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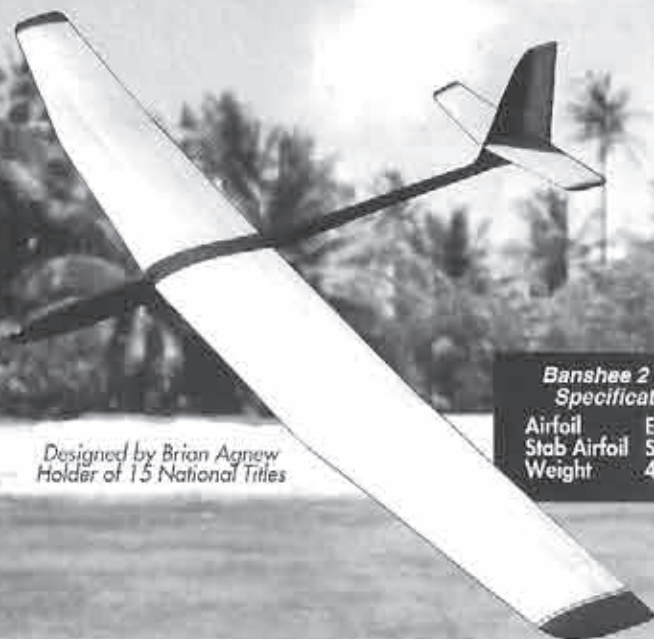
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October, 1997

Vol. 14, No. 10

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## R/C SOARING DIGEST

A Publication for the  
R/C Sailplane Enthusiast!



*R/C Soaring Digest* (RCSD) is a reader-written monthly publication for the R/C sailplane enthusiast and has been published since January, 1984. It is dedicated to sharing technical and educational information. All material contributed must be exclusive and original and not infringe upon the copyrights of others. It is the policy of RCSD to provide accurate information. Please let us know of any error that significantly affects the meaning of a story. Because we encourage new ideas, the content of 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 Jon Gray, lecturer and technical consultant. He can be reached at: 210 East Chateau Circle, Payson, AZ 85541; (520) 474-5015; [ejmpg@netronet.com](mailto:ejmpg@netronet.com)

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TRAVELING REPORTER  
VISITS NEW YORK

Gordy Stahl catches Vaquero, Ninja style, by the Mohawk River in Schoenectady, New York. Photo by Dave Garwood.

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## Advertising Note

Please note that the cut-off date for classified & display ads is the 1st of the month.



## The Soaring Site

### In the News

We've received some very nice compliments about the effectiveness and overall appearance of the RCSD web page, which Bill & Bunny Kuhlman maintain for us on their web site. We hope to evolve the page, based on the input we receive, and continue to provide up-to-date news, providing a jumping off point to other sites of interest, particularly those that have articles and tips, and/or are updated frequently. If any of you note something newsworthy, it's easy to let us know; just click on the e-mail icon on the web page, and tell us what's up. For those of you not on-line, we'll continue to provide information we think will be of interest.

In the news from Ankara, Turkey, Daryl Perkins of the U.S.A. is the 1997 F3B World Champion. Our congratulations to Daryl and the U.S.A. team, which took third place. Also in the news, reported by Mark Nankivil, the 1998 United States representatives for F3J are: Skip Miller, Ben Clerx, Joe Wurts, and Josh Glaab (alternate).

In the local news from Texas, congratulations go to Jim Frickey of Kansas, the new TNT (Texas National Tournament) Champion, and to Fred Mallett, who took first place in hand launch.

### "Hot Air"

This month, Robin Lehman kicks off a specially designed, comprehensive, original series of "how-to" articles on "Aerobatics". Regardless of what kind of flying you do, the series is designed to test your skills, and add some "salt and pepper" to your life. Robin is testing each maneuver, on-hands, himself. For those of you that decide to tackle his monthly "Flight Plan", be sure to let us know if the schedule is too much, too fast, too slow, or if you have any input regarding your type of sailplane, and the style of flying that you do, etc.

Happy Flying!  
Judy & Jerry Slates



## Jer's Workbench

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### Storage or Travel Box

Have you ever left a model leaning against a wall, or standing in a corner, where it fell over, causing damage to the plane? How about traveling with a model in the back of the car, slamming on the brakes, and the load shifts? If you answered yes to either question, then perhaps a travel box is for you.

If you build your own planes, then you probably have all the tools, necessary to construct a box, on hand: ruler, square, ball point pen, clamps, and box cutter. The material required are a sheet of fluted polypro, glue, and straps.

For those of you not familiar with fluted polypro, it's a material that looks like corrugated cardboard, but it's made out of plastic, instead. It can be found at craft stores, or plastic dealers. The sheet used to construct the box, shown in the photo, cost \$10.00, and is 4' wide by 8' long, 4 mm in thickness.

The glue used to construct the box is called "Glue Buddy", by Sachoc, which I found while roaming around a local hardware store. The sign in front of the glue said, "New. Bonds to most surfaces." So, for \$3, I decided to give it a try. Of course, the glue was tested first on some test strips before I glued the box together. By the way, one of the reasons that this particular glue was selected over others on the shelf was because the label said it was U.V. stable and weather proof. That was, of course, important to me. How good is the glue? Only time will tell, as the box gets more and more travel time under its straps.

While the straps really aren't required, I decided to include them, anyway. They were purchased in a local yardage shop for \$4.50, each.

The biggest decision involved in making a travel box is determining the proper size. I would suggest that the first step is to draw a plan of the box on a scrap of

paper. Then, determine if the box can be constructed using one sheet of fluted polypro and, of course, if the box will fit into your car.

Don't forget that the top of the box needs to be bigger than the bottom. I suggest that the top be approximately 1" longer and about 1/2" wider than the bottom of the box. If the top is too tight, it will be difficult to get on and off.

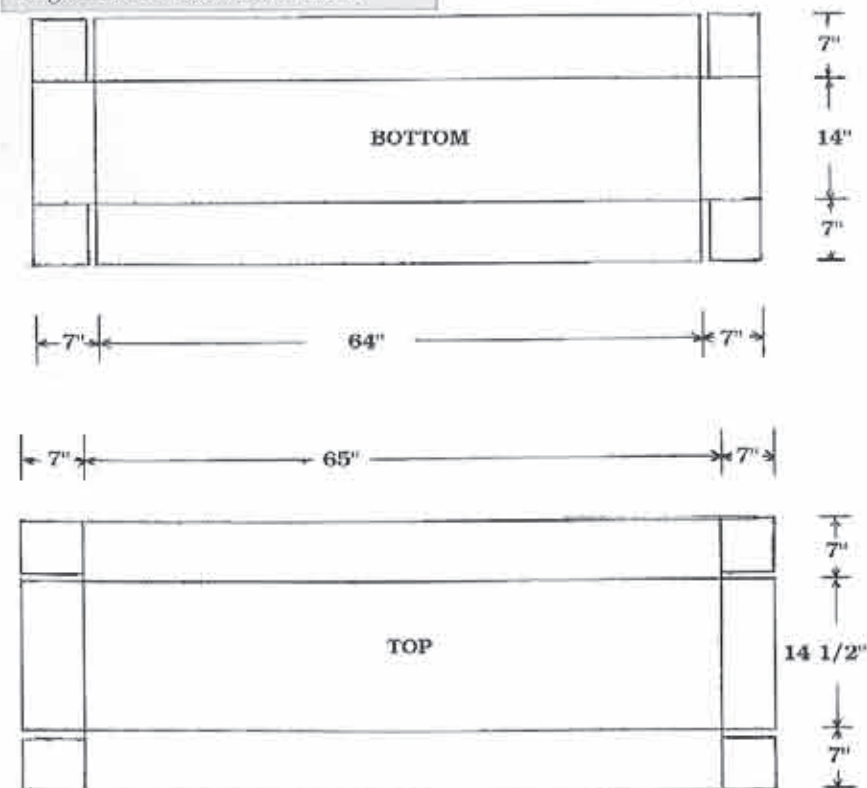
### "Til Next Month! ■



If you study the diagram carefully, you'll note that there is a difference in the design of the top versus the bottom of the box. Because of the size of the box that I constructed, two sheets of fluted polypro were required. For most, normal size, thermal ships, a single sheet should be sufficient.



(Top) Use wood under the clamps to prevent clamps from marking box.  
(Bottom) Tools required to make the box.







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### Updates! to previous columns Komets! (July 1996)

When we wrote our column on the Komet series in July of 1996, we mentioned the Me 163A as a possibility for a thermalling model. Well, Dave Sanders' Dave's Aircraft Works (DAW) and Marc and Richard Webster's Silent Squadron R/C should both have EPP foam models of the Me 163 available by the time you read this column.

The semi-scale DAW Me 163 was designed by Wade Kloos of the Laguna Niguel Slope Soaring Guild and sports the MH45 airfoil. The fuselage has been "flattened" a bit (but it's not a profile model); the wing is single taper, like the Me 163B. Light lift performance on the combat slope is said to be fantastic, and yes, it will thermal over flat land!

Sensei John Roe was bungee and hand launching one of the prototypes at a contest in Pasadena on July 27th. For some neat photos of this new Komet, take a look at Sensei Roe's RC soaring web page at the following URL: [http://ourworld.compuserve.com/homepages/sensei\\_john\\_roe/ridethew.htm](http://ourworld.compuserve.com/homepages/sensei_john_roe/ridethew.htm). DAW can be reached by phone at (714) 248-2773, by e-mail at [104271.3352@compuserve.com](mailto:104271.3352@compuserve.com) or by regular mail at 34455 Camino El Molino, Capistrano Beach, CA 92624. The DAW web page is: <http://ourworld.compuserve.com/homepages/davesaircraftworks>.

