that. There's also another thin section I missed that Tom Clarkson (Torrey Pines Gulls) mentioned as interesting.

Running our base case (11:1 Aspect ratio, ~10.25 oz. total weight, middle of the road parasitic drag) with the UIUC data for these sections, gives the results shown in Figure 1. In this case, the MA409 looks pretty good compared to the SD7080. It is a thinner section, which probably accounts for the better mid-speed efficiency. However, it is a lower lift airfoil and the min. sink might not be quite as good. It also has a somewhat high pitching moment as the maximum in the camber is pulled pretty far back. However, a max thickness near 25% of the chord appears to be helpful in minimizing separation effects, so this airfoil is well behaved over a pretty broad range of Reynolds numbers.

Turning to the S6063, this is definitely a faster moving section. Min sink will not be as good as the other sections studied, but

Figure 1: HLG Airfoil Comparisons



the speed range and efficiency at this weight is significantly enhanced. This should be an asset in the launch as well as the ability to cruise at higher speeds. This could be advantageous for windy weather flying. Or perhaps with camber changing surfaces (flaps, flaperons) to recover some of the slow speed flight when you need it. I'm not saying anything that Joe Wurts hasn't expressed more eloquently on RCSE. Just pointing out that the numbers back up all of his comments. I don't think that reflects a needed vote of confidence in Joe's insights as much as it provides some verification that simulating performance of RC sailplanes through calculations is going to get the trends, and maybe even some of the actual numbers, close to real-world experience.

Soccer Field Science

Returning to the design we sorted out last month, two activities have been under way to refine things. The first was a trip to the local soccer field to see if dead-air performance was anything close to expected. The other was an evaluation of different volume coefficients for stability and handling of this ship. Let's look at the measurements first.

We had one of those very rare, dead-calm nights several weeks back, and so it was off to the local soccer field to see if we could measure some performance values. Now this is gonna be crude, but in my book, cheap is never obsolete if it proves useful.

Now the first thing you find at a soccer field is that the fields are not a standard length. After some pacing (and a few subsequent phone calls), the field I was using turned out to be 90 meters long. After warming up with a bunch of tosses to get trimmed out, the plane was set on what appeared to be a good cruising trim and about 6 launches were made that went to

the far goal and back and then some out into the parking lot. After a little pacing and checking, a best guess at the overall cruise distance was ~580 ft. Typical time over this distance was ~35 seconds. (Measured from entering the cruise phase to touchdown.)

Next check was to try and set up for min. sink. A couple of clicks of up and a bunch of tosses indicated that I could get between 36 and 39 seconds from a typical launch. This time was measured from the maximum height in the launch, not from the release of the airplane. So it does NOT include the climb out and flare at the top. Might add another 3 to 5 seconds for that.

Final check was to see how high a typical launch really was, so a number of tosses were made at some of the Black Oaks around the edge of the field. One was found that I could just barely clear with a decent heave. I will note that this experiment was significantly delayed by finding at least one tree that I couldn't routinely clear - but that's another story. (A man's GOT to know his limitations!) Triangulating on this tree using my height as a reference, indicated that 35 ft. was about what this old geezer could routinely accomplish.

So, let's do some numbers. Using the tree height and the stopwatch time, we get:

- Velocity (min sink) - 0.94 ft/sec (predicted = 0.92 ft/sec)
- Max L/D - 16.6 (predicted = 17.4)
- Velocity (max L/D) - 16.6 ft/sec (predicted = 17 ft/sec)

Now these estimates aren't perfect, but they're pretty close for such a crude measurement. In all cases, they're better than 5% agreement, so I'm not gonna apologize for any of this. It also helps answer another question posed on RCSE

recently about expected dead-air time for a good HLG. John Roe had indicated times in the high 40s to low 50s should be reasonable. As indicated here, from my puny altitudes, I can get ~ 40 seconds with modest attention to flying smoothly. So what it really comes down to is how high can you throw and how smoothly can you transition into the glide.

If you use a sink rate of ~ 0.95 ft/sec and allow an extra 5 seconds for the climb and transition, you should get ~ 41 seconds from a 35 ft. launch, ~ 47 seconds from a 40 ft. launch and maybe 53 seconds from a 45 ft. launch. Obviously youth and limberness are an advantage for contest performance!

Tailplane Design

Now to tie up one more loose end (so to speak), we've discussed design of the tail group for good stability in previous articles. This really hasn't entered anywhere in the polar calculations other than the parasitic drag and weight terms. And the results so far indicate that isn't an egregious error. But what about flight stability? You may have the greatest polar in the world but if you can't trim and fly the ship, what's the point? So, let's look at the tail groups used in this design.

First of all, the Tahlequah is a V-tail, so we have to go through the projections discussed in June to get the actual volume coefficients. We'll assume I did the math right and here's the way it worked:

V-tail #1 - TVC = 0.42, RVC = 0.054

This was 3/32 sheet balsa and was discarded due to flutter in the launch phase. However, the overall pitch and yaw stability was excellent. The only complaint was a tendency to point into the wind on breezy days suggesting the RVC was a bit high.

V-tail #2 - TVC = 0.34, RVC = 0.047

This was 1/8" sheet balsa and cured the flutter problem. It was lower in overall area to try and compensate for the extra weight. Again, pitch stability was good but still a slight tendency to 'weather-vane' in yaw.

V-tail #3 - TVC = 0.25, RVC = 0.034

Yaw control on this one was good. Dead air turn response was good but with much less tendency to face the wind when the breeze came up. However, pitch sensitivity was very bad. Almost impossible to find a CG and stable trim setting, so we clearly went too far here.

V-tail #4 - TVC = 0.40, RVC = 0.038

This was a return to the TVC in tail #1 with an RVC near tail #3. Just like the porridge in Goldilocks, this was just right and is the tail group used for the final design.

Let's wrap up this thing next month and go fly!



The Heath Clan in a typical, non-flying moment, with Seamus, the innkeeper's dog. Author is gritting his teeth, left front.

HAVE SAILPLANE, WILL TRAVEL!

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Segelschleppen at Sleeping Bear Dunes

Call me Ishmail. Each year my wife's family sets off on a group vacation, and for the last two years I have taken sailplanes along to try to work some flying into the schedule. Last year, I reported on the trip to Bedford County, Pennsylvania, where there was a plenitude of slopes and a total dearth of wind.

This year, the Heath Family Mass Migration was to Leland, Michigan, near Sleeping Bear National Lake Shore, one of the greatest slope soaring sites in the midwest. In Michigan-speak, Leland and Sleeping Bear are located in upper northern lower western Michigan. For those of you who speak English, imagine Michigan as a left handed mitten, and Leland will be the little wart on the outside of your pinky near the first knuckle.

So, last June I did lots of segelschleppen—I hauled two Zags and a bag of gear all the way up to the shores of Lake Michigan, hauled said planes up and down various wooded trails out to distant sandy bluffs, and hauled everything back home again. I got just over 12 minutes in the air out of the whole week. Those 12 minutes at Empire Bluff were, however, magnificent. The wind, having come all the way across Lake Michigan from Wisconsin, was absolutely smooth and laminar, and smelled slightly of cheese.

The old Zagi-LE would go wherever I pointed it, and it felt like I was flying a jet, not a sailplane. I was able to fly easily even

though the wind was light, and not directly on the west-facing slope. When the wind dropped, I could still mooch along the boardwalk, a good 450 feet above the lake. Control was so clean that I felt safe flying through the branches of an old skeleton tree, recently exposed by the shifting dune. So, why only 12 minutes? Here is my tale of woe and intrigue.

The plan was to leave Columbus, Ohio bright and early, get to Empire Michigan before 5 p.m. when the ranger station closed, get my segelfluggenden permit (more on this later), and then repair to the B&B for R&R. The Michigan Department of Highways, however, arranged for I-75 to become a parking lot for a couple of hours mid-day, so we arrived much later, long after Ranger Rick had packed it in for the day.

Tuesday morning, I was up and ready to fly, but Grandma Heath had come down with laryngitis and family protocol required all nine of us to go with her to Port Asbestos and hang out in the ER while she had this diagnosed, and then mill around the pharmacy waiting for her prescription. (The ER at Northport, Michigan is on a hilltop, and would be a great slope site for east winds off Lake Lelanau if it were not for the hospital planted there.)

The Grandma Heath excursion also presented an opportunity for the ladies in the entourage to carefully tour several of the excretia shops in the village of Northport. (An excretia shop is a boutique where no guy worth his salt would ever buy any of that crap.) I tried to tolerate this delay.

It was now mid-afternoon and I was getting sort of anxious, since I was now 25 miles or so further away from the ranger station in Empire, and the west winds were singing to me.

Back at the Bed and Breakfast, the family segued into a discussion of what we were going to do next. Various options were offered, discussed, debated, tabled, amended and generally chewed to death. I already knew what I was doing next. I had left the car idling. "You folks can do whatever you want! I'm going flying!" I said. Grandma was silent. Laryngitis. God moves in mysterious ways. And I was off.

I pulled into Empire after 3:15 p.m. with visions of sand dunes and Immelmans and Wurtsing flowing through my brain. I got in line to talk to the ranger about a flying permit. Cal Postuma, Don Harris and Ken Shaw had all given me information on getting a free flying permit at Sleeping Bear. However, Ranger Jim had never heard of this permitting system. Thanks to the Contract On America, we now have \$7 federal park user fees and unpaid volunteer federal park rangers. Ranger Jim was very kind and patient though, dug out the manuals, found the forms, and made about 3 phone calls to someone up the line. And then he offered me a hang-glider permit. I tried to convince him that the RC soaring application WAS the permit and that I did not actually want to hang from my Zagi; I filled out the forms for him while he made more phone calls.

By 4:15 p.m. I finally had my permit and park pass, and was on my way.

Next came a 3/4 mile hike from the trailhead out to the bluff. And there it was! A dune that would make Frank Herbert break down and cry. Wind as laminar as Twiggy lying on her back. A faint smell of cheese. And an un-charged receiver battery.

So I flew for maybe 12 minutes, figuring I'd check out the other slope sites and be back tomorrow. And that was the last flying I did all week.

I should digress here to tell you that it had not rained in the Sleeping Bear Dunes area since mid-April. Everyone I talked to during the next three days told me this, as a series of violent thunderstorms tracked through the area hour after hour like boxcars, day after day, with torrential rains and heavy east winds. East winds are just about the only ones you can't fly at Sleeping Bear.

Thursday afternoon things cleared up, and Martin Doney, from Baldwin, Michigan called me at the B&B to see if I wanted to go flying. I surely did. The family had other plans. Martin flew alone, and I ferried Grandma Heath down the Crystal River in a canoe. At least I didn't have to listen to her commentary. The laryngitis was still holding up.

We were leaving Friday morning; the west winds had resumed, so I figured I could sneak in about a half hour of flying after breakfast and check out. Unfortunately, the nearby Whaleback Conservancy Area turned out to be not-flyable. After we hiked all the way up there, the overlook proved to be down a narrow ravine. Takeoffs would be easy, but you would never see your plane again. And the wife was anxious to depart, unwilling to endure another hour's delay to let me fly off the bluffs in the park.

Unbeknownst to me, the wife had scheduled a two hour layover on our drive home at the excretia shops of Frankenmuth, Michigan. You may remember the story about the Three Wise Men who journeyed bearing gifts of Gold, Incense and Frankenmuth. Well, they must have dropped some of the Frankenmuth as they passed through Eastern Central Lower, because there is a big pile of it there. Avoid it at all costs.

The only interesting thing I saw in Frankenmuth was a little bridal shopee on the north outskirts of town. My son Andrew and I decided that it was "The Bride of Frankenmuth."

IF YOU GO

The following is some helpful and mostly factual information about flying and hanging out in the Sleeping Bear Dunes area.

1. The **ranger station**, where you can get your free flying permit, is on Michigan Rt. 22 in the village of Empire, about 22 miles west of Traverse City. Open 9 to 5 daily; phone number 616-326-5134. The rangers will want to see some ID and your AMA card. (For non-AMA members, there is some information about non-park sites below. Cheapskates.) You have to buy a

park user permit, of course, but it is only \$7, and is good for a week, and will cover everyone you can cram into your car, assuming there is any room left after you stow all your sailplane stuff.

This year the rangers may require you to check in with them on a daily basis, and the permits may be issued only for certain sites. Try to work with the rangers, explain to them that we are at the mercy of the winds, and make it clear that you are totally willing to hike out a ways to avoid flying over tourists. Show the ranger your soft little Zagi, and **avoid** discussion of "Combat and Heavy Metal" near anyone wearing a uniform. The rangers apparently have a lot of discretion in giving out permits.