Silent Squadron R/C now makes a scale Me 163A. It, too, was demonstrated at the Pasadena two day event. The plane was being zip launched with a 5/8" x 25' bungee, and launch height exceeded that of the contest winches. The plane is capable of speeds in excess of 100 miles per hour off of the zip

*The largest set of lenticular clouds one can imagine was photographed on a windless day. Taken from the end of the B² family driveway in Olalla, Washington, they report that Mt. Rainier is southwest from this location; the house in the picture is on Vashon Island, west side.*



start, aided no doubt by its sturdy 1/4" carbon spar.

The Silent Squadron kit comes with the fuselage cut in profile and plan view, and needs about a half hour of sanding to shape properly. The wingspan and fuselage length and width are scale. This Komet will thermal, too! Contact Silent Squadron RC by phone at (805) 297-3948 or by mail at 22912 Frisca Dr., Valencia, CA 91354.

	Dave's Aircraft Works Model B/C	Silent Squadron R/C Model A
Span	49"	46"
Area	432.3 sq ft	437.3035 sq ft
Weight	18-22	23-25
Loading	5-7.33 oz/ft <sup>2</sup>	7.58-8.24 oz/ft <sup>2</sup>
Misc.	semi-scale MH 45 airfoil	scale carbon spar system
Price	\$59.99 plus shipping	\$64.95 plus shipping

### Trick R/C's Zagi LE (January 1997)

The Zagi-LE has to be one of the most successful RC glider designs in a very long time. The Zagi is a constant topic of discussion on the RC Soaring Exchange, the e-mail list run by Mike Lachowski with the facilities of *Model Airplane News*, and a large number of Zagi kits have been sent overseas to both Europe and Japan. It seems to get rave reviews everywhere it goes!

Paul Clark, who flies off a river retaining wall in Japan, constructed one using every trick he could think of to keep the weight down. Guess where Paul and his son, taking a break from college, went as soon as they had the opportunity?

We've heard of people making double and triple size Zagi slopers, and there's a small contingent who take their Zagis out for flat field flying using just the

rubber tubing from a high start to get into the air — it's called zip launching. While this method can put some extreme loads on the airframe, the Zagi seems to be up to it.

Trick R/C, Jerry Teisan, 938 Victoria Ave., Venice, CA 90291. To order call (310) 301-1614. You can also send e-mail to [Zod@zagi.com](mailto:Zod@zagi.com), or find Trick R/C on the World Wide Web at <http://www.zagi.com>.

### X-36 (May 1997)

The X-36 flew for the first time on 17 May 1997. The flight lasted about five minutes, and the X-36 got to an altitude of around 4,900 feet. Reports stated the flight went very smoothly, with no surprises. In fact, its "flyability" was praised by those involved.

We also received an e-mail message from Al Bowers stating the canard surfaces do in fact move. They are used to control the airflow over the wing



during landing. The picture included in our column in the May 1997 issue of RCSD does show the canards rotated to a very high angle of attack during taxi trials.

### Dennis Weatherly's JackWabbit (July 1997)

In June we had the opportunity to meet Dennis Weatherly and watch his JackWabbit fly. What an exciting experience!

The JackWabbit has only a 30 inch wing span, and so Dennis keeps it relatively close by. The problem is that it is so darn fast! Dennis really put the JackWabbit through its paces, doing loops and rolls, Immelmans and high speed passes. The special 5x5 prop hauls that little devil around the sky as though it were on rails.

When we spoke with Dennis, he talked seriously about furthering the development of the Jack Wabbit — making a more streamlined fuselage and perhaps trying a thinner section than the EH 2/10 used on the original. He was certainly enthusiastic about its potential in Speed 400 pylon racing.

We'll keep RCSD readers informed of future JackWabbit developments.

### Jim Keller's Zephyrus (August 1997)

Jim Keller's Zephyrus is still going strong. He's added ballast as the winds on his slope have become seasonally stronger, and his Zephyrus now weighs 22 ounces.

Jim had an interesting experience with

his Zephyrus a while back. It went into a spin half way through a loop. This brought back our memories of some very strange gyrations performed by one of Alan Halleck's wings while flying on the Columbia River gorge.

Alan was flying his swept wing with a moveable CG. When the CG was forward, the glider had no problem at all completing loops. But when the CG was moved back, the wing would quickly roll upright at the top of a loop. It would also enter a spin, something it would not do when the CG was forward. The only way to recover from a spin was to quickly move the CG forward again and hope there was room to recover.

The behavior of Jim's Zephyrus exactly matches that of Alan's wing at the Columbia gorge that day. Such experiences point out the necessity of accurately placing the CG relative to the neutral point. While performance improves as the CG is moved back, there is a rear limit, and it's always forward of the NP.

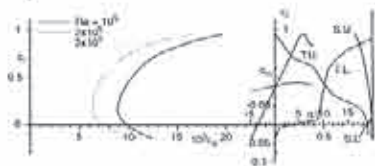
Suggested topics for future columns are always welcome. We can be reached at P.O. Box 975, Olalla, WA 98359, or at <bsquared@halcyon.com>.



## UNDERSTANDING POLARS WITHOUT MATH

A guide to getting the most from polar diagrams

by Bill & Bunny (B<sup>2</sup>) Kuhlman,  
with a special section by Bill Kubiak



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## UP - UP AND AWAY!

(The Lamentings of a R/C Sailplaner's Wife)

Arlene Bergstrom  
Merna, Nebraska

Any of you readers ever recall - hearing the saying, "UP, UP AND AWAY?"

Seems R/C sailplaner, Ken, learned the TRUE meaning of this - one day. When he and wife, Arlene, were just out enjoying a long winter's afternoon, Bad became Worse - even quicker, he realized THIS meaning too soon!

Ken's "second love", his "SAPPHIRE", was soloing her maiden journey flight, Blasting off like a rocket into the piercing azure blue, oh so very bright! Off the wench, zooming like an arrow so high - she just simply disappeared, Not momentarily but ABSOLUTELY, a reality of a nightmare he'd feared.

Frantically yelling to his wife, "Come quick," as in the pickup she calmly sat, She'd witnessed the usual great take off, after all it was just "old hat". Immediately, she leaped, and followed his upward gaze into the darkest blue, Two pairs of eyes scanning the skyways, the terrible VERDICT was true!

Almost squinting toward the bright sunlight, Arlene felt positive she'd go blind, Life had turned dead serious - with a vengeance of "Seek and Ye Shall Find". Just at that moment, crossing the heavens, vapor trails being made by a big jet, "Ken, could THAT be it?" But - "terminology" warned - NO time for JOKES, yet.

IT WAS GONE! IT WAS NO MORE! - Ken's prize possession had just vaporized, His, "How could it have happened so suddenly?" - with muffled inner sighs "It just has to be somewhere," he lamented, meaning "it" just HAD to be found, Together, they searched diligently, eyeballing each particle of ground.

A "DO OR DIE" situation, quick - a telephone S.O.S. to Steve, Ken's pilot friend, Nary a reservation, he'd fly NINETY miles - his keen eyesight to freely lend. Traumatic and dramatic, what turbulence this sleek shiny "SAPPHIRE" created, Arlene knew pronto - "the BOY and his TOY", she'd definitely under-rated!

The race was on - Ken's pickup reached the airport, only some thirty miles away, While in Merna, a farmer called reporting THE GREATEST NEWS OF THE DAY!! SAPPHIRE had been spotted, all alone, crumbled, out in a dusty sunflower patch. Accepting that, but next was NO SURVIVORS!! - not even any in the hatch.

Thus now this saga of "SAPPHIRE" was over, it disappeared up, up and away — And now broken spirited, was retired to the shop area where the "others" lay, Middle age of sixty five and three years of being Ken's so called — "NEW" wife, Perhaps this "UP, UP & AWAY" may become, the most exciting part of life!!!

## PENSACOLA 1997 !!! Scale / Airtow Extravaganza !

November 1st - 2nd, 1997, Site 8, Pensacola, Florida  
Contact: Asher Carmichael For Info Packet

**The Best For The Best !**

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## This Old Plane



ZIKA

...by Fred Mallett  
334 Haroldson Dr.  
Corpus Christi, Texas 78412  
(512) 991-3044 (Week Days)  
FrederM@aol.com

### 2 Piece Wing

Often as not, my HLG planes use a 2 piece wing. The reason is that contests are usually a commercial flight away. Having a 2 piece wing makes bringing a plane along much easier, as well as allowing for some evening practice on business trips.

I always have fun after a contest when I take my ship apart and people freak out that it is a 2 piece wing, but still competitive weight. They seem to equate 2 piece with heavy. This does not have to be true; remember, the forces in an HLG are rather small (no winch, and light wing loading). Most people overbuild a joiner system for an HLG. This system adds .3 oz. for me. I use a glass tube for the carrier, and a carbon tube as the wing rod. The ones I use are from Aerospace Composite Products, part numbers TU-01, and RH-1, respectively.

This article is about making a 2 piece HLG wing from a vacuum bagged wing. In built up wings it is easy; use 2 root ribs, and a tube carrier for a joiner rod. We will use the same technique for the joiner system in a bagged wing.

Obviously, it would be easiest when you bag the wing yourself, as you can put the joiner parts in before the skin goes on. This is not necessary, however; it only looks better. The pictures in this article are from a bagged-in joiner system, but you can use the same techniques as described on a purchased wing that is already cut in half. The write-up describes the steps for both.

Here we go. I wrote this in numbered steps, as it might be easier to follow that way.

### 1) Make and drill the root rib

I use 1/2" medium weight balsa for the root rib. Note I said rib, not ribs. You will make one root rib, attach both wing halves, and then cut it in half. The reason for this is that the hardest part about a 2 piece wing is getting the halves aligned. By pre-drilling the holes, and installing the root rib in one piece, this is no longer an issue.

So, trace the root of the wing cores, or the wing half root if it is pre-bagged, onto the 1/2" balsa stick. Cut out the root rib being sure to keep the sides vertical so it will match both wing halves.

Next, decide where you want the wing rod; I usually go with the maximum thickness point. You want to drill the hole for the wing rod carrier close to the bottom skin; but remember the length of the rod and the di-hedral angle. You need to locate the hole so that the ends of the rod won't come through the bottom skin when installed. About 1/4" from the bottom of the rib is typically about right, higher if you plan on lots of dihedral. Drill a 1/4" hole presuming that is about the size of your wing rod tube; then, also drill the 1/8" locating hole centered towards the trailing edge. I put mine about 3/4 aft.

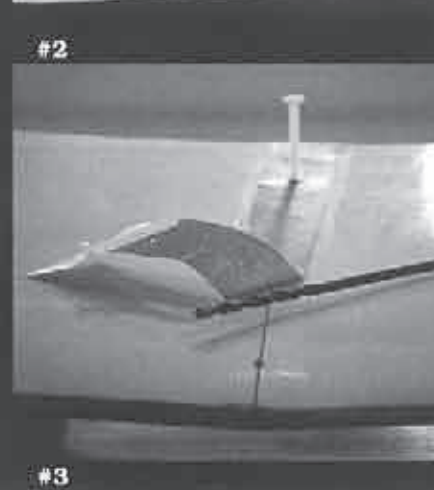
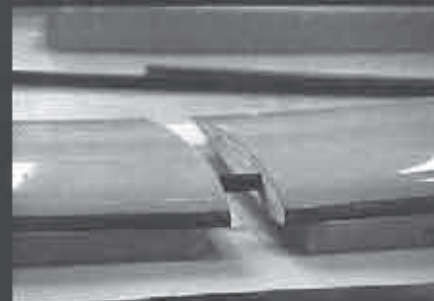
If doing this after bagging, you can get most of the dihedral angle in there by sanding the cores at a slight angle, then tracing for the root rib so that it matches the "angled" sides of the root rib.

### 2) Install the pre-drilled root rib

After sanding as desired for a near perfect fit of the root rib to the cores, glue the root rib to both cores, or wing halves. If you are doing this pre-bagging, lightly tack it, as the extra epoxy during bagging will be sure it is attached. If doing this after bagging, make for a perfect fit, and then use a very thin coat of 5 minute epoxy, or micro-balloon mix. Be sure everything aligns perfectly. I do one half at a time to be sure it all lines up.

### 3) Secure the root rib (via joiner tape, or bagging)

Now, either bag the wing as normal, or join the wing halves with some fiberglass tape and epoxy, doing everything as you normally would. (Maybe the



joiner tape would be a little bit wider than normal to cover the 1/2" of balsa.)

### 4) Cut the wing in half

This is a bit harder than usual, as the balsa/glass is surprisingly difficult to cut. If you are one of the privileged, use your super fine blade and radial arm saw. For the rest of us huddled masses, just have a good eye, a steady hand, and a zona saw or the equivalent. I have even heard of a few people using a razor blade (yikes). Of course,

try to make the cut as straight and vertical as possible.

### 5) Install the joiner tube

Finally, we will install the tube. I use only 6" of tube for the whole wing. Jack up a wing half so that it is at the correct angle for the finished di-hedral. Now drill or melt a hole into the foam for 1/2 of the carrier tube; for me, this is 3". Do the same to the other side.

Picture #1 shows the wings with the foam melted out (or drilled), with the carrier tube sticking out of one wing half.

Now, since the holes in the root rib were pre-drilled, and you had the wings jacked up at the proper angle when drilling the holes, when you slide the tube into both wing halves, the roots should line up perfectly, and the correct dihedral should be in the wing. After testing, cap both carrier tube ends; I use thin balsa and thick CA, so that epoxy does not run into the tube.

Using epoxy/micro-balloon mix, smear in both holes, slide the tube in, and get the root ribs as close to each other as you can. If the holes are a good fit, this will take very little epoxy. Block it all up so that it can cure.

Picture #2 shows the wings slid onto the carrier tube while testing alignment. When glued up, the root rib halves will be almost touching.

After curing, cut the wing joiner tube in half; then sand the root ribs for a perfect fit to each other. Put the wing rod in while testing the fit. Note that this sanding must be done after the tube is installed, so that the tube halves will remain aligned.

### 6) Make the sub-ribs

Now, you probably noticed that the carrier tube is held quite well at the root, but is only in foam at the outboard ends. To fix this, we will make a "root rib" from micro-balloon/epoxy mix (pookie). Just inboard of the carrier tube ends, cut a 1/8" wide, 3/4" long slot in the bottom skin. This is easy to locate by putting the wing rod in the tube, and using that as a guide (assuming you remember how long the carrier tube was).

Dig down in the foam until you find the carrier tube, then picture a root rib holding the tube in place. The reason we try to get the carrier tube very low in the



wing is so that this rib can be very small; in my best jobs, the end of the tube touches the bottom skin. We will now fill this hole with "pookie" mix to act as a root rib. In the picture, you see that I sometimes get carried away and make a cross shaped hole instead of just the slot. When the hole is filled with pookie, epoxy a 1" patch of 2 oz. cloth over the hole to spread the rib load to the skin.

### 7) Put it all together

Now we need to make the rear alignment pin, so that the wing joins up perfectly. Since the 1/8" hole was pre-drilled, all that remains is to "stiffen" up the balsa around the hole on one wing half with thin CA, and then glue in a very short 1/8" dowel to the other half. I sand the end round, and let it stick out only about 1/8". It is not for strength, just alignment.

Next is to make the bolt holes. I just use masking tape to hold the wing halves together and drill as usual. It does not matter if the holes are centered, or wander mostly into one wing half of the other. Just treat it like a one piece wing when attaching the

wing to the fuselage.

Picture #3 shows this step; after drilling, just removing the temporary masking tape.

At this point, you should have a wing that joins perfectly. Now we need to keep the halves together.

I use a 1/2", very strong, sticky tape, and lay it down flush with the wing root on both halves. This tape will hopefully never come up. The purpose of this tape is to have a surface that does not stick very well. When you are ready to fly, just tape the two wing halves together with clear office tape; then poke a screwdriver through the bolt holes, and attach the wing. This will hold the halves together fine. In all my crashes, I have never torn the wing halves apart, nor have I ever damaged this joining system. Sometimes I get lazy and just use masking tape to hold the wings together, as in Picture #3. Works fine.

If you build a 2 piece aileron wing, you will need to have 2 connectors for the wiring. I have a neat system for this, but we will save that for another column.

Have fun!! ■

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## Never Leave a Man Behind

...by William C. Swingle II  
Pleasanton, California  
bill\_swingle@electro-test.com

A typical Wednesday night was unfolding. I left work right on time at 5:00 p.m., and headed for home. My son, Colin, has a music lesson every Wednesday evening, and this evening was no exception. I picked up Colin and pointed the car toward the home of the music instructor. But, also true to form, not without putting a plane in the car, too.

There happens to be a medium sized park around the corner from Colin's instructor, which has sufficient open space for HLG flying! It also happens to have decent lift-generating abilities. On the down side, the park is popular with the local residents, so I am typically rewarded with either an audience, a field of moving obstacles, or both. Also, detracting from the park, as a flying site, are the trees which line the perimeter. However, they at least provide a bit of a barrier between the park and the adjacent streets. It's a minor consolation at best, but better than nothing.

All in all, the park is a moderately good flying site, when the wind isn't blowing. However, as the wind blows harder and harder, the park becomes more and more challenging. The lift remains due to the surface topography in general, but the effective size gets smaller and smaller. As the wind creeps upward, downwind turns start to become exciting. It gets more and more difficult to complete the downwind turn, before being blown into the trees on the downwind edge of the park.

A challenging environment such as this can be hard on a plane, which is why the latest development in foamic combat technology is such an advantage. Expanded polypropylene (EPP) foam, unlike conventional foams, does not dent, but rather springs back into shape after an impact. EPP has revolutionized the sport of combat and, fortunately, is beginning to be used for thermal gliders, as well. I was flying my EPP constructed TG-3 (Dave's Aircraft Works) and had no



fear. It's a fairly scale Schweitzer TG-3 with a six foot polyhedral span. The plane is controlled with rudder and elevator, and floats nicely, while still being nearly indestructible.

I started with a few hand launches. Today, the wind was blowing firmly at about 10 mph and the launching was great. I found that the upwind tree line created a wave of lift, but it was too small to work effectively. It was challenging and I had only minimal success.

I then staked out what I call my "jerk start". It's ten feet of heavy latex tubing with no line or parachute. I call it a "jerk start" because it only gives the plane a short jerk before going slack. Jerk is also vaguely representative of how I felt after paying the hugely inflated retail price that the hardware store charged for the tubing.

I stretched the jerk start to about 45' and launched. The plane went up well and high, thanks to the wind. I found the wave that I'd experienced earlier. It was better now that I had some more altitude, but the turbulence was also more evident. It was just as challenging as the previous flight, but it suckered me into making a mistake. I made my downwind turn too large and quickly was at the edge of the park. I had begun the turn and was about halfway through it when I saw the trees. "It's going to be close," I thought, as I cranked the plane up onto its wingtip and pulled hard on

the elevator. "I'm going to make it," I thought. I always have before and besides, even if I hit the tree, the plane would be fine. I wasn't worried.

Then, with a rustle of branches, it smacked into the tree about 20 feet above the ground. Suddenly my nonchalance came to an end. The plane stopped and just hung there, motionless in the tree. Egad, it had never occurred to me that the plane would get stuck in the tree. It was a fairly small tree and I hadn't even considered this possibility.