2. The slope nearest to the ranger station is **Empire Bluffs**, just south of the little village of Empire. It faces west winds, but tolerant of SW and NW winds as well. Go west on M-72 into Empire, and keep going until the road T's out. Turn right (north), and drive out to the beach; drop the family there. Go back south on Lake Street, which turns into Wilson Rd. and goes uphill to a trailhead parking area. Hike the 3/4 mile (easy up and down trails) back to the bluff. If you land out (down at the beach) it is OK to go down the bluff to get your plane, but impossible to get back up; hike north to meet your family at the beach.

Empire Bluff has an area marked for hang gliders, and this is where I flew. Ken Shaw tells me that the locals hike a little further south past the end of the boardwalk for their flying.

2. Easiest Access to a Slope: Pierce Stocking Scenic Drive

This one-way loop drive is named after Pierce Stocking, the great chief of the Michigan tribes who fought the early cherry ranchers at the Battle of Michikalawilliwannapaddiwack and then sold the screen rights to his story to Fox. But I digress.

The Pierce Stocking site works with west or southwest winds, according to folks more fortunate than I, and is a short stroll from the paved parking area. When I was there, lightning was striking all around, and it seemed wisest not to extend an aerial. If you fly there, the rangers will want you to hike about a quarter of a mile north from the boardwalk to ensure that you are not flying over the other park visitors, and to make sure that you do not create a traffic jam by causing visitors on the loop trail to pile up at that point watching sailplanes.

Pierce Stocking Drive runs off M-109 which intersects M-22 just a little way north of Empire. There is a "climbing dune" and some nice inland lake beaches for the family just north of Pierce Stocking Drive on M-109. The Coast Guard Lifesaving Museum at Glen Haven is also within easy driving distance, if they want to drop you off and come back later to rescue your sand-blasted corpse.

3. North Winds

Try **Pyramid Point**, about 15 miles north of Empire. Take Port Oneida Rd or Basch Rd off M-22, and park at the well-marked trail head. It is a good half mile uphill walk to the north-facing bluff. When I was

there the winds were 180 degrees wrong. The big meadow at the trailhead would have been nice for handlaunch flying or thermal flying, but when I was there the entomologists were migrating, and had flocked all over the meadow to photograph dragon flies. I was afraid they would stick a pin through my ZAGI and pour ether on it.

4. **North Point**, just beyond the Lifesaving Museum in Glen Haven is easy to get to from the museum parking area. Larry Storie wrote saying he did his LSF eight hour slope flight at this location.

5. Frankfort/Elberta

Many of the locals fly west winds off a slope a little south of the Sleeping Bear National Lakeshore, at Frankfort/Elberta, Michigan. The slope is on the south side of the harbor, on the Elberta side, and since it is not national park land, you do not need a ranger permit here.

6. Unabashed Plug for the Snowbird Inn

The Snowbird Inn is a bed and breakfast located on M-22 about a half mile south of M-204, and 20 miles north of Empire. Great accommodations, wonderful breakfasts, friendly hosts, nice dog, and plenty of outlets. Phone (616) 256-9773. The Snowbird also has its own lake frontage, and a local winery that is close enough that you can crawl back to the lodge. They are open year round.

7. There are many fine restaurants in the Empire-Glen Arbor-Leland Area, and **lots of fun things** for other family members to do, if you can just convince them to go

and do them and let you go flying: dune-climbing, free beaches, canoeing, sea-kayak rentals, swimming, historic tours, the lifesaving station museum, winery tours, excretia shops, etc. (We also saw one beach with a sign that read "Private Members Only". I spent some time visualizing what that would look like.)

8. Beautiful **Lake Lelanau** is unique in having an almost unpronounceable name. We settled on Lake Louie Louie. Fine for sea-kayaking or biking around.

9. If you get to the Sleeping Bear area and all attempts to go flying fail, try liberal quantities of "Sleeping Bear Amber Draft", an outstanding local brew. I did.

(Many thanks to the following flyers who contributed to setting up the permitting system at Sleeping Bear and/or sent me information on these sites: Ken Shaw, Cal Postuma, Don Harris, Walt Fricke, Larry Storie, Martin Doney and Tim Donahue.)

...

This is the first in a series of articles on soaring vacations. The number and useful content of future articles will depend on you, the RCSD readership. If you are planning a vacation that includes your plane and transmitter, consider making notes as you go, and working up an article, later. Take photos and collect maps. Send your notes, sketches, photos and articles to travel column editor Tom H. Nagel for gentle editing and suggestions at <tomnagel@freenet.columbus.oh.us>.

■



THE ELECTRIC CONNECTION

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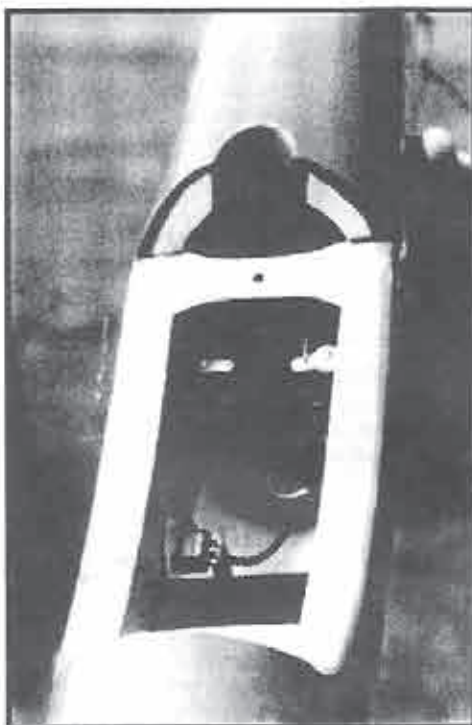
Multi-Engine Models

Does anyone out there like the idea of multi-engine models? I have been enticed by multis for a number of years and with electrics, most if not all the problems of flying multis are eliminated. Engine out situations in wet motor models seem to be, shall we say dicey, and I have seen a number of them bite the dust over the years in that situation. Starting wet multiple motors can be fun to watch, too. There's something about the buzzing sound the props on a multi make. Herk Stokely says that Woody Blanchard's Spruce Goose (8 Speed 400 motors) sounds like a swarm of bees!

With the general acceptance of electrics, the kit manufacturers, especially European firms, are producing multi-engine models that fly well and can be handled by the majority of fliers. While in Albuquerque at Hobbies 'N Stuff, I saw two P-38 Lightning models that looked great and are electric powered to boot! The olive drab finished model (quartering head on shot) is from Hobby Lobby and spans 48" with 324 sq. inches of wing area. Powered by 2 direct drive Speed 400 motors, the all up weight is claimed to be 46 ounces. The booms, center section and central fuselage are all molded as one which simplifies construction and alignment. The other silver Lightning is from here in the U.S. and is produced by K&A Models Unlimited. The specs on this model are a wingspan of 50" with 350 sq. inches of area. Either way, they both make for great looking models. I have a Douglas C-54 Skymaster on the drawing board for 4 geared Speed 400 motors as well as a Blohm und Voss Bv138 flying boat that will be powered by 3 geared Speed 400 motors. This is the 50th anniversary of the Berlin Airlift and it seems appropriate to model the Skymaster, and as for the Bv138, well it looks different! Anyone else out there have a multi they'd like to share with us?

Lincoln E-Fly

The 2nd annual Land of Lincoln E-Fly was held on June 13th & 14th in Springfield, Illinois. Hosted by the Knights of the Air R/C Club, this is an event well worth attending and is becoming the electric event to attend here in the middle Midwest. Keith Shaw, Jim Ryan and others typically attend so you will see some of the finest e-models flying today. I was not able to attend Saturday's flying but thanks to club president Tim McDonough, I'll have photos in the next column that will give you an idea of the models, fun and flying that went on. I drove up on Sunday through some wild, windy and stormy weather in the optimistic hope that



Wing saddle area of the Bearkitty shows the basic simplicity of the model. Light weight flies right!

Springfield would be spared. That didn't happen but I did get a chance to see Keith Shaw fly his Bearkitty in 20-30 mph winds! Keith is a tremendous flier and he made it look oh so casual.

The Bearkitty has been shown in a number of other model magazines and is a real performer in the air. Its structure is really quite simple and something that just about any modeler can duplicate. The wing is built up out of balsa while the fuselage is made of carved/sanded foam that's been hollowed out to a thin shell with a basic wood substructure supporting the radio, battery and motor. The foam shell is then covered with brown paper and thinned white glue. The brown paper used is just the simple, lowly old grocery store bag! Of course, that's assuming your grocery store still uses paper sacks. There have been a few articles on this construction technique in the model mags within the past year or so and when you see how well it works on Keith's Bearkitty, you'll want to try it yourself.

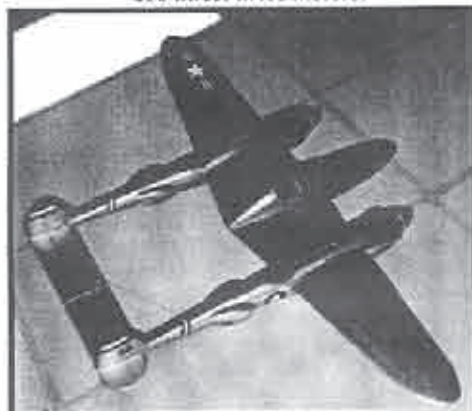
I also had the chance to see Jim Ryan's prototype of the F8F Bearcat for Speed 400 size motors and look forward to seeing it in kit form. Jim has a great semi-scale P-38 available and a F6F Hellcat that's worth having in your hangar. I picked up one of his Hellcat kits while I was there and the quality is top notch. Check out Jim's models by e-mailing him at:

jimryan@sprintmail.com

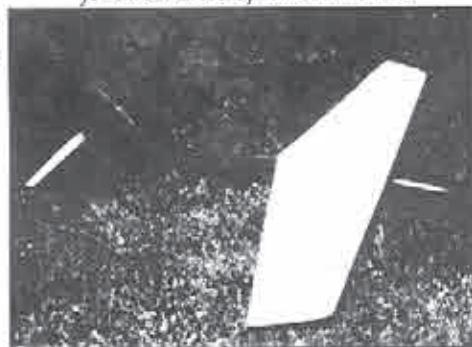
Keith preparing to remove the motor battery pack after another sortie - gives a sense of the size of the model. Note full flying stab and overall cleanliness of the airframe.



Hobby Lobby's P-38 Lightning for Speed 400 direct drive motors.



K&A Models Unlimited's P-38 Lightning for direct drive Speed 400 motors.



Partially completed Cavazo Sailplane Designs Vortex SP - review to follow shortly!



The front end of the Bearkitty - motivated by an Astro 020 brushless motor. Super gearbox combination. Plenty of power in that package.



Or give him a shout at:

Ryan Aircraft
6941 Rob Vern Drive
Cincinnati, OH 45239
573/729-3323

Tim McDonough is one of the prime movers of this E-Fly meet and also has his own line of kits, laser cut motor mounts and accessories. Check out Tim's website at:

<http://www.inw.net/~tpm>

Or contact him at:

Tim McDonough
127 S. Oaklane, Springfield, IL 62707

Tim has a Speed 400 MiniStreak that is oh so simple to build and flies well. It might even make a fun, light air mini-sloper!

The next Land of Lincoln E-Fly is scheduled for June, 1999 so mark your calendar accordingly and join in on the fun.

I have been building a Vortex SP from Cavazos Sailplane Design and will shortly have a review of this excellent kit in RCSD. It should be a quick building model for anyone though I have been oh so slow with mine because of outside commitments.

The model reminds me of an oversize pylon racer and looks fast and smooth just sitting on the building table. I am just a few days away from first flight but I am really looking forward to it! Check out CSD's ad elsewhere in the magazine and take a look at their products on their website. Good stuff!

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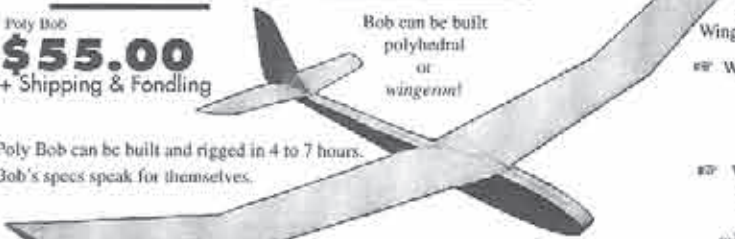
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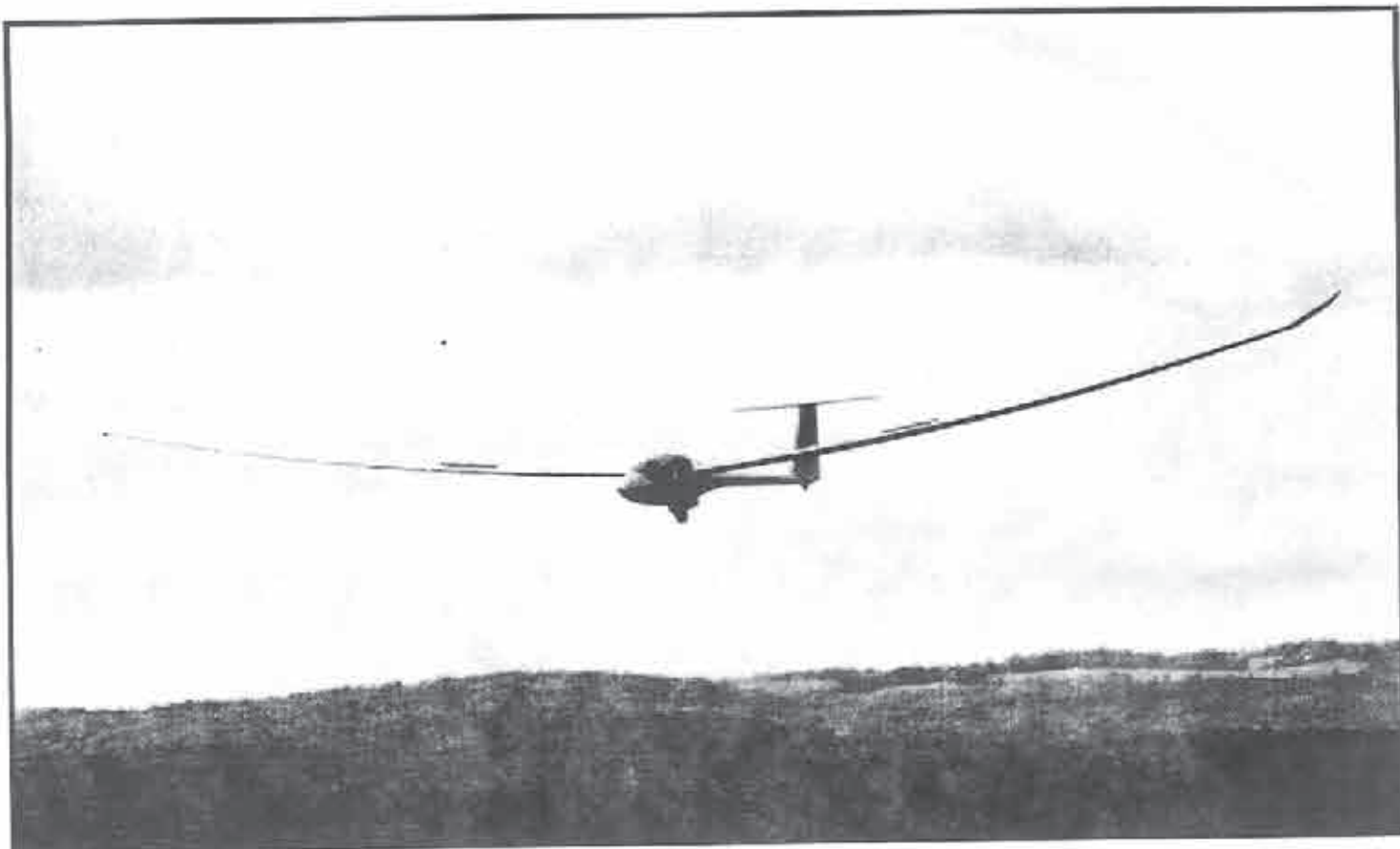
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ASH 25 performing mild aerobatics. Note the wing flex!

Aerobic Flight Plan

October 1997

- Uncouple your rudder & ailerons.
- Practice flying Straight & Level.
- Master airspeed.
- Practice the Inside Loop.
- Determine what rudder & aileron adjustments are required to fly a perfect loop.
- Tackle Inverted Flight.

November 1997

- Practice the Split-S or Wing-over.
- Practice gaining sufficient airspeed to be able to complete a 360° Roll.
- Practice The Roll.
- Combine maneuvers to develop your personal, custom, aerobatic sequence.

December 1997

- Practice 1/2 Cuban 8.
- Practice the Cuban 8.

January 1998

- Practice the Outside Loop.

February 1998

- Practice the Immelmann and Reverse Immelmann.

March 1998

- Practice the Hammerhead, Reverse Cuban 8, and Reverse Half Cuban 8.

April 1998

- Practice the Spin.

May 1998

- Practice the Tail Slide.

June 1998

- Practice the Humptybump. (Issue includes Sportsman & Advanced Routines.)

July 1998

- Practice the Chandelle & Procedural Turn.

August 1998

- Practice the Two Point & Four Point (Hesitation) Rolls.

Notes:

- Establish and maintain a "Sailplane Diary" for each plane.
- Review monthly progress.
- Practice flying with a knowledgeable friend or expert, and remember that safety comes first.
- Practice with a flight simulator program such as Flight Unlimited (April, 1997 RCSD).
- Definition of "One Mistake High": Be darn sure you're high enough to complete the maneuver and make one mistake, before hitting the ground.



"Hot Air"

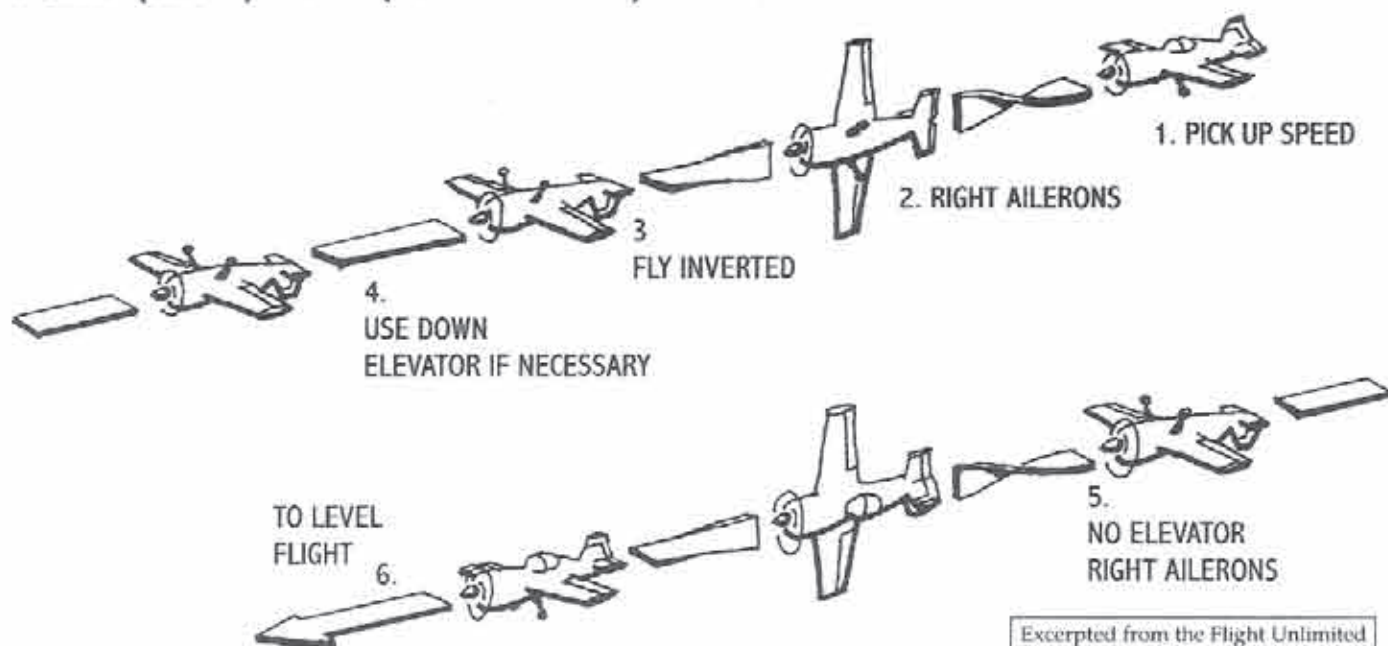
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Aerobatics

Many of you have very hot, sizzling *HOT*, temperatures outside. Others more fortunate, will be enjoying the best flying weather of the season. In either case, now that you are reading *RCSD*, please STOP! Go get yourself a nice coooooool drink and, on the way from the fridge, bring back your favorite R/C transmitter while you're up. No, I'm not kidding. Don't read any further. Put *RCSD* down and please *do* go get your transmitter. You're going to need it in just a little while because we're going to do some "hands on" aerobatics. The cool drink can only help...

I know a few of you have a computer flight simulator (Flight Unlimited or something else) - that's even better! Bring whatever flight box you use. Either way, your transmitter will help you get the feel of what's to come in your fingers. When you fly through an aerobatic sequence, the better you understand what your fingers must do, the easier it will be for you to "perform". The less you have to think about what you

2-POINT (SLOW) ROLL (TO THE RIGHT)



Excerpted from the Flight Unlimited game manual. Copyright 1995, 1997 LookingGlass Technologies, Inc.

fingers need to do, the better you will be able to fly through your desired maneuvers... And yes, practice makes perfect. I know you've heard that before, but it simply can't be said enough.

You're back so soon? Got yourself a nice cool drink and the transmitter? OK, let's buckle up next to the air conditioner and have some fun!

You may have noticed that many aerobatic maneuvers can not be divided into parts, while others are often used as elements of more complicated maneuvers. For example, the spin, the roll (or half roll), the chandelle, the stall turn, or the loop (or half loop) can not be divided into smaller parts - they are what they are as they are. Others such as the Cuban-8 (or half Cuban-8) can be divided into the sum of their parts. The Cubans really are just a combination of loops and rolls. For that matter, most maneuvers use the loop and/or roll as basic building blocks and, for this reason, these two are perhaps the most important maneuvers of all.

While there are just two types of loop (inside and outside - the knife edge loop is impossible in a sailplane), by contrast, the roll can be performed in many different ways. You can roll vertically, horizontally, pointed straight down, at 45 degrees in any direction, and the rotation can be slow or fast or stopped.

I am pleased to introduce my very good friend, the point roll or hesitation roll. This is a very handy dandy maneuver because it can be used anywhere the roll is used (with our good friends the Cuban-8s or the Split-S for example).

Hesitation Rolls or Point Rolls
(very difficult for R. + E. and moderately difficult for A. + R. + E.)

Once you have mastered the (continuous) roll, you might like to try the

hesitation or point roll, which are very interesting to do and to watch.

A point roll must hesitate with equal time on each point of its axis, hence the name hesitation roll or point roll. There are three basic types of hesitation rolls and many variations on these. In order of difficulty we have the two point roll, the four point roll and the eight point roll.

- The two-point roll is the easiest. The aircraft rolls to inverted, stops (hesitates), and then rolls right side up to level flight.
- Next is the four-point roll, with a hesitation at each 90-degree stop.
- Most difficult is the 8-point roll. The roll is divided into eight equal parts with the wings stopped at each of the eight points in the rotation (at 45 degrees, 90 degrees, 135 degrees, 180 degrees and so on).

These hesitation rolls are all well within the reach of any sailplane which has snappy and effective aileron response.

Here's how to do them:

The Two Point (Hesitation) Roll

Get a goodly amount of airspeed; then, from straight and level, with ailerons only (no coupled controls please!), roll to inverted flight and stop the ailerons. Continue inverted for a second or two; then (with ailerons only), roll right side up to straight and level flight. You might or might not have to add a little bit of down elevator when you are inverted to keep the nose up.

This maneuver presents no difficulties! Once you have mastered this, move on to the four point roll.

The Four Point (Hesitation) Roll

This maneuver is much more difficult to do well and requires a lot of airspeed. I

suggest you first try this in parts doing only the first 90 degrees of the roll and then fly back to level again. Once you have mastered this, go 90 and 180 degrees; after that go to 90-180-270 degrees and then... by Jove! You've got it! Remember to do an equal hesitation at each point in the roll. The longer you hesitate, the more impressive this point roll will be and the more difficult.

There are a couple of ways to approach the four point hesitation roll depending on what type of glider you are flying and how long you wish to hesitate between the four points. A quick hesitation can be flown as follows.