I studied my options. The tree was too small to climb without risking injury to the tree. I tried to snag the offending branch with the jerk start, but without success. I was stuck. As much as I hated to do it, I had little choice but to leave the plane and get some more plane retrieval tools from home. Besides, Colin's music lesson was about to end.

I took a business card out and wrote a short note and my home phone number on the back. I placed in on the trunk of the tree and, with some trepidation, drove off to pick up my son. I was a little concerned about leaving the plane behind, but convinced myself there was no need to worry. The plane was fairly well obscured by the tree's leaves and newly emerging blossoms. It seemed plausible that no one would even notice it.

I picked up Colin and appraised him of the situation. Then, I sheepishly asked if he'd mind keeping an eye on the plane, while I dashed home. To my surprise, he readily agreed, so I zipped over to the park, showed him the location of the plane, and headed for home.

In my garage, I gathered up some rope, a long pole, and various other objects, which I hoped would be helpful. I stuck my head in the front door of the house, shouted a highly condensed version of what I was doing to whom-ever could hear me, and hurried back to the park.

I arrived back at the park and there was my plane, safe and sound, being held at attention by Colin. Hooray! The tree looked undamaged and the plane

was fine. Turns out though, that I was far luckier than I realized.

Even though the plane was partially obscured by the foliage of the tree, two boys in their early teens had seen my unintended landing and my failed recovery attempts. What they apparently didn't see was my leaving Colin to watch the plane. While I was driving home for retrieval tools, one of the enterprising youths climbed far enough up the tree to shake loose the plane. Not knowing that the wing is removable, they were unsure how to get the plane into their car. This is when Colin approached them.

Astoundingly, the car was being driven by the boys' mother. Seeing this, my nearly teenage son hoped the boys would be reasonable. He greeted them and pointed out that the plane they were attempting to transport was, in fact, not theirs, and that I was just now pulling into the parking area with some rope to retrieve my plane. At this point, they mumbled something barely intelligible, tossed the plane on the ground, and drove away.

As the thought of having my plane stolen sank in, I estimated the cost to replace the plane and radio gear. It was not a pretty thought. The thought of the lost building time was equally unpleasant. I drove straight to the nearest ice cream parlor and thanked Colin properly.

Though not always the case, I've found that I often have to learn the "hard way". Today was no exception. I've often wanted to put my name and phone number on my airplanes, but just never got around to it. The need is obvious, but for some reason I just never did it. Thanks to my son, this time I got to learn the lesson for free. ■

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### Why Aerobatics?

After we've caught a few thermals, and after flying around long enough off the slope, we all begin to get itchy fingers and look for some other diversions... It's time for the occasional loop, or roll, or low pass, or whatever... And as you've probably found out, it's great fun!

When I first attended the airtow event in Switzerland on June 29-30, 1991 (the I.C.C.), my eyeballs fell out ogling some 75 absolutely beautiful and immaculate scale sailplanes. Seeing them all fly was one thing, but the highlight of the day came when one of these pilots performed some low level aerobatics. His routine was the same for every flight; after a tow up and some thermalling, he did a low roll down wind, some inverted flying entering the traffic pattern - rolling to level with just an eyelash of ground clearance, and eventually landed right at his feet. As I watched him do this for the first time, I was absolutely sure he was going to stall and crash; but not so - he knew exactly what he was doing. He did this same routine four or five times during the day, and every time the rest of us applauded.

Another good flying mate who doesn't otherwise do much in the way of aerobatics, usually ends his flat field airtow flight with a high speed low pass a few feet off the deck, whistling down the middle of the strip, then a couple of low 360s and a landing. We can hear him coming and invariably we

all watch. He learned his specialty maneuver by practicing little by little and really got to know what his bird would do.

As you can see, not only are aerobatics fun for the pilot, but they are also great fun to watch - great spectator sport!

One of the main reasons why some pilots enjoy the competitive circuit is that they are trying for personal bests with every flight. When you boil it all down, *pursuit of perfection* is the name of the game.

The same is true of aerobatics. Every time you do a maneuver, you get an immediate visual pay back. Did you do it correctly? Was it a perfect maneuver? How can it be improved? What mistakes did you make? And how can you correct them? And if you *did* do a perfect maneuver, did you "place" it correctly and compensate for the wind, etc., etc.? And best of all, you can do all of this on your own! You can compete with yourself and try to hone and *perfect* your skills!

Germany and Switzerland hosted aerobatic scale contests last summer, and sooner or later there will be competitive aerobatic contests for sailplanes here in the USA. As it now stands, the AMA National's allow for any stunts you wish to perform, provided that you can get high enough to do them. If airtowing is provided, you *will* be towed high enough to execute any maneuver you wish to try. (And for this reason, eventually, airtow *will* become the preferred method of flat field launch in competition.)

What follows is a series of "how to" articles on aerobatics for sailplanes. To some of you, many of these maneuvers will be familiar, but to others some of this material will be new. My hope is that these articles will add some salt and pepper to your flying! Enjoy!

In the next few months we will cover straight and level flight, inverted flight, traffic pattern, procedural turn, inside loop, outside loop, roll, snap roll, slow roll, Immelman, Chandelle, side slip, stall turn, tail slide, figure 8, Cuban 8, Split-S, two point rolls, four point rolls, top hat, horizontal 8, vertical 8, and spin... What the heck was all of that numbo-jumbo? Well, if this tweaks

### Aerobatic 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.

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.

your curiosity, read on...

You may be surprised to learn that almost every maneuver just mentioned is derived from just two maneuvers: the LOOP and the ROLL! When you combine just these two, you will be able to fly almost everything else.

### Practice makes perfect

I know you've all seen the occasional loop or roll or other maneuver, but generally speaking, aerobatics fall into the category of "horsing around". Whether it be powered aircraft or sailplanes, very few pilots ever go out and PRACTICE any maneuvers and *perfect* them. You know the old saying, "practice makes perfect"? Well, the same is true of aerobatics.

If any of what follows tweaks your interest, and you decide to learn a new maneuver, I strongly recommend your practicing a single maneuver during a flight. Practice it until you lose your concentration, then RELAX. Five minutes of practice is worth more than a whole day of "horsing around"! Try this approach, and you will be amazed at just how quickly your newly-learned skill will become part of your daily flying.

### First things first - UNCOUPLE

Sorry, fellas! But you're going to have to uncouple your rudder and ailerons. If you wish to fly aerobatics, be aware that almost all require input on all three axis *independently*. Your rudder is

used to keep your fuselage straight, or turn it. Your ailerons are to keep your wings level, or rotate them. And your elevator is to bring your nose up or down, or to keep it level.

### For rudder and elevator only

Many of the following maneuvers can be executed with 2-channel radio ships, so don't despair. You too can tear up the sky! Wherever possible I will try to include a "how to" for you.

### Practice high enough

Last but not least, remember to DO ALL OF YOUR PRACTICE AT LEAST ONE MISTAKE HIGH!

### Methods of Launch

HIGH START is a good way to get up, although you may only have time to do a little bit of practice from each launch. If you catch a thermal and regain height, you can start your practice session again. All the more reason to plan your practice session ahead of time to make the very best use of precious altitude!

AIRTOWING is my preferred method of (flat field) launch and will let you get as high as you want. Plenty of room to experiment, but just bear in mind that if you are too high you can't see your glider very well. You must be low enough to be able to *see*, yet high enough so that you can have room for errors!

The SLOPE is perhaps the best place to



practice and learn aerobatics. On a good day you can practice all day long. You can do your maneuvers almost at eye level, which enables you to see exactly what is going on! But remember, as I said earlier, a few minutes of concentrated effort is worth more than hours of aimless horsing around.

Now buckle up, fasten your seat belts and let's get on with it...

### Straight and Level

(easy for R. + E. and A. + R. + E.)

First things first. All aerobatic maneuvers are started and ended by a horizontal line. Can you fly your sailplane straight and level regardless of wind conditions? Why don't you practice this? Flying straight and level is not always as easy as it sounds. For instance, when your buddy comes in to land, how often have you heard, "Oh, the wind got under the wing", etc.? YOU are in CONTROL of your aircraft. Learn to put the glider where you want to put it, regardless of what's happening with the wind. With this in mind, try and fly some straight and level lines in the sky.

The key to good aerobatics is being able to enter and exit each maneuver straight and level, and then go on to your next. The next time you see an airshow, watch how the real airplanes do this. They string together a whole series of aerobatic maneuvers giving the impression of a beautiful aerial ballet. That's really what a good aerobatic sequence should strive for. And when you have learned just a few simple maneuvers, with just a little planning, you too can become an aerial artist.

### The Loop

(easy for R. + E. and A. + R. + E.)

Let's agree that your glider is *always* descending. It gets its energy to fly from gravity. So when I describe a maneuver and mention straight and level, let's agree that the sailplane might be slightly nose down to maintain *airspeed*.

For some maneuvers you will require very little airspeed (straight and level or a spin), while for others you may require a lot of airspeed (a loop or a roll).

You get your airspeed by using the force of gravity to your advantage.

In order to do a loop you need enough airspeed to go up in a circle and then come back down more or less where you left. After you've tried one or two, you will quickly learn how much airspeed is necessary to execute a perfect loop; too little and you will fall out of the loop, too much airspeed and you will waste a lot of height and put undue strain on your wings; but just the right amount of airspeed, and your glider will gracefully go up in a perfect circle and then nose back down. This all sounds a little bit like Goldilocks and the Three Bears, doesn't it? Master your airspeed and you'll find that the loop is a piece of cake.