The (faster) Four-Point Hesitation Roll

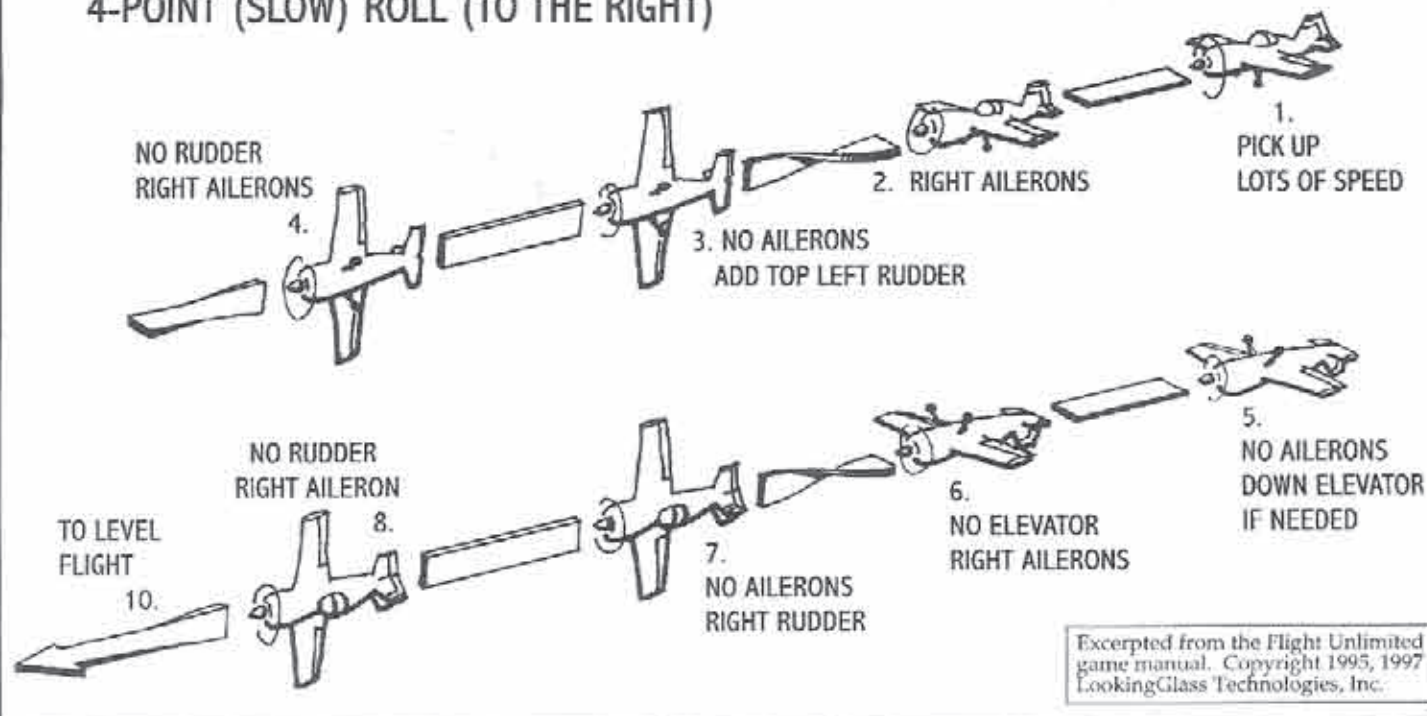
This maneuver is easiest with a good, clean (doesn't slow down very fast), snappy (crisp on the controls) glider.

Dive to gain enough airspeed; then pull up a bit past level, give full ailerons (one way or the other), and stop ailerons exactly at 90-180-270 and 360 degrees of rotation. You might need to add a little bit of down elevator when your sailplane is inverted. Try this and see how it works.

Airspeed, airspeed, AIRSPEED!

The idea is to fly the whole maneuver as straight and level as you can. As we are flying an unpowered aircraft, the tendency in flight is to both slow down and to start to drop the nose. If you fly slowly, the ailerons will not "bite" and will produce a slow rate of roll, which you don't want. If you are in the middle of the maneuver, the slower you fly (low airspeed), the more the nose will drop, the less effective the ailerons will be making it more difficult for you to complete the maneuver. That's why lots of airspeed is so important.

4-POINT (SLOW) ROLL (TO THE RIGHT)



You might need to start the 4-point roll with the glider nosed up and end the maneuver nosed down. However you approach it, the whole maneuver should be symmetrical, meaning it should either be executed straight and level or it should follow a barely noticeable horizontal arc. You DO want to draw attention to the point roll you are doing, but you want to "hide" the fact that you may not be able to do it straight and level.

The ease or difficulty of this maneuver will vary greatly from glider to glider. With some, the 4-point roll will be quite easy, while with others this will be a very difficult maneuver to do well.

As always, practice makes perfect!

Approach the four point roll little by little, mastering parts of it at a time.

As mentioned earlier, master the first 90 degree rotation first, then add the second point at the 180 degree hesitation, then add the third, and so on.

You can practice the last two points in the four point roll by doing a half loop, then flying inverted and, from there, trying the 270 degree hesitation and back to level flight.

Once you have mastered this four point roll, you are ready to try another variation of this hesitation roll.

The (slower) Four Point Hesitation Roll

More difficult, but also more spectacular, is the 4-point roll with longer hesitations. The longer you hesitate, the more likely the glider's nose will begin to drop. To counteract this tendency, you will need to add top rudder at the 90 and 270 degree points and down elevator at 180 degrees when inverted. In order to perform this maneuver well, you will most likely need to combine and coordinate inputs of rudder, aileron, and elevator with

just the right points in the roll as follows.

This is going to sound complicated at first, but it's really much simpler than you might think.

Now stop reading! Take a break!

That's right, put RCSD down, get up and go find your radio transmitter and let's run through this maneuver with you *holding your transmitter!* This will be much easier for you to understand if you are steering with the sticks. Now for some hands-on couch flying!

Are you now holding your radio in your hands? OK, ready or not, here we go!

Let's run through a (long) 4-point roll to the right.

Dive to pick up a lot of airspeed, bring the glider to straight and level, now:

1. Roll to the RIGHT (with ailerons) to the 90° position (stop the roll) and add top LEFT rudder. Notice that both sticks go *out* away from each other - (when you roll to the RIGHT top rudder is to the LEFT).
2. Roll RIGHT (with ailerons) to the 180° inverted position (stop the roll), add down elevator if necessary (to keep the nose up).
3. Roll RIGHT (with ailerons) to 270° (stop the roll) and add top RIGHT rudder (now the aileron and rudder sticks both push to the RIGHT in the same direction as your roll).
4. Roll RIGHT (with ailerons) 90° back to level flight.

A similar but slightly different pattern happens with the four-point roll to the LEFT. This time it's:

1. Roll LEFT (with ailerons) to 90° and now both sticks push towards each other, giving you RIGHT top rudder. Hesitate.
2. Roll LEFT (with ailerons) to inverted

and add down elevator if necessary. Hesitate.

3. Roll LEFT (with ailerons) to 270° and add top LEFT rudder (both sticks push in the SAME direction to the left). Hesitate.
4. Roll LEFT back to level flight and fly straight and level.

To sum up, if you're going to start your roll to the RIGHT (from level flight), your 90 degree hesitation (top) rudder will be LEFT. If you're going to roll to the LEFT, your 90 degree hesitation (top) rudder will be to the RIGHT.

Adding top rudder from inverted to the 270 degree position, your rudder control will always be in the same direction as the ailerons. Your top rudder is always in the same direction you are rolling.

Now here is a little trick, which will greatly help you with the long hesitation roll when and if you need top rudder:

- From level flight to the 90-degree position the rudder and aileron sticks always push IN THE OPPOSITE DIRECTION.
- From inverted to the 270-degree position the rudder and aileron sticks always push IN THE SAME DIRECTION.

The real trick WITH AEROBATICS is not to have to think about what your fingers are doing, so once again when inverted, remember that the 270 degree top rudder is always in the *same* direction as ailerons; from level flight, the 90 degree top rudder position is always *opposite* the ailerons.

What is Top Rudder?

By now I am quite certain that you have figured out what TOP RUDDER is, but just in case it's unclear to you, let me explain...

When the airplane is flying sideways on,

the rudder is in the horizontal position and so it can act like an elevator to some extent. Adding rudder in such a way as to bring the tail down, will help keep the nose up. Some of you have seen powered aerobatic stunt airplanes perform *Knife Edge* at airshows quite low to the ground. The airplane literally flies straight and level but sideways on, held off the ground by the powerful (top) rudder.

Now, run through the 4-point slow hesitation roll once again while holding your transmitter. Have you run through this holding your transmitter sticks? If not, DO try this again with the radio in your hands. Very quickly you will "get" it! And then it's off to the flying field or better yet, the slope to try this out for real.

It's really only a question of learning where and when to add (top) rudder, ailerons and (down) elevator.

Variations on a Theme

You might wonder what else you might do with the point rolls. Well you could mix your aerobatics up a bit. For example, you could do your Cuban-8 using point rolls. For that matter, anytime you need to roll in a maneuver, you could use your point roll instead (the Split-S, the HALF Cuban-8, the Reverse Cuban-8 are all examples). If you want to fly inverted, you can hesitate at 90 degrees before going inverted, and if you are already inverted, you could exit to normal flight with 2 points of a four point roll. The variations are limitless.

Practice Makes Perfect

Now do go out and fly through some hesitation rolls.

Use your imagination. You can use parts of some maneuvers added to parts of other maneuvers to create something new!

Just remember to fly one mistake high! Oh yes! And don't forget your radio!

Happy Landings! ■

NEWS REPORT

Model Solar Plane

Smashes Former Altitude Record

Reported by Lee Murray
Appleton, Wisconsin

Dave Beck set a record for solar powered model aircraft altitude Saturday August 15th with an altitude of about 4,500 feet. The record is unofficial at this point and the documentation of the altimeter, the flight equipment, and the specifics are yet to be submitted. The accuracy of the altimeter is to be established later this week. However, the event was quite exciting and we hope to bring it to the pages of *RCSD* in the not too distant future. The flight was performed on his Solar Solitude that was used to set a 25-mile distance record last year that has since been broken. The model had been fitted with new solar cells, a brushless motor, and a telemetry system for altitude, direction, signal strength, and voltage from the cells. This information was transmitted down to a large, strange looking antenna strapped to the top of Dave's van. Inside the van Dave's son, John, verbally reported the relevant information appearing on a laptop PC as the flight progressed. The flight lasted over two hours and was punctuated

with a moment of terror after achieving the maximum altitude as a transmitter battery went dead. The model went into a spiral until a backup transmitter could be put in service. The model's wing was flexed so badly that several solar cells broke and others were dislocated. Despite this, the model was landed safely at the Anderson Sod Farm, within 75 feet of the launch point, at the west end of the Anderson Sod Farm. The event was witnessed by a number of Valley Aero Modelers participating in the weekly, Saturday soaring activity.

Dave Beck was able to fly the model without visual aids while the CD (contest director) watched through a set of binoculars. The sky was nearly cloudless with only the tops of thermals briefly appearing to aid the pilot and model to achieve the desired altitude in spurts of high climb rates. This plentiful thermals later became a liability, as Dave struggled to bring the model down from the 4,500 feet. While Dave is the model designer, pilot and strategist, the solar project is the result of several people's efforts. Several ham radio associates provided the telemetry software and radio downlink. Other club members aided Dave in modifying the model, assembling the solar cells, and suggesting improvements. ■



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GORDY'S TRAVELS



Doug Barry of Richmond, Virginia holds his Monarch 2m closely to his heart; he has truly fallen in love with this ship. Who the heck is DB? Well, he's achieved LSF 5 and the Canadian achievement equivalent. Doug's experience flying and building sailplanes really adds weight to his words and he's got butterflies in stomach over this one!

Butterflies are Free, But Monarchs are Worth the Money

Gordy Stahl
Louisville, Kentucky
GordySoar@aol.com

The rumors of 2 meter class ship's death have been greatly exaggerated. Sure, there aren't many contests, or many ships produced, but everyone still seems to want to own one. I guess it's because of their convenient size and their agility: big enough to see way up there and small enough to fit in the back of the car or trunk. They rocket off launch and can work that light HL air.

V tails really found their home in this class ship, and because of that I went to the home of some fairly famous V tail guys, Joe Hahn and Don Stackhouse, the Monarch guys.

All the world recognizes the ships these guys have created, as their Monarch HL energized the current handlaunch craze. If you are expecting a review of their new composite 2m Monarch, well relax because you are going to get it. However, this ship is worth waiting for so before we go there, how about a look into where these history makers came from and what led them to get into the sailplane business.

Turns out they met while working together at an aircraft propeller company. Don Stackhouse was the senior R&D engineer and Joe was the senior Tech Rep. They were both way into RC aircraft, so they

started hanging out together, exchanging ideas and flying together.

Joe got hooked by a 1967 issue of *Flying Models Magazine*. There was a construction article by sailplane pioneer Carl Lorber. It was the 9' Molly Hawk. He sent away for the plan but never built it. Instead he built a 6' variation of it as a free flight. (Not bad for a 12-year-old!) His first RC ship was a 1/2a Goldberg Skylane. His first radio an escapement, he later moved up to a Galloping Ghost. (Pretty strange stuff and many of you reading this wouldn't believe how these old radios worked!)

Don's dad was a pilot and a modeler. So it was natural that Don would take up the balsa, too. Add in an eighth grade science teacher who was also flying RC, and the foundation was set forever. Christmas of 1969 brought his own first RC model and radio: a Falcon 56, with a .19 and a Galloping Ghost radio. Don had to pay for half of the \$100 cost of the radio, and it took him most of the following year to do it. His next ship was a 9' original design sailplane called the "Kittiwake" that got killed pretty often by the unreliable GH radio. But that pushed Don to begin experimenting with sailplanes and that one went through numerous variations.

Handlaunch class intrigued both guys and so Don ordered a couple of Flippers, and they flew 'em, but they weren't exactly the performance or construction either would have preferred. Discussions continued about the class, but there really wasn't any real effort made toward the better 'mouse trap'. Regardless, the fascination continued and so a call was put into NSP to ask what was hot in the HL class. At that time Brian Agnew's Vertigo was the ship, and one was purchased. It flew OK, but was heavy at 14.5 oz. In the mean time, Joe was flying a lighter (11.5 oz.) built up ship called the Mini Prodigy, which actually flew pretty well for him and was the first HL ship he sky'd out. Joe told me that's all it takes to really hook you in HL! It sure did him!

About this time they found out about the DARTS club, in Dayton, Ohio and began flying with them. In the club was a rival propeller manufacturer's engineer and the gauntlet was thrown. They were determined to prove that their company had smarter engineers than did that other guy's. Intense effort began to develop a HL that would humble this competitor. That was 1992; 10 wings, 6 fuselage types and as many tail assembly types were developed and tested, which finally led to the first Monarch. The funny thing was that they never had a chance to fly with this other engineer who had inspired them to create the Monarch, as he left for another company. His name is Greg Cole, a really nice guy; hope you read this!

Besides multiple prototypes, Don spent over 150 hours analyzing their data, and while they are quick to point out the computer can't give you a ship, it was helpful for them to optimize and evaluate

their ideas.

Here's Don and Joe

Q: Why the name Monarch?

Don: When we started this little project in 1992, Joe and I had merely wanted to develop a better HLG for ourselves, capable of flying well in our prevailing (lousy) west-central Ohio thermalling conditions. We had NO intention of making any of them for anyone else, let alone getting into the kit business. However, our design efforts turned out to be successful beyond our wildest dreams. We had also invested a lot of time, effort and money into the prototypes. In hopes of recovering a little of this, we first thought about selling a few to some of the other DARTS club members, and then looked at the bold step of marketing them through NSP. Sal told us to send him one to try, and he'd let us know if he liked it. We did, and that really launched our business!

We needed a name for this strange little sailplane, and for the fledgling company it had inspired. It was a Saturday morning in late February 1993, Joe had come up with the company name a while before, "DJ Aerotech", as in "Don and Joe". I was alone in my office at home, sitting in front of my computer, trying to come up with a name for our little creation and a logo for our new company. We needed a name that embodied the little glider's unusual combination of extraordinary L/D and range, and fantastic floating and turning ability. We needed something catchy, easy to say, and recognizable (i.e., no weird, unpronounceable names of animals that no one outside of central Mongolia has ever heard of).

Then it hit me... "Monarch". It had two meanings that both applied to our ship: "superior, regal, ruler of its society", and also the name of a certain butterfly with low speed performance (not unlike our model), but that migrated annually a distance of 12,500 miles, from Canada to Mexico and back again. Low speed float in combination with extraordinary range. In a flash, the name for our little sailplane - the "global butterfly" logo for our company - and the paint scheme for my own personal "Monarch", all simultaneously popped into my head. In a minute or two, I'd drawn a little pencil sketch of the logo, then called Joe on the phone to see what he thought of it.

Q: How did you decide on the materials for your planes?

Don: I'd become interested in composites a number of years before, when I started building a full-scale Rutan Vari-eze. My employer also did a lot of work with composites, and between what I learned on my own, plus what I picked up at work, I'd become reasonably familiar with them. I figured out that we could build a lighter, smaller and stronger fuselage from fiberglass than could be done with balsa. Wings were another matter.

Vacuum bagging techniques weren't well developed then; composite wing struc-

tures possible then would have trouble being as light as balsa, buckling strength of thin composite wing skins was an issue, and the available unidirectional carbon was too thick and ridiculously expensive.

It didn't look like balsa alone could have the necessary strength and still meet our weight targets. Also, from a commercial standpoint, the HLG sailplane market at that time wouldn't support the extra labor cost of a vacuum-bagged composite wing. Carbon is a poor match for balsa from a stiffness and strain-to-failure standpoint. Kevlar is also a poor stiffness match, and also has extremely poor compressive strength, very critical on a wing. We settled on a balsa-skinned wing and tail, using internal fiberglass reinforcements in the high stress areas. It was the best choice given the materials and equipment we had available and the structural and aerodynamic goals of the design.

Since then we've developed better wing and tail structures from composites, and all of our foam cored structures today use composite skins.

Q: Why V tails?

Don: I'd been experimenting with various sailplane design concepts since the late '60's with small (typically about 30 cm wingspan, 1 to 3 cm average chord) indoor free flight models. A lot of what I know about low Reynolds number aerodynamics began with those models. The experiments also included studies of different tail types. I soon found that of the various major types, for the same level of stability, V-tails did the best job of not getting broken on landing, recovering from spins and in minimizing drag. The aerodynamic advantages were very small in most cases, but the structural benefits were usually quite significant. Initially our kits came with an option for a conventional tail, but folks are so used to V-tails now that it really isn't necessary to provide for those compromises anymore on our more sophisticated composite kits. We still include the parts and instructions for both conventional and V-tails on our Chrysalis series of wooden sailplanes, and we plan to continue this in the future.

Q: How did you decide on an airfoil?

Don: We had tested various wings during the original development program on the Monarch. The first of those used existing airfoils, such as the Lippler 387 and the SD7037. They failed to meet our performance and/or handling goals. At that point I realized that the published airfoils everyone was using were based on the requirements of wooden structured wings for 2-meter and open class winch launched sailplanes. They were totally inappropriate for the completely different aerodynamic and structural requirements of HLG's.

At that point I used the lessons of my earlier experiments in very low Reynolds number models to develop some new airfoils. This was a big leap of faith, since the prevailing thinking in the sailplane community (including us) at that time was

that airfoil design was the exclusive province of "gurus" like Dr. Selig. It was considered somewhere between heresy and outright lunacy to use anything that wasn't published in "Soartech 8". Our very first sections were merely refinements of traditional airfoils, but then I began developing our own sections.

We made the switch to airfoils designed specifically for HLG's. (As opposed to merely borrowing something from some other class.), and tailoring the airfoils along the wing to match the local requirements. (As opposed to trying to make one airfoil fit the varying requirements of the entire wing; a practice that makes almost as much sense as sewing a glove with all 5 digits shaped to fit your thumb!) First the performance, and later, after more development work, the handling of our design rose to exceed our design goals.

Q: What parameters guide your designs?

Don: We try to consider the entire operating environment of the model, making as few "simplifying assumptions" as possible. For example, when a thermal duration model is flying slowly, it's also usually in a tight turn. The flow field around the model is highly non-uniform. This influences the entire design, from the optimum shape for the fuselage nose, to the planform and airfoil designs of the wings.

For example, certain problems in this mode, such as adequate tip stall resistance, cannot be solved effectively with washout; they require changes in airfoils. In a tight thermal turn, the airspeed, lift coefficient and even the Reynolds numbers at the tips and the root of the wing are all different, and the angle of the airflow at the nose and tail are different from what the wing sees. At high speed the balance between induced drag and parasite drag is different than at low speed, so the best design points for optimizing those two are different.

We try to take all of this into account, and develop a model that flies well at all points in its design envelope, rather than optimizing one particular operating point at the expense of the others. We develop a design specification based on this study, then design the model to meet that. During the course of development it's not unusual for our understanding of the operating environment to evolve, which may require changes to the design specification. Each new design teaches us something and makes our design process a little more efficient, but it may still take several iterations through the entire process to arrive at the final design.

Q: Where are your airplanes being flown today?

Joe: We have Monarchs on every continent except Antarctica. (As far as we know! Anybody take a Monarch with them to McMurdo Sound?) Outside of the US, Japan and Australia have the most "prolific" populations of our ships.

Q: How many kits have been sold?

Joe: We've sold approximately 1600 Monarch handlaunch kits to date.

Don: I find this number somewhat amusing. When we first started producing these, the typical "high performance" (by 1992 standards) HLG sold for around \$50 to \$70 each. The first Monarchs were priced at about \$100 with all wood and other materials, but without pre-sheeted wings. We were paying a premium for extra high quality wood, the labor to produce the model was also fairly high, and \$100 was a fair price considering all of this. I remember NSP telling us, "You'll sell a few at that price, but not very many!" I think we've shown that the soaring community is willing to pay a fair price for quality, as long as the product is truly worth it.

Q: What parameters did you use for the new 2 meter ship?

Don: We'd been flying the prototype of the 2 meter Chrysalis, and noticed that it was surprisingly close to the performance of the original 2-meter Monarch. Just as the performance of the hand-launch Chrysalis had prompted us to improve the Monarch 'C' HLG, we now knew our flagship 2-meter needed an upgrade. We needed something with more high speed performance and energy retention, but without sacrificing thermalling ability. The original Monarch 2-meter had great L/D and thermalling ability, but got into drag trouble at very high speeds. It also didn't have as much tip stall resistance as we would like. We'd just finished development of the Monarch 'D' hand-launch kit, and in the process developed some improved families of airfoils and some better ways of analyzing the aerodynamic conditions in circling flight. We applied these to the design of a new 2-meter, based on a new design specification written for that particular type. The resulting design was the Monarch 'D' 2-meter.

Q: How does it differ from your original Monarch 2 meter ship?

Don: We've changed the wing structure to make it lighter and also easier to produce. The airfoils and planform are totally different from the original Monarch 2-meter, which caused a change in the fuselage, requiring a new mold. We took that opportunity to include some changes in the fuselage's wing and tail saddles to make it lighter, stronger, stiffer, easier to manufacture and easier for the customer to assemble and maintain. The new wing required some changes in the tail to get the stability balance just right, so the tail moment arm on the new fuselage is a bit longer. In flight, the low speed performance is similar but the handling is much better, as well as the high speed performance. It's very much like the difference between the old Monarch '94 or Monarch 'C' handlaunch and the new Monarch 'D'; drastically improved high speed and even friendlier low speed behavior. Of course all this makes it even more fun to fly!

Q: What is the construction of the wing, and what makes it strong enough for today's aggressive winch loads?

Don: We use the best materials for the job;

then we use finite element analysis to figure out the best locations for exactly the right amounts of them. Then we do static tests to make sure we didn't miss something, and finally we do deliberately abusive winch testing to prove that it works. The finite element studies are the key in this case; if a problem occurs in testing, it's the finite element analysis that does the best job of finding why it broke. It's not enough to know what happened; you must also know why it happened, if you hope to find the optimum fix.

Q: Your aileron ships have unique, wide flaps and ailerons. Why?

Don: It's a function of the low Reynolds numbers. On airfoils this small, the control surfaces work much better with the hinge lines further forward. Large chord and small deflections seems to be a much more efficient approach, both according to theory and according to our test results. Just as full scale airfoil sections don't usually work well on models, full scale control surface design practices typically don't work very well either.

Q: Tell me about the fuselage features, and why it self-aligns the usually tricky, V tail alignments.

Joe: The tail mounting area is molded so as to allow the tail to locate itself only one way. Our original 2 meter has a molded "fork" that the tail slides into, which automatically keys the tail into place with the proper incidence. The second generation 2 meter will have an arrangement which does the same thing, but with a simpler shape in the mounting area, which will save weight. The prototype weighs 38 ounces. Production ships will be closer to 35.

Q: What airfoil and why the planform?

Don: It was all a result of the design specification, and the resulting demands on the wing at various flight conditions. Getting sufficient tip stall resistance in tight thermal turns was a big part of it. The airfoils are from the DS6082 family, the same family as the Monarch 'D' hand-launch, but not the same specific airfoil sections or planform. The DS6082 is a proprietary family, developed here. "DS" stands for "Don Stackhouse", and the number has absolutely nothing to do with the geometry.

Q: Can it be purchased in a one or two piece wing?

Joe: We will have the 1 piece version available first, with a 2 piece version to follow.

Q: How about a polyhedral version for R.E.S. events?

Joe: We just got some feedback from our first RES owner/flyer. He is thrilled with this ship, and placed VERY well in his first contest.

Q: How much will the new ship be?

Joe: \$400 range, approximately.

Q: You offer the Chrysalis in a wood kit that has been very competitive and economical; any plans for a two meter

design?

Joe: Yes, the 2 meter Chrysalis prototype is/has been flying extensively. It looks like a killer performer. We hope to have that kit out soon. It should be extremely competitive in the many RES contests that have a wood-construction requirement, but it's also more than stable and gentle enough for beginners. The L/D is high enough that we decided to make spoilers standard equipment. It's much easier to land that way; it doesn't like to come down without them.