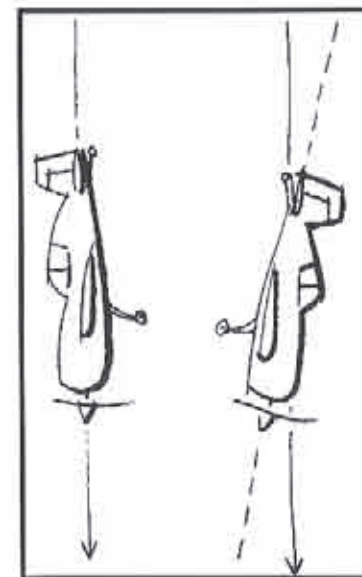
Your loop is done with elevator only. You simply give up elevator and do a complete vertical 360° circle. According to the AMA rule book, "A loop must have, by definition, a constant radius, and must be flown in the vertical plane throughout. A loop must start and end with a well-defined line which, for a complete loop, should be horizontal." (Printed by permission of AMA.)

What can possibly go wrong with a loop? Well, STRAIGHT AND LEVEL flight is very important here, for if you go into your loop when your aircraft is in a slight turn, your loop will not be flown in a vertical plane, and will end up looking more like a huge corkscrew roll. Try to begin your loop with your wings *exactly* level. If your ENTRY to the loop is correct, and you have enough AIRSPEED, your loop will be excellent.

### Fine tuning the loop

If you have a strong head wind or cross wind when you loop, you will find that the amount of elevator input to do a perfectly *round looking* loop will not be constant. As the wind is blowing you in one direction or another, in order to do a perfect *looking* loop, you must compensate for this wind in order to make a visually accurate vertical circle with a constant radius.

You also may find that in order to keep flying a perfect loop you will need small adjustments with rudder or ailerons. How do you make these



YOU WILL PROBABLY NEED SOME  
DOWN ELEVATOR TO STAY  
INVERTED

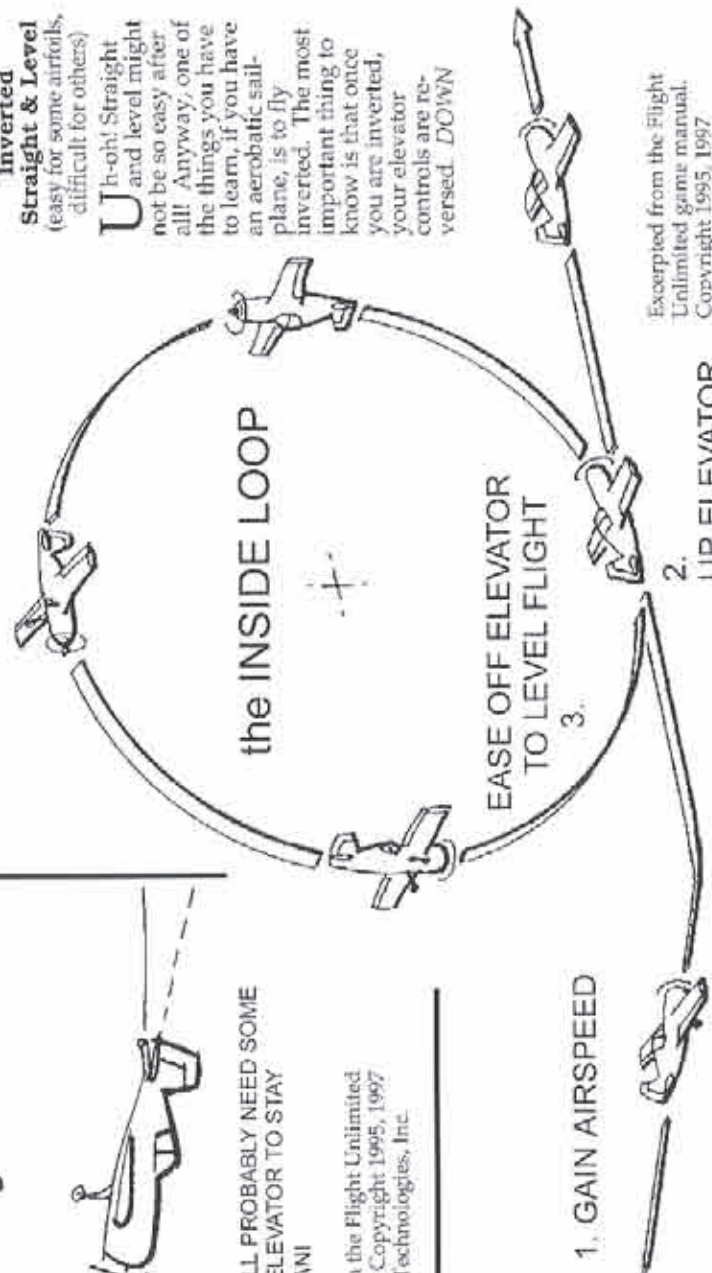
Excerpted from the Flight Unlimited  
game manual. Copyright 1995, 1997  
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adjustments when you are inverted in the loop? Let's tackle inverted flight next to find out.

### Inverted Straight & Level

(easy for some airfoils,  
difficult for others)

U-h-oh! Straight and level might not be so easy after all! Anyway, one of the things you have to learn, if you have an aerobatic sailplane, is to fly inverted. The most important thing to know is that once you are inverted, your elevator controls are reversed. DOWN



1. GAIN AIRSPEED

Excerpted from the Flight  
Unlimited game manual.  
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elevator makes your nose come UP, and UP elevator makes your nose come DOWN. Try it; you will get used to it! It's really no more difficult than learning how to steer right and left when your glider is coming toward you.

Make sure to practice your first inverted flight one mistake high!

The best way to find out if your particular sailplane will fly inverted is to do a loop, and on the top of the loop,

instead of continuing on down, push your elevator stick forward and see if your sailplane will fly inverted. If not, then give a little bit of up elevator and continue your loop, no harm done.

Some sailplanes, even with a lot of dihedral or polyhedral, will fly inverted, and some will not.

Another way to get into inverted flight is with a roll. With rudder only, this will be more difficult, but with ailerons you can roll inverted and then, if

necessary, add down elevator (making the nose come up), continue to fly straight and level inverted.

You can exit inverted flight either with a half roll or a half loop.

### Ailerons

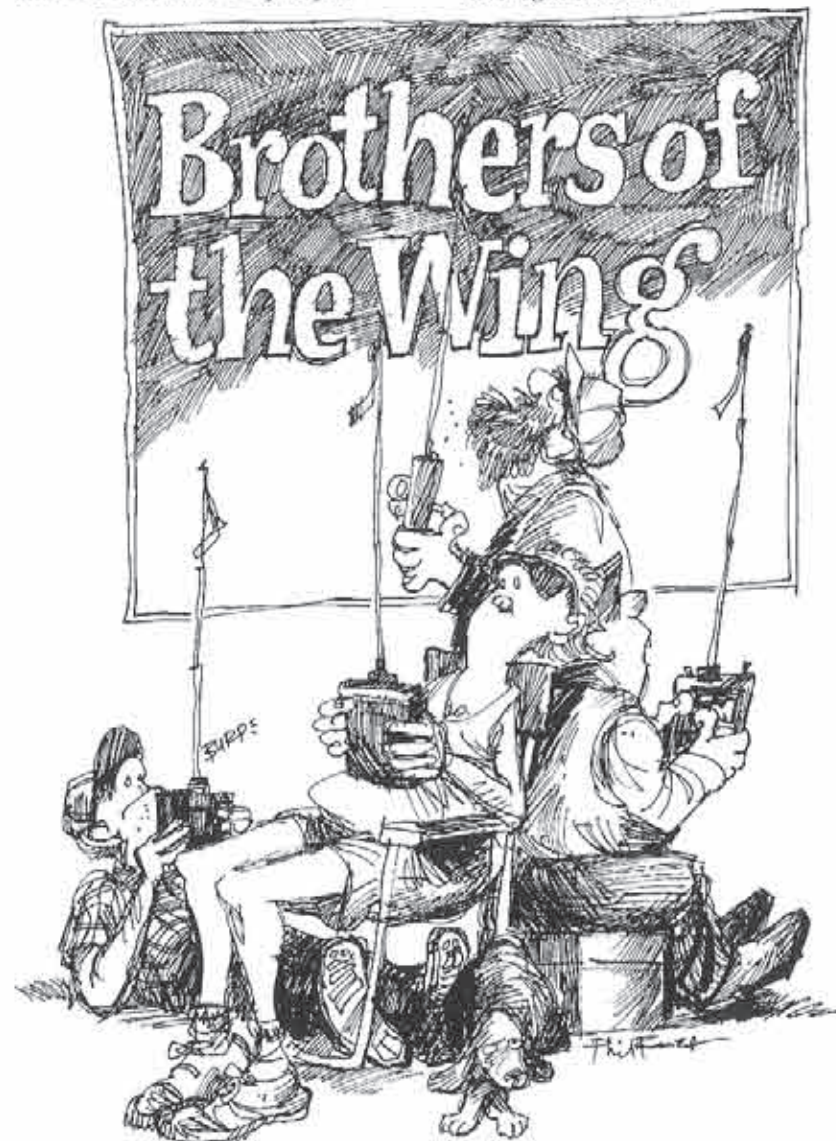
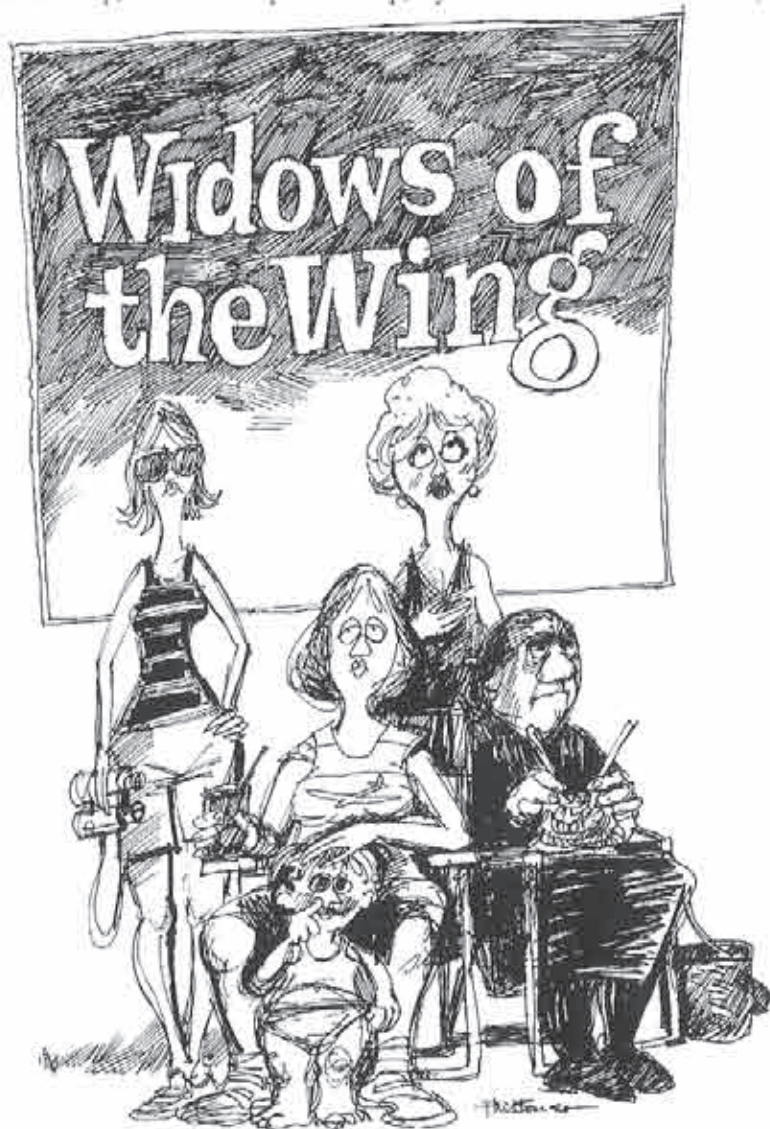
By now you may be wondering if I've forgotten something. How to turn while inverted? With ailerons, it's a snap: right side up, upside down. It makes no difference. Fly as you

always have. Turn right to go right. Turn left to go left.

### Rudder only

Rudder only is another story. When inverted, all rudder inputs are reversed: turn right to go left, turn left to go right.

In order to steer straight and level, small corrective inputs might be necessary so it's nice to know how to steer right and left. ■





## "SHORT CUTS"

Steve Savoie  
RR #3, Box 569  
Gorham, Maine 04038  
(207) 929-6639

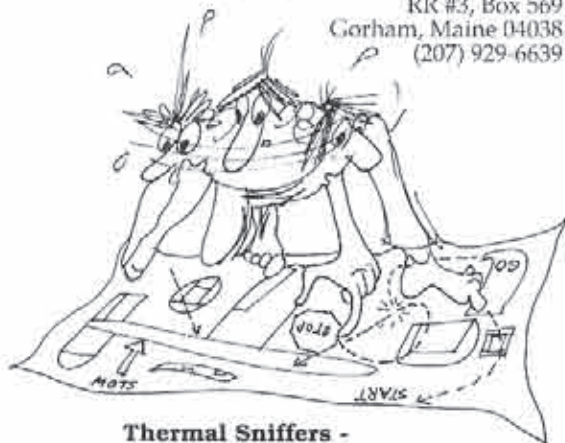
and bore the rest of us; but stand by, as there's more to thermal sniffer use than one may think.

It's a common misconception that thermals are very weak in New England. Here in Maine, our best boomer flying comes in the spring, when the night air dips to 40 degrees and day time temperatures can verge in the high 70's. This is especially true when a cold front passes through at about 6 p.m. These are the days we all dream for, but they sometimes come with a price. When is high enough? It has at times been a common problem getting

out of these suckers. Last spring, for example, I had a 144" Catalina at about 3500', when I decided it was time to get out, since the only thing in sight was a black line (wing). The fuse and tail were not visible; it was time to pull the flaps and put the nose down. But, it just kept on going up; in fact, the Catalina rolled over twice, as I attempted to get out.

Everywhere I went she just kept on going up; by now I had two spotters helping. Then it hit me. "Use the thermal sniffer to get into some down, or at least neutral air," I told myself. The sniffer had been turned off after the first 30 minutes, because it just wasn't needed. I did finally find some sink, after about 7 minutes of searching, thanks to that low, sour tone from the sniffer. But this wasn't the last time I'd use the sniffer for non-thermal use.

On another occasion, I shifted the CG on the Catalina and needed to re-trim the plane. Most folks get up very early in the morning and winch up into the thermally stable morning air to do their trimming. I like to avoid early morning (5 a.m.) hours and the morning dew, so I trim at dusk. The problem doing this, with a large plane and a black bottom, is visibility. Kind of tough to get the best thermal trim when dusk is settling in for the night. For these occasions, I use the sniffer to get the plane trimmed just on the verge



### Thermal Sniffers - What Are They Good For?

Over the years, I've grown quite fond on my old thermal sniffer and wouldn't give it up for the world; in fact, some believe they should be classified as an endangered species. Mine is an old ACE R/C unit, and it's worked well for many years. For those who don't know, a thermal sniffer is an electronic device that signals vertical speed back to the pilot via a small output transmitter and a receiver unit; other types just mix into the rudder circuit of the plane's receiver and gently turn the plane. Most of the sniffers in use are the transmitter/receiver type.

This little device works via changes in air pressure (that accompany changes in height) through an orifice diaphragm chamber that flexes a small lens on an optical circuit to input into the transmitter. The changes in air pressure (vertical speed) produce changes in tone through the receiver, which is usually belt worn by the pilot. Considerate pilots use an earphone; others use external speakers and commonly stand nearby their favorite friends.

Thermal sniffers are a must for cross country flying or at heights greater than 2000'. At that height, minor changes in pitch and altitude are quite difficult to detect by sight. This is pretty straight forward stuff, and possibly will interest only those new to R/C soaring.


precious seconds of a doomed flight. So, think twice when you see that dusty old thermal sniffer on the shelf the next time you go out to fly; it's got more uses than you think. ■

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## Analysis of Flight Performance

...by Lee Murray  
Appleton, Wisconsin

Samuel Clements (Mark Twain) quoted Benjamin Disraeli (1804-81), English statesman and author as follows: "There are three kinds of lies: lies, damned lies and statistics." Many people share that opinion, because of the poor application of statistics. In truth, statistical analysis is a valuable discipline of science and mathematics, which can pick out the significant relationships from a pool of highly variable data. The analysis of statistical data is not trivial and requires

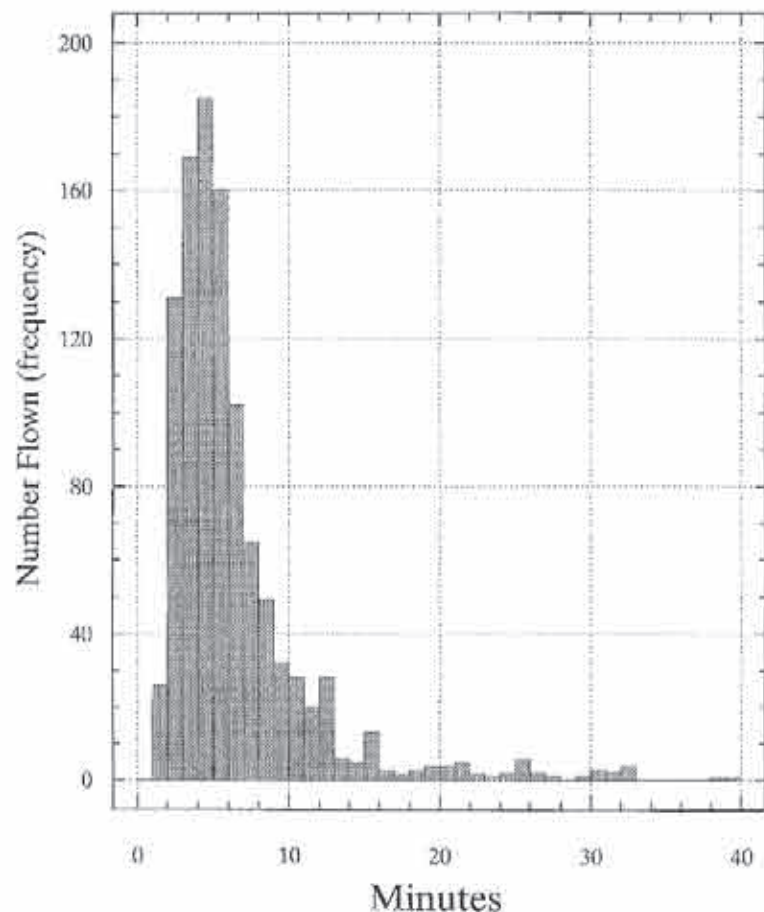
training. For us, having actual data for a large number of flights can be useful in developing ideas, which will lead to higher performance models, and flying skills.

This report is the statistical analysis of 1080 flights of several models flown by a single pilot over a 10 year period. Three previous reports were published in *RCSD*<sup>1,2,3</sup>, which dealt with the topic, having half the flights covered in this report. More detail can be presented as more trends become apparent. The main conclusions I wish to submit for examination here include:

1. Model performance is a strong function of wingspan.
2. Over the years, model performance

Figure 1

Frequency Histogram



has improved.