Q: What new developments are in the near future?

Don: One of my Internet friends asked me the other day how many projects we had in the works. I counted 19 kit designs in various stages (it's now up to 22), a consulting job for the airframe of a special-purpose aircraft, our 3x4 foot low speed wind tunnel project, and the construction of our second factory to try to keep pace with the rising demand for our products. The 2-meter Chrysalis should be available very soon. We also have some giant scale sailplanes and power models in the works, and a number of EPP models of various types.

We have a built-up Mosquito class (750mm) HLG in test, and its initial performance looks very promising, actually very similar to the Chrysalis 1.5 meter HLG. It's called the "Nymph". We have a composite Mosquito class model in the works, the "Harvester". (Named after a small carnivorous butterfly; it EATS OTHER BUGS!) It should be even higher performance than the Nymph. We have a number of other ideas in development, some very innovative flying wings of various sizes, and a new open class model I hope to have in the air this summer.

Q: There have been rumors of one of you becoming sensitive to epoxy; anything you want to say about that?

Joe: YES! Don't take the stuff for granted. Wear gloves; DON'T get it on you. You MAY be lucky and never be bothered by it, but once an epoxy allergy attacks you, it will be too late and you WILL be sorry you weren't more careful. Just being exposed to the fumes bothers me now. In my case, open, un-healing bleeding from hands/face/arms/etc. Swelling, itching (really FUN in the summertime). Some folks can even go into a type of shock in which breathing is severely impaired. It CAN kill you!

Don: So far I've been lucky, none of the problems that Joe has seen, but I'm very careful with the stuff. Given enough exposure, EVERYONE eventually develops an allergy to epoxy, it just happens quicker to some. One of the side projects I've been looking into is alternative materials that can possibly give us the performance of epoxy without its health risks. Vinyl-ester resins look promising, but they require changes to nearly everything else in the model. For example, you can't use them with any type of Styrofoam core; they eat it.

Q: Who actually does the core cutting, lay-ups and fuselage construction for the kits?

Joe: We have some very talented folks working for us. Katie Simpson, our production manager, does all of our fuselage lay-up work as well as many other production operations, and Jason Patterson does wing and tail production. I basically get in their way and slow them down — that's my job.

Flying the New 2 Meter

I met Joe at his home on my way up to Toledo, a work trip. He gave me a tour of his design development facility (the garage), and we set up a date to do some flying on my way back.

The weather did not cooperate; the wind was howling at around 20 mph. Sunny though, and a really nice flying site. We launched with a high start and flew at least 20 flights. I caught thermals and worked way down wind and often found some wave over a tree line. My goal was to see how well this light airframe would penetrate for the return trip. Of course all of Don's science paid off; not once did either of us have a problem bringing it home.

I did lots of launch and land cycles to see how it handled during the rigors and demands of landing. The huge flap surfaces didn't drop the conventional 90 degrees, and that didn't surprise me, as the wing uses a 'live shin' hinge. But the huge chord of the flaps slowed and controlled the glide path without complaint.

Both Joe and I attempted some really dumb downwind and in-the-turbulence turns, and in a few cases our gambles didn't pay. Yes, the old spin into the turf trick; I particularly wanted to see how the airframe would hold up. The wing and tail feathers took the worst of the hits, with no problems, wrinkles or crushes.

The fuse is very light, and the wing has some unique construction features. Joe mentioned the tail mount system. This area of the fuse has the angle molded into the mounting area to make sure the tails are aligned; the mount is strong, and it provides a lot more tail boom stiffness over the previous mounting system.

The ship looks a lot like a Monarch, only bigger.

The wing construction includes some Spyder foam, matched with lighter gray extruded foam and some awesome carbon laminated in to assist in the spar strength.

There is no doubt that the one piece wing is not a problem with transport and it's lighter, stronger and simpler. If you expect it to be a copy of existing conventional 2 meter ships, forget it. From the ground up, it is all Monarch. And from what I experienced that windy day at the field, that's a good thing!

Mid-South Monarch Experiences

The Monarch was deadly and popular. They showed up flying against open class ships and in the hands of some super stick pilots. Jim Bacus of Mr. Magoo fame

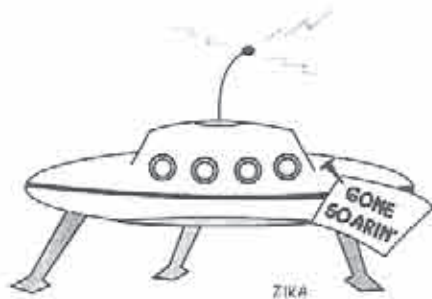
based in Illinois flew his, and from the other side of the world was Doug Barry. Ed "Hobby Hanger" had his and well there were so many that we were concerned about having to get butterfly nets instead of landing zones! These ships look a lot bigger than 2m and they sure flew like they were. Cool and individualized paint jobs on them wings seemed to be the trend.

If you have more questions or want to contact Don or Joe, you can call Joe at (937) 773-6772, or e-mail them at either "djwerks@bright.net" for Joe, or "djarotec@bright.net" for Don.

I would have to say that the guessing is over; the Monarch 2m is worthy of its place along side their prestigious HLG line.

Traveling has its advantages, and this trip made up for some rainy, boring ones in between. Be on guard, I just might show up at your site! Next stop? You'll see.

Hope you enjoyed this trip! ■



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F3B EAGLE Specifications:

WING SPAN	112.5"
WING AREA	935.50 SQ. IN.
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AIRFOIL	R6-15
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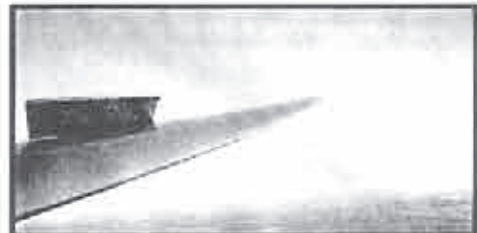
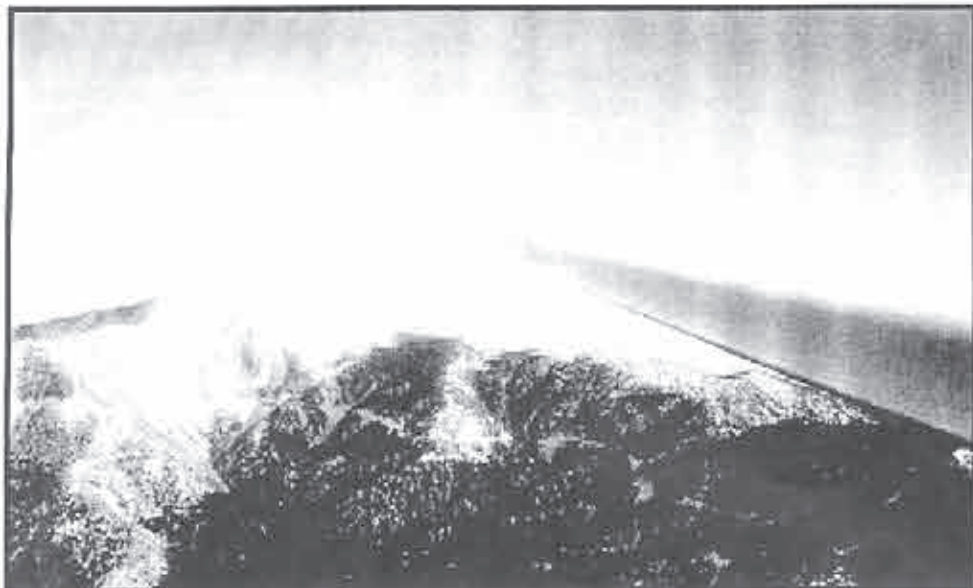
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Winter Soaring at Crystal Soaring

By Joe Enhuel

Lawrenceville, New Jersey

Whenever I travel, I always check to see if there are any full-size soaring sites near my destination. Why? Because I enjoy full-size soaring as much as R/C soaring. I have been flying full-size, two-place sailplanes (with an instructor) off and on over the past ten years and I love to fly at different sites to sample different flying conditions and to view the various landscapes in the country.

I was in Los Angeles in early January of 1998. The nearest soaring site (Crystal Soaring) is located in Llano and is about 2 hours drive from where I stayed. I called Crystal Soaring and was told a slot was available on Saturday afternoon and off I went.

The Crystal Soaring site is located at the foothill on the eastern side of the San Gabriel Mountains with an elevation drop at about 5,000 feet. The geographic setting is ideal for thermal and wave flight. The thermals top off at about 18,000 feet above MSL in summer.

I was greeted with warm winter desert sunshine and a light breeze when I arrived at the site. My Grob-103 (with my instructor George Watkins) was ready at about 3:30 p.m. I have flown with George before and he is considered one of the best sailplane instructors in the country. The tow-line was hooked up and we were on our way to the top of the San Gabriel Mountain. The tow was smooth and I knew that I could not have picked a better day for soaring. The Grob was released about 500 feet above the snow-capped mountain and we were in light slope lift. I looked down and saw a pickup truck on a winding road. The visibility was almost infinite and the air was silky smooth. On the way down, we flew over the San Andreas Fault and California Aqueduct. The Grob landed smoothly just before

sunset. I did not feel light headed thanks to the smooth winter air in the California desert (expect a bumpy ride during a windy day).

There are hundreds of full-size soaring sites around the country and each site is unique based on my limited experience in

flying at different sites. When you travel, try out a ride at a soaring site nearby and get a change of pace from flying R/C.

I sure miss the winter soaring experience at a California desert glider port, especially now in the middle of summer.

5th Annual Southern California Scale Glider Festival

September 19th

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To be held in Costa Mesa, California
at the H.S.S. field. This will be an A.M.A.
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Events:
Saturday, 8:30 to 9:00 check-in
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11:00 static judging, 1:00 awards presentation

Prize choice awards for:

Vintage 1908-1945 1st 2nd 3rd
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All model industry vendors welcome!

Entry fee \$20.00 Pre registration by August 1st, 98 \$25.00 after August 1st
All entrants must have a current AMA card! no exceptions!!!
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Email "rickbriggs@earthlink.net"

NEW PRODUCTS

The information in this column has been derived from manufacturers press releases or other material submitted by a manufacturer about their product. The appearance of any product in this column does not constitute an endorsement of the product by the R/C Soaring Digest.



P.S. Flyer

...from Buzz Waltz R/C Designs

The P.S. Flyer 78", cabin-type, electric powered sailplane, has been redesigned for the Master Airscrew electric motor and 3:1 gear drive and folding prop.

The 660 sq. in. wing is two piece construction, with spruce spars, and I-beam sheer webbing to the tip; wing is joined together with steel rod. Large wing area makes it a great trainer. Construction is simplified with use of full size plans and step-by-step instructions.

All balsa, lite ply kit is available as standard kit for \$50.00, or deluxe kit with master motor and prop included for \$92.00.

Buzz Waltz R/C Designs, 68-320 Concepcion Rd., Cathedral City, CA 92234; (760) 327-1775. ■

Czech-Built Sailplanes & Sailplanes

...from Sailplanes Unlimited, Ltd.

Completely finished Czech-built sailplanes with all flying surfaces finished and covered (Oracover or glass, depending on the version); retracts and spoilers are installed - add control horns, nose weight, radio and go fly!

- 1/3 Ventus 2C all glass, 6m (237") wing span, HQ 3/15, 13, 12, 10, 8 wing profile, ~26 lb.
- 1/3.75 ASW 27 foam-obechi and all glass, 4m (158") wing span, HQ 3/12 wing profile, ~11 lb.
- 1/3.75 ASW 24 foam-obechi, 4m (158") wing span, HQ 3/12 wing profile, ~11.5 lb.
- 1/3.8 Kestrel T 19 all glass, 5m (196") wing span, HQ 3/15-10 wing profile, ~15 lb.

Bruckmann ASK 18

Capable of mild aerobatics, the ASK 18 (1/3.8 scale, 4.2 meter (176") wing span, E 203 wing section, 11 lb.) is one of the most stable and nicest thermal scale sailplanes available for the first time scale pilot, as well as the seasoned expert. Suitable for slope, winch or airtow.