3. 2M and larger classes of models benefit from having strong winches.
4. Thermalling performance in spring and fall is better than mid summer.
5. You probably won't spend more time in the air with your favorite model than it took to build it.

Most all of the flights took place on the Anderson Sod Farm, the soaring site of the Valley Aero Modelers. This is a challenging flying site in that it is at the edge of the Great Medina Swamp of Northeast Wisconsin.

### Discussion

A Histogram is a graphical representation of the frequency of occurrence vs. some variable or continuous parameter. In the examples presented here, the number of flights of a given time (nearest minute) is plotted as bars of proportional lengths vs. flight time. Figure 1 is a histogram for all models flown during the study. Easily, one can see that there are few 1 minute flights and very few flights of 30

minutes (longer flights not included in this plot). At a glance you can tell that I was most likely to have a 4 to 6 minute flight by the height of the bar at 5 minutes. You can also see that the shape of the peak formed by each column is not a symmetrical bell shaped curve (e.g., not purely random), but is skewed with a long tail on the high side. The reality that we all recognize is that without finding lift one will probably have a flight time of 3-5 minutes (on hot days, it will more likely be 3). Under more fortuitous conditions, lift will be encountered, which will extend the flight time past 5 minutes.

There are times when this logic goes out the window. One such occurrence is the well known noon balloon, which is usually good for 10 or more minutes for everyone in the air when it happens. For the new flyer, I will explain that the noon balloon is a large area of lift which occurs when the mixed boundary layer breaks through the temperature inversion, which develops overnight.

## Probability of Flights Longer Than 5 Minutes

Lee Murray's Model Flight Time Data

Wing Span (In)

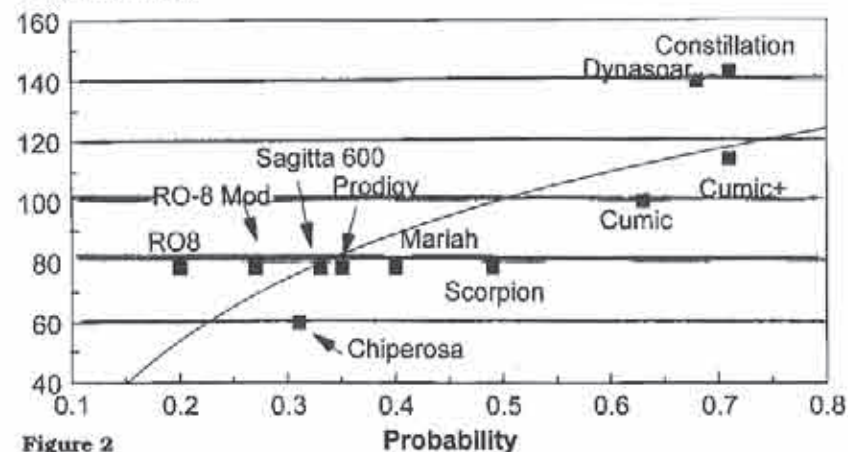


Figure 2

Probability



The normal situation on our field is that you will not find lift on one third to one half of launches and subsequent flights. The model contributes to the chances of encountering lift by:

- staying in the air long enough (by virtue of a low sink rate),
- being able to be launched higher (by virtue of strength and low drag),
- fling through more air (by virtue of a good L/D ratio), and
- being able to reach known thermals or escape sink (by virtue of its speed range).

Of course, your skill amounts to the biggest factor in achieving a general level of success. Because this comparison is made with one pilot (me), much of the skill factor has been reduced in making the comparisons. I do hope that I have learned some improved skills over the years.

Another problem in making performance judgments is what yardstick to use. I will use two yardsticks or indices to measure flight performance:

- The probability of finding a thermal and extending flight times past 5 minutes. This is the fraction of flights greater than 5 minutes.
- The second is average flight time. Admittedly, this index if it is skewed by exceptionally long flights, and is compromised when I land early because I'm tired or bored.

Figure 2 is a graphical comparison of models by wingspan vs. the probability of flights over 5 minutes. The information contained in the figure is illustrative of the superiority of modern model and airfoil design. The RO-8 had the lowest chances of getting a flight over 5 minutes, and has the lightest wing loading <math><3.7 \text{ oz./ft}^2</math>. One might conclude from other sources that a low wing loading is important to hand launch gliders, but the data here indicates that the effect does not extend to larger models in general. Just looking at 2M model technology, consider the order of models arranged by probability of flights over 5 minutes (lowest probability to highest probability):

Model	Features / Airfoils
RO-8	Unknown semi-symmetrical airfoil with turbulence
RO-8 Mod	E-205 (no turbulators)
Sagitta 600	E-205
Prodigy	S-4061
Mariah	S-4061 (Ailerons, Elev., Flaps., & Rudder)
Lil' Scorpion	SD-7037 (Ailerons, Elev., Flaps., & Rudder)

Another great tool is theoretical performance analysis, which you will see is relatively consistent with my observations. Based on the probability of flights of 5 minutes or longer, theoretical "Lift to Drag Ratio" and the width of the L/D curve are important predictors of this probability.

A point of interest would be to compare the launch method vs. flight performance by model class. Here the results seem to be inconsistent. With two meter gliders, my guess is that, it doesn't matter if a sport winch<sup>4</sup> or full size winch would be used. However the data indicates that the more power available, the better the flight performance. See Chart 1.

With Unlimited Class models, the trend seems to be less consistent with the sport winch, showing better probability of flights over 5 minutes, but with less average flight time. Factors which may distort the 2M data include a changing mix of 2M planes being flown in the evening vs. during the day. Flying landing practice, I would terminate flights which could go past 6 minutes, and landing on even numbers of minutes on lesser flights. The distortion in unlimited class data comes from my flying my Cumic+ after work, in the evenings, when the lift is light but more consistent than during the day, when I am more likely to have the Ford 12V winch out on a Saturday afternoon. Future comparisons of launches with the sport winch using Unlimited Class airplanes are not likely to be made, because it just doesn't give a good launch for my Prism or other full house unlimited ships. See Chart 2.

I have continued to notice that average flight performance is better in the spring and fall vs. mid summer. I have heard of a parameter known as altitude equivalent, which is based on tempera-

Chart 1

Class	Launch Method	Average Time	f < 5 Min.	Number
Two Meter	High Start	5.18	0.30	199
Two Meter	Sport Winch	5.38	0.42	275
Two Meter	Ford 12V Starter	6.61	0.46	113
Unlimited	High Start	7.77	0.67	26
Unlimited	Sport Winch	7.14	0.73	113
Unlimited	Ford 12V Winch	9.53	0.62	94
X-Country	Ford 12V Winch	9.80	0.69	94

Chart 2

Time	Class	Average Flight Time	f < 5 min.
Total Experience	Two Meters	5.38	0.42
Evenings	Two Meters	4.80*	0.32*
Total Experience	Unl (Cumic+)	7.14	0.73
Evenings	Unl (Cumic+)	6.31	0.78

Note: \* = Bias produced from landing at even number of minutes and avoidance of long flights.

Chart 3

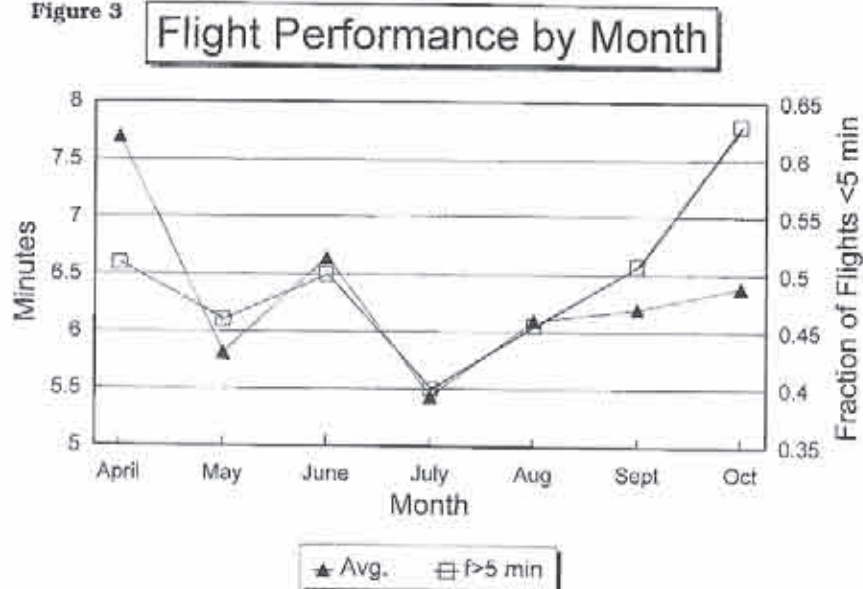
Model	Number of Recorded Flights	Total Flight Time Minutes	Total Flight Time Hours
Cumic+	235	1893	32
Mariah	179	869	16
Prodigy	243	1443	24

ture, barometric pressure and humidity. During summer, the equivalent altitude increases and, along with it, the lift, which is generated at a specific speed. Perhaps someone who lives in Denver can comment on flight performance vs. altitude there. I suspect that launches do not go as high. After the launch, I cannot say with assurance if

the loss in lift is compensated for by a reduction in frictional drag. It seems that some of my longest flights have been in summer, but also there is a lower fraction of flights above 5 minutes. Figure 3 details the two key parameters vs. the month of the year.

To diverge from the stated topic, I

Figure 3





remember hearing someone making a comment that you never get as much flight time from a model as it takes to build it. Chart 3 shows the somewhat understated data for my most used models.

As a footnote, I would like to complement the producer of my Fab-Tech Sport Winch. I have records of my own 393 flights. This number could easily be doubled for unrecorded flights and launches for other peoples' models. I purchased it used from someone getting out of soaring due to his advanced age. I have only recently put the first break in the line. It otherwise has the same parachute, starter solenoid, motor, brushes, turn around and foot switch as when it was new.