White gelcote fuselage comes with wing joiner and alignment tubes in place; alignment tubes for the stab and elevator are cut out and glued in place; rudder post is hinged, ready to accept the rudder and glued in place. Flying surfaces are completely finished and ready for covering. Balsa/obechi stab and elevators are completely finished with elevators cut out and capped and alignment tubes and braces glued in place. Balsa/styro rudder



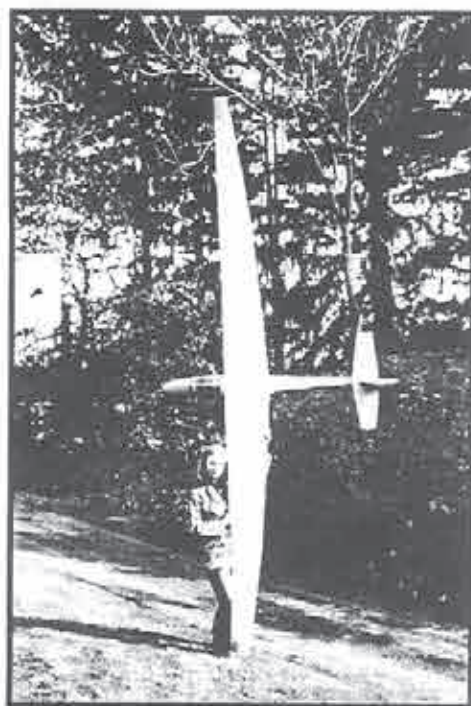
Bruckmann ASK 18

is completely finished with hinging in place, and ready for installation. Styro/obechi wings are carbon fiber reinforced with carbon fiber leading edges; spoilers installed; cutouts for ailerons and spoilers; aileron servo wires installed in wings; wing joiner tubes and alignment rods finished and glued in place. This ASK 18 comes with a canopy (no canopy frame) and a GFK wing rod.

Bruckmann Salto

The V-tail Salto (1/3 Scale, 4.5 - 5.2 meter (176" - 204") wingspan, Ritz 2 wing section, 14 lb.) is unique; this version, with its two wingspans is truly one-of-a-kind. With a longer span thermal configuration, this Salto is an excellent floater, while in the shorter winged version, it is more aerobic, will fly a bit faster and has excellent penetration. Recommended for intermediate and expert pilots, suitable for slope, winch and airtow. (Put the tow release a few inches from the nose underneath the fuselage.)

White gelcote fuselage has wing joiner tube and wing alignment tube finished and glued in place; alignment tubes for the stab/elevators installed. Flying surfaces are completely finished and ready for covering. Stab/elevator is very light and built of balsa/obechi sandwich and comes with carbon fiber alignment plug-in rods installed; elevators are capped and totally finished, ready for covering & hinging.



Styro-obechi wings are completely finished; 500mm spoilers are installed; ailerons are capped and finished; servo cut-outs have the servo wires installed; spoiler cut-outs are ready for servo installation; wing joiner tubes and alignment rods are glued in place; forward & trailing edges are carbon fiber reinforced as is the wing itself; styro/obechi wing tip extensions are completely finished with carbon fiber alignment tube and joiner glued in place and ready to put on the wing. Kit comes with a canopy, canopy frame and a solid GFK wing rod.

The Bruckmann 1/3 Fox

The Bruckmann 1/3 Fox (1/3 Scale, 4.66 meter (183"), E374-SD6060-SD6062 wing profile, ~24 lb.) is a light, aerobic scale model suitable for intermediate and expert pilots. Good for airtow, slope and a powerful winch.

Fuselage is white gelcote; wing joiner, rod and alignment pins are installed in fuselage and in place; rudder post is glued in, hinged and ready to accept the rudder; front and rear wheels are installed and ready to roll; elevator hold down mechanism is glued in place; there is a "monoblock" wing joiner locking system installed and ready to hold the wings on. Obechi-covered wings are finished and carbon fiber reinforced. Servo wire and aileron and spoiler cutouts are in place; the finished, hinged, gapless ailerons are rounded into the trailing edge of the wing; spoilers are installed; wires for aileron servo is in the wing. Rudder and stab/elevator are styro/balsa, hinged and completely finished. Canopy is glued to canopy frame and fitted to the fuselage. Model comes almost complete; just add nose weight, attach control horns, cover flying surfaces, install servos and radio equipment.

Contact Sailplanes Unlimited Ltd., 63 East 82nd St., NYC, NY 10028; (212) 879-1634, fax (212) 535-5295, <www.sailplanes.com>. ■

Classified Advertising Policy

Classified ads are free of charge to subscribers provided the ad is personal in nature and does not refer to a business enterprise. Classified ads that refer to a business enterprise are charged \$5.00 per month and are limited to a maximum of 40 words. The deadline for receiving advertising material is the 15th day of the month. (Example: If you wish to place an ad in the March issue, it must be received by February 15.) RCSD has neither the facilities or the staff to investigate advertising claims. However, please notify RCSD if any misrepresentation occurs. Market Place Listings are \$5 a month. Personal ads are run for one month and are then deleted automatically. However, if you have items that might be hard to sell, you may run the ad for two months consecutively.

For Sale - Business

PC-Soar Version 3.5 Sailplane Performance Evaluation Program Optional Sailplane Library now expanded to 54 models including: Alcyon, Anthem, Genesis, Mako, Probe, Thermal Eagle, and Synergy 91. Free Library Upgrades. PC-Soar Upgrade to Ver. 3.5 \$10, PC-Soar New Purchase \$40. New Libraries of Sailplanes and Airfoil Polars \$30. Please include \$3 P&H for all purchases & upgrades. Also available: Laser cut airfoil templates. LJM Associates, 1300 Bay Ridge Rd., Appleton, WI 54915; ph: (920) 731-4848 after 5:30 pm weekdays or on weekends; <<http://www.athenet.net/~atkrn95/pcsoar.htm>>.

PRECISION AMAP WING CUTTER, replacement parts, and service. AMAP Model Products, 2943 Broadway, Oakland, CA 94611. Butch Hollidge, (510) 451-6129, or fax (510) 834-0349.

A.M.P. Aerial Model Products, sport, slope, race prototypes - all airfoils. 60" Del Valle Snake, 94" H&K Cobra, AMAP Flair, Kevin Cutler's full house Davenport Monitor. All race tested. Butch Hollidge, (510) 680-0589, eve, California.

PARACHUTES: \$10. Dale King, 1111 Highridge Drive, Wylie, TX 75098; (972) 475-8093.

PLANS - R/C Sailplanes - Scale, Sport & Electric. Old Timer & Nostalgia - powered, rubber, and towline. Scale - rubber. All models illustrated. Catalog: \$2.00. Cirrus Aviation, P.O. Box 7093 Depot 4, Victoria, BC V9B 4Z2, Canada.

For Sale - Personal

1/3 scale ASW 20/20L short kit, fuse, canopy, gray foam cores, some instructions. Yields 184" or 224" span (you choose) 2 to sell. \$200.00 each + shipping. Paul Wright, (402) 796-2175, <PaulW@isco.com>.

Original Hobbie Hawk in styrofoam case, no radio... \$200.00 obo. Paul Wright, (402) 796-2175, <PaulW@isco.com>.

Zagi combat wing, RTF, RCD5 ch receiver, 500mah battery pack & 2 Hitec servos... \$125.00 + shipping; Rahm's winch retriever, like new... \$175.00 + shipping. Randy Martin, (310) 519-9539, California.

112.5" Condor, complete kit, by Slegers International, SD7035, steel rod, white gel fuse... \$325.00 plus postage. Tom Botkin, (941) 291-6391, Florida.

1/3scale Bruckmann Fox, partially damaged, 4.66m (183"), E374-SD6060-SD6062 wing profile, ~24 lb... \$795 + shipping (was \$1485 new). Fuselage is white gelcoat. Wing joiner, rod & alignment pins are installed in fuselage; rudder post installed & hinged, front & rear wheels installed, elevator hold down mechanism glued in place, "monoblock" wing joiner locking system installed. Obechi covered wings are carbon fiber reinforced. Servo wire, aileron & spoiler cutouts are in place. Finished, hinged, gapless ailerons are rounded into trailing edge of wing, spoilers installed, wires for aileron servos in wing. Rudder & stab/elevator are styro/balsa, hinged, completely finished. Canopy glued to canopy frame and fitted to fuselage. Minor damage to one wing at root; more substantial damage to other wing at root. Wing rod in place; integrity of wing not in doubt. Contact Robin Lehman, 63 E. 82nd St., New York, NY 10028; (212) 879-1634, <www.sailplanes.com>.

1/4 Roedel Super Cub (towplane), 2.687 meter span, wing profile Clark Y mod. (suitable motors are 160 T, 300 T, OS BGX-1, Brison 3.2 or similar), NIB... \$385.00. Contact Robin Lehman, 63 E. 82nd St., New York, NY 10028; (212) 879-1634.

Wanted

Looking for 1/5th scale Twin Astir/Twin Grob glass fuselage complete with canopy to match a pair of wings that are lonely. The original was one of the original Wik composite ARF of 15 year vintage that has given good service until the wing joiner decided to separate. Call (905) 468-3923 or e-mail Phil at <linden@niagara.com>, Niagara Peninsula, Canada.

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Closet Scale Stuff At Sailplanes Unlimited, Ltd.

1/3 Pribek ASW 27 - 5 meter span (196"), wing profile HQ 2.5/12, ca. 20 lbs.

1/4.2 FiberClassics Nimbus 4 - 6.28 meter span (246"), wing profile E 68-66, ca. 18 lbs.

1/3.6 Roedelmodell DG 800 - 4.15 meter span (163"), wing profile E 207, ca. 11 lbs.

1/3.75 Roedelmodell Fox MDM-1 - 3.8 meter span (149"), wing profile RG 12, ca. 15 lbs.

1/2.77 PriBek ASW 19 - 5.4 meter span (212"), wing profile Ritz 3 mod., ca. 20 lbs.

Roedelmodell Ka6E, NIB, slight imperfection, \$495.

Roedelmodell ASK 21, slight shipping damage, NIB, \$395.

Please call for additional info: (212) 879-1634.

BOOKS FOR SALE

All of the books listed are duplicates from our private library. All prices include packaging and postage. Checks or cash only, please. Your money will be returned if the book is already sold.

* The Pocket Encyclopedia of World Aircraft in Color - Fighters Between the Wars, 1929-39; Kenneth Munson, Macmillan, 1970. 164 pp. \$8.00

* Fighters and Bombers of World War II; Kenneth Munson, Peering Books, 1969. 323 pp., with dust cover. \$15.00

* Radio Control Slope Soaring; Dave Hughes, RM Books, 1983. 324 pp. \$15.00

* Old Buzzard's Soaring Book; Dave Thornburg, Pony X Press, 1990. Square corners, damaged exterior back cover. \$8.00

* Old Buzzard's Soaring Book; Dave Thornburg, Pony X Press, 1993. Rounded corners. \$15.00

* Aerodynamics of the Helicopter; Gessow & Myers, Macmillan, 1952. Ex-library, has "unique" bookplate. 343 pp. \$15.00

* Model Airplane Design and Theory of Flight; Charles Hampson Grant, Jay, 1941. 512 pp. \$30.00

* Jane's World Sailplanes and Motor Gliders; Andrew Coates, Ziff-Davis, 1978. 192 pp., with dust cover. \$25.00

* Aircraft Archive - Famous Racing and Aerobatic Planes; Argus, 1989. 95 pp. \$10.00

* B-1 Lancer, in detail and scale; Wayne Wachsmuth, TAB, 1990. 72 pp. \$10.00

* Radio Control Miniature Aircraft; Robert Lopshire, Macmillan, 1974. 180 pp. \$10.00

* Technical Aerodynamics; Karl D. Wood, McGraw-Hill, 1935. 330 pp. \$15.00

* Aerodynamics of the Airplane; Clark B. Millikan, John Wiley & Sons, 1946. 181 pp. \$20.00

* America's Soaring Book; Editors of Flying Magazine, Charles Scribner's Sons, 2nd printing, 1975. 272 pp. \$20.00

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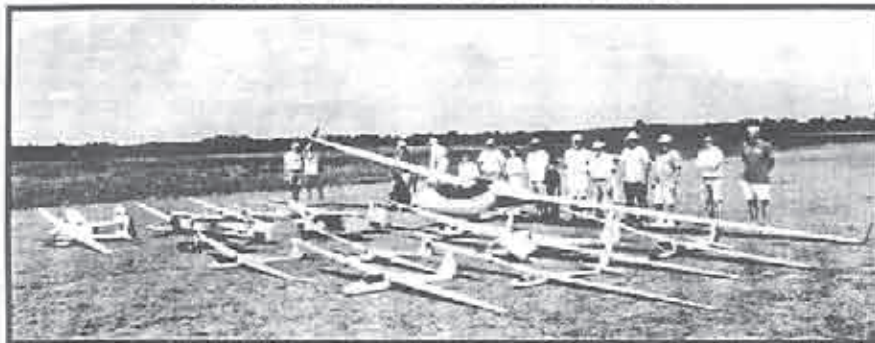
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SCHEDULE OF SPECIAL EVENTS



Fayetteville '96, Lehman photo.

September 4-6

Texas National Tournament
Henry Bostick, (972) 279-8337 Dallas, TX

September 5-7

Soar Utah '98 Salt Lake City, UT
Kent Petersen, (801) 254-5018, petersek@wipd.com
<http://www.wordplace.com/soaring>

September 12-13

Sailaire One Design Contest Cincinnati, OH
Ed Franz, (606) 586-0177, ejfranz@fuse.net

September 18-20

Last Fling of Summer Broken Arrow, OK
Jeff Naber, (918) 495-1028
Nxtdoor@webzone.net

September 19-20

442-444 Tullahoma, TN
Herb Rindfleisch, (931) 455-1836

October 2-4

Airtow Acrobatic Sailplane Contest Fayetteville, NC
Wayne Parrish, (919) 362-7150

October 3-4

25th CVRC Fall Soaring Festival Visalia, CA
Phil Hill, (209) 686-8867

October 3-4

CSS Fall Intergalactic Cincinnati, OH
HL Series Event
Paul Siegel, (513) 561-6872, psiegel@fuse.net

October 17

LSF South East Regional Contest Huntsville, AL
Ron Swinehart, (205) 722-4311
ron.swinehart@lmco.com

October 17-18

Pumpkin Fly Cincinnati, OH
Ed Franz, (606) 586-0177, ejfranz@fuse.net

November 7

Turkey Fly (Winch & HL) Cincinnati, OH
Ed Franz, (606) 586-0177, ejfranz@fuse.net



Pensacola, Lehman photo.

1999 - June 25-27

MSSC '99 Memphis, TN
Bob Sowder, (901) 751-7252

Please send in your scheduled events as they become available!

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Friday, 2 pm: Class A - HL - 6 Rounds
Saturday, 9 am: Class D - Uni. - 6 Rounds
Sunday, 9 am: Class B - 2 Meter - 4 Rounds
Sunday, 3 pm: Awards

AWARDS: 1st Place Overall

5 Places - Open, 3 Places - Sportsman & HL

\$25 - one class ** \$10 - second class
\$40 all three classes

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Denny Darnell, Assistant CD

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(918) 481-5855, DOZ@ionet.net

ENTRY FORM

Date ___ Freq. 1st/2nd HL ___ / ___

2M ___ / ___ UNL ___ / ___

Name _____

Phone _____

Address _____

Open _____ or, Sportsman _____

HL ___ 2 M ___ Uni. ___

AMA Number _____

Amt. Enclosed: \$ _____



Los Banos, Lehman photo.



Elmira '96, Lehman photo.



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Salt Lake City, Utah

Vintage Scale · Modern Scale · Power Slope Scale · Open Fun Flying

Primary slope - Point of the Mountain

Alpine soaring - Francis Peak, more than a mile above the valley

To register or for more info visit <http://www.soarwest.com>, call Scott at
801.965.6055 or email smasta@medicode.com.

R/C Soaring Resources

These contacts have volunteered to answer questions on soaring sites or contests in their area.

Contacts & Soaring Groups - U.S.A.

Alabama - North Alabama Silent Flyers (NASF), Ron Swinehart, (205) 722-4311, <ron.swinehart@lmco.com>, or Rob Glover at AMA3655@aol.com, <http://sh1.ro.com/~samfara/>

Alabama - Central Alabama Soaring Society, Ron Richardson (Treas.), 141 Broadmoor Ln., Alabaster, AL 35007, <ron_mail@bellsouth.net>.

Alabama - Southern Alabama & NW Florida Aerotow, Asher Carmichael, (334) 626-9141, or Rusty Road, (904) 432-3743.

Arizona - Central Arizona Soaring League, Iain Gilthero, (602) 839-1733.

Arizona - Southern Arizona Glider Enthusiasts, Bill Melcher (contact), 14260 N. Silwind Way, Tucson, AZ 85737; (520) 825-2729. SAGE welcomes all level of flyers!

Arkansas - Northwest Arkansas Soaring Society, Tom Tapp (President), RT 2 Box 306, Huntsville, AR 72740; (501) 665-2201, eve.

California - California Slope Racers, John Dvorak, 1063 Glen Echo Ave., San Jose, CA 95125; (408) 287-0375.

California - DUST, Buzz Waltz, 68-320 Concepcion, Cathedral City, CA 92234, (760) 327-1775.

California - High Desert Dust Devils, Stan Sadoff, 14483 Camrose Ct., Victorville, CA 92392; (760) 245-6630, <Soareyes@aol.com>.

California - Inland Soaring Society, Robert Cavazos, 12901 Forman Ave., Moreno Valley, CA 92553, RC.AV@aol.com.

California - Northern California Soaring League, Mike Clancy, 2018 El Dorado Ct, Novato, CA 94947; (415) 897-2917.

California - Sacramento Valley Soaring Society, Lee Cooper, 4856 Rockland Way, Fair Oaks, CA 95628, (916) 966-2672, <www.svss.org>.

California - South Bay Soaring Society, Mike Gervais, P.O. Box 2012, Sunnyvale, CA 94087; (408) 683-4140 (H), (650) 354-5469 (W).

California - Southern Calif. Electric Flyers, John Raley (President), 1375 Logan Ave., Costa Mesa, CA 92626; (714) 641-1776 (D), (714) 962-4961 (E), e-mail: E-Flyer@ix.netcom.com.

California - Torrey Pines Gulls, Ron Scharrck, 7319 Olivetas Ave., La Jolla, CA 92037; (619) 454-4900.

Colorado - Rocky Mountain Soaring Assn., Phil Weigle, 1290 Salem St., Aurora, CO 80011, (303) 341-9256 eve.

Eastern Soaring League (VA, MD, DE, PA, NJ, NY, CT, RI, MA), Jack Cash (Pres.), (301) 898-3297, e-mail: badideas@aol.com; Bill Miller (Sec./Treas.), (609) 989-7991, e-mail: JerseyBill@aol.com; Michael Lachowski (Editor), 448 County Rt 579, Milford, NJ 08848, e-mail: mikel@airage.com, <<http://www.eclipse.net/~mikel/esl/officers.htm>>.

Florida - Florida Soaring Society, Mark Atzel (President), 1810 SW Terrace, Ft. Lauderdale, FL 33312, (954) 792-4918.

Florida (Central) - Orlando Buzzards Soaring Society (www.speccs-usa.com/~ingo/OrlandoBuzzards), Jerre K. Ferguson (Pres.), 4511 Pageant Way, Orlando, FL 32808, (407) 295-0956, <jerre@bellsouth.net>.

Georgia - North Atlanta Soaring Association, Tim Foster, (770) 446-5938 or Tom Long, (770) 449-1968 (anytime).

Hawaii - Maui Island Slope Soaring Operation (MISO), Duane A.K. Asami, 262 Kamila St., Kula, HI 96790, pgr. (888) 932-6247, <dasami@mauigateway.com>.

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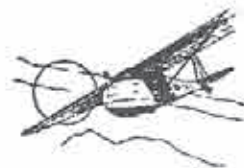
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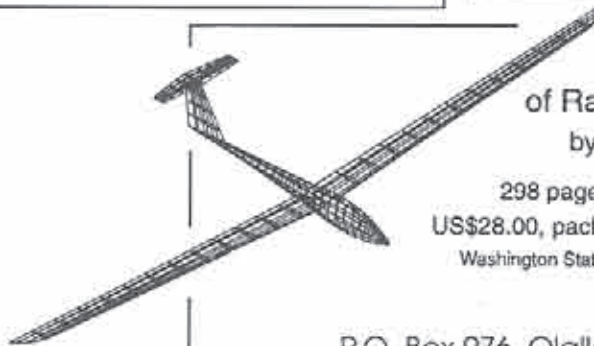
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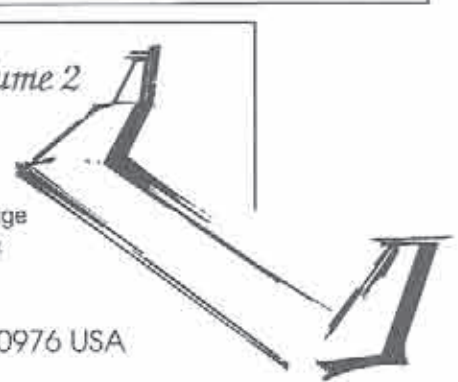
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The wings are made in America by Ron Vann, owner of Spectrum Enterprises. Ron is also an avid competition flier, and is considered to be one of the best wing manufacturers in the industry. Taking his years of experience in manufacturing wings, Ron has produced wings and stabs for the Condor that we feel are world class. Starting with the spar that Mark Allen designed, Ron uses only the best and most accurately cut foam cores available. He then uses hand-picked obechi from Kennedy Composites, which is applied with West Systems epoxy.

CONDOR

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building time, and those who don't like to paint, there is an optional pre-painted, in the mold, fuselage which includes a unique carbon fiber canopy.

All kitting is done at Slegers International's new and larger manufacturing facilities. We have spared no time or expense with supplying the modeler with the best materials available. The kit contains pre-sheeted wings and stabs by Ron Vann, fiberglass and Kevlar™ reinforced fuselage by Steve Hug, 3/8" diameter titanium wing rod from Kennedy Composites, optional 3/8" diameter steel wing rod by Squires Model Products, control horns and tow hook by Ziegelmeyer Enterprises, pushrods by Sullivan, or optional one piece steel rods. All wood is custom cut. Specially cut basswood of 60" is supplied to eliminate splices in leading edge, flaps and aileron capping. All balsa is hand picked, light to medium, to ensure light weight wing tips, stab tips, and rudder. Aircraft ply is used for the pre-fit servo tray and towhook block. A comprehensive instruction manual is included.

The Condor, designed by Mark Allen, wings by Ron Vann, fuselage by Steve Hug, and kitted by Slegers International, we feel, is the best open-class, thermal duration sailplane available, at an affordable price of \$395.00 plus S&H.

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SAILPLANES UNLIMITED, LTD.

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Krause

1/4.75	Discus	HO2.5/12	158" (4m)
1/4	Salto	HO3/14	179" (4.53m)

Roedelmodell

1/4.5	ASK 21	E393	165" (4.2m)
1/4.6	Ka6E	E392	165" (4.2m)
1/4.75	Fox	RG12	149" (3.77m)
1/4.8	DG 800	E207	165" (4.15m)

Buechele

1/4.75	Fox	HO1.5/10-12	149" (3.77m)
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FiberClassics

1/4.2	Nimbus 4	E68-66	246" (6.28m)
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PriBeck

1/4	ASW27	HO2.5/12	196" (5m)
1/4.7	ASK18	E203-201-193	209" (5.33m)
1/4	Ka6E	E207-205-205	196" (5m)
1/4.7	ASW19	Ritz3 mod.	212" (5.4m)

Schueler & Fleckstein

1/4	all glass ASW24	E203	196" (5m)
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Bruckmann

1/4	Salto	Ritz 2	176-203" (4.5-5.2m)
1/4.8	ASK 18	E 203	165" (4.2m)
1/4	FOX	E 374 SD 6060-6062	183" (4.66m)

Czech these out!

All completely finished with retracts installed:

1/4	all glass Ventus 2C	HO 3/15, 13, 12, 10, 8	237" (6m)
1/4.75	all glass ASW 27	HO 3/12	158" (4m)
1/4.75	foam-obechi ASW 24	HO 3/12	158" (4m)
1/4.8	all glass Kestrel T 19	HO 3/15-10	196" (5m)

TOWPLANES

Frisch: 1/4 Wilga 109" (2.78m)

Brauer: all glass 1/4.8 Pilatus Porter Turbo 139" (3.52m)

Roedelmodell: 1/4 Jodel Robin 86" (2.18m)

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1/4	ASW27	HO2.5/15	294" (7.5m)
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Bruckmann

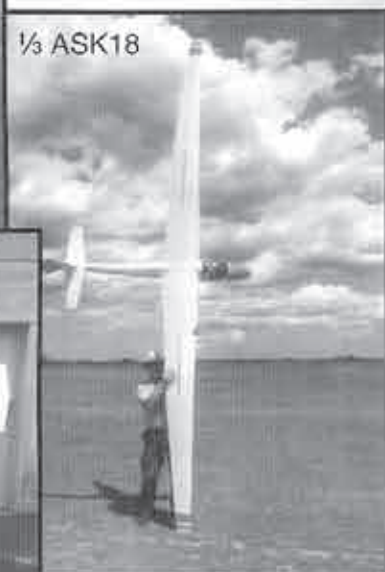
1/4.5	Fox		222" (5.65m)
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Schueler & Fleckstein

1/4	all glass Fox	RG12	183" (4.66m)
1/4	all glass ASH 26	HO3/14-10	235" (6m)
1/4.5	all glass ASW15B	HO3/14	235" (6m)



1/2.5 Fox



1/3 ASK18



1/4.5 ASK21



Nimbus 4



1/4 & 1/3 Ka6E



1/4 Wilga



1/4.5 Porter