<sup>1</sup> R/C Soaring Digest Vol. 10, No 9 (Sept. 93) pg. 28 *Comparison of Model Sailplane Flight Times by Class*

<sup>2</sup> ibid. Vol. 10, No 10 (Oct. 93) pg. 37 *Sailplane Flight Times as a Function of Launch Methods, Wind Speed, & Time of Year*

<sup>3</sup> ibid. Vol. 1, No 1 (Jan. 94) pg. 18 *Effect of Model Size on Performance*

<sup>4</sup> Fab Tech Sport Winch

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### 1st Annual Land of Lincoln E-Fly

I headed up to Springfield, Illinois to take in the event held by the Knights of the Air R/C Club. Primarily a wet fuel club, there are a number of members who fly electrics and who approached the club membership about hosting an electric event. As it turned out, the wet fuel guys were quite surprised by the great turn out and also by the quality of the models on hand. I'll let the photos speak for themselves, but I really enjoyed the day and hope that this becomes an annual event! Great job, guys!

I recently purchased an Avcex F7LMR brushless geared motor and speed controller, and was pretty excited to see it show up in the mail. A beautifully made motor, the cost is a bit more than the typical brushed motors on the market, but it will also fill a broader range of uses than other motors. First use for me will be in a FVK Silent Dream 2.2. This will be a 7 cell set up and the specs show a 58 oz. thrust with a 14x10 prop! Vertical performance here we come! I will also use the motor on 10 cells in a old Tyro Models 80" span Playboy. With the higher cell count, I'll need to go to a smaller diameter prop, but the performance will continue to be extraordinary. This is my first go at a brushless motor and I'll pass on more info. when I get it in a model and into the air.

That's it from me this month! Send along any electric info. you have, and don't forget to include photos of your latest projects.

**Good Health and Good Lift!!** ■

Jack Dobbins with his "baby" Bee - 1/2A plans reduced further and powered by a Dick Miller motor and homebrew gearbox. Uses 6 - 350 mah cell motor pack, two HS-60 servos hard wired directly to an MFA Direct 2000 Micro receiver. AUW about 12 oz.



Joe Price from the Chicago, Illinois area with his 1/2 size Klingberg Wing and Fun Fly Fun Thing. The 1/2 size Klingberg Wing is built to the size of the drawing that comes with the Klingberg 78 model and Joe was taken by the idea when he saw it in Model Builder a couple of years back. Power is a Nikko motor/gear drive set with 6 - 270 mah cells. Joe says to mount the batteries in the nose and keep the servos (two HS-60s) inboard as possible. CG location is critical and limit the control throws to 3/16" each way. AUW is 10 oz. It flies like it's on rails! Joe also has a Klingberg 78 powered by two Kyosho AP29 motors with pusher props - set up like the Northrop N9M flying wing.

The Fun Fly Fun Thing is powered as per the Klingberg Wing and also weighs 10 oz. The model is scaled down from the Flying Models 1/2A construction article. Flies great!!







Robbe's all foam Dash-7 by Ralph Weaver. Stock kit except for the use of Graupner 6x3 props. The sound of four motors/props is something to hear! Good flier, too.



Dave Grife's Elxtra 300 powered by a geared Astro 60 and using 33 - 2000mah cells and ALIW of 13 lbs. A really fine flying model with a likeness of electric guru Keith Shaw adorning the cockpit. Dave is still experimenting with motor/cell/prop combinations to further improve vertical performance.



Dave Grife from Michigan with his DH Mosquito from Brian Taylor plans. Two Astro 25 cobalts with AFI's new super gear box. 35 - 2000mah cells and ALIW of 14 lbs. Model is over 4 years old and still flying strong. Not a hangar queen!



Peter George of St. Louis with his Graupner Sukhoi Su-26M. Model uses Graupner Ultra 1600 with a 2:1 belt reduction, Astro 210 speed controller, and 16-1700 mah cells. Model has plenty of go and can do full aerobatic routine with ease.



(Left) John Berlin from Effingham, Illinois holding his Little Star from Unbeaten Path Imports. Powered by a geared Speed 400 set up, John would pass the transmitter to anyone interested in flying it. I don't think John had a flight under 20 minutes all day.



Dan Weeks of St. Louis with his Andersen Pylon O/T model. Converted from the Balsa Products 1/2A Texaco kit, the model uses a Graupner Speedgear 100 4:1 motor/gearbox on 7-500 mah cells. Flew quite well in the breezy conditions on Saturday. Dan is new to electrics and this is his first E-model.

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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 beech from Kennedy Composites, which is applied with West Systems epoxy.

## CONDOR *Tomorrow's Sailplane, Technology Today*

This is after he has first reinforced the wing with carbon fiber and fiberglass. The servo wells are routed out, as are the flaps and ailerons. What this means for the sailplane enthusiast is a minimum amount of work before getting the sailplane into the air. The wing is light but strong enough to take "pedal to the metal" launches. Also available as an option is Ron's unique internal capped hinge-line. This means even less work for the modeler.

The fuselage is made by Steve Hug, owner of the Fuse Works. Steve is another master at what he does. Fuse Works makes what we consider to be the best fuselage in the business. Steve uses only the best fiberglass and Kevlar™ available. All fuselages are manufactured using the West Systems epoxy. Steve's fuselages have the least amount of pinholes, if any, that we have seen. In fact, the fuselage is so pretty that many people do not paint it. The fuselage is extremely light, and yet strong enough for very aggressive flying and landing. For those with very little

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Saturn 2M... \$300.00, ask about servo; WindDancer, my own design, have 4 to sell, a lot like the Falcon, 110" - 118" span, various airfoils... \$350.00 ea.; Synergy 91, very nice... \$400.00, ask about servo. Dale (Head III) King, (972) 475-8093, Texas.

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New Products

### 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.



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...from Soaring Stuff

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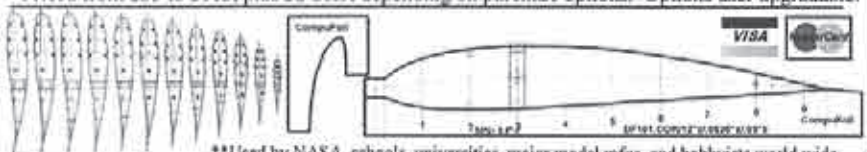
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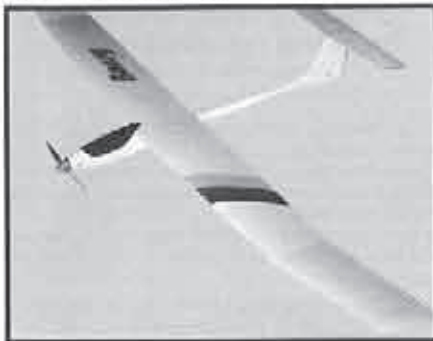
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...from Hobby Supply South

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## GORDY'S TRAVELS

### Nat's 'Sumthin'!



*Daryl Perkins catching HLG.*

...by Gordy Stahl  
GordySoar@aol.com  
Louisville, Kentucky  
Photography by David Garwood  
Scotia, New York



*Tim Vandenheuvel*

Muncie isn't far from Louisville, but I never figured my schedule would let me attend. As usual, I was wrong! On a recent trip, I found myself heading to Albany, New York, so I got on the phone and hunted down Dave Garwood, R/C photo master and soaring columnist for *Model Aviation*.

We met, did some cool sloping over the river, had a few laughs, a few barley pops, and a couple of great steaks.

The conversation came around to the Nats, and Dave mentioned that he had planned on sharing a room with Lexington's Bob Kidd. Bob canceled, and he invited me to share the room... And, that's how I got from New Albany to Muncie.

So, what was it like? Dave snored... (Oh, you mean the Nats?) Well, it was awesome, exciting, fun, and informative - an opportunity in lots of ways.

I missed the two meter and handlaunch competition, but Daryl Perkins won them using an NSP Laser and a Maple Leaf HL. A bunch of other guys flew the events, and did

themselves proud, or at least had fun.

The Unlimited event was the best. Mike Stump held the pilots meeting and started out by introducing me to the whole crew! There were so many great and distinguished pilots in attendance, many of which I had read about over the years; it was kind of like being at the academy awards and seeing the stars of soaring. Just to name a few, I met Mike Stump, Troy Lawicki, Daryl, Mike Fox, Sal, Mike Popescu, Brian Agnew, Doug Barry, Eric Sanders, and Chuck Anderson. It was like a who's who of soaring.

The weather was gorgeous, but the wind was up. The landing zone was laid out like parking spots, with the object to land your plane on top of a stripe; points were lost based on how far away the plane's nose was from the stripe. The catch being that if one over-shot the zone, the entire flight was zeroed. This rule is aimed at safety.

I have never witnessed anything so majestic as when I stood at the edge of the landing zones and watched a gaggle of ships come racing in on



*Josh Glanb launches in HLG contest.*



*Troy Lawicki launches 2M Duck in 2-meter contest.*





*Tom Keisling circles a CR Aircraft Climmax in HL Golf.*

approach, make their turn to line up for the landing, and pop their crow to hover into the spot. No words can explain this sight effectively, as it is just something you'd have to see for yourself. It was just plumb wonderful!

The high wind and the super tuned winches took their toll on ships that first day. I believe the count was 17 that died on the launch or off the zoom. Wings and stabs made sounds much like the appetizers we had at dinner that night; to the pilots who came to compete, it was not at all appetizing; I can understand why some weren't in the mood for dinner that night...

I remember seeing the disappointment in Paul Perret's eyes, having traveled all the way from New Orleans with hopes of going for the big prize; having practiced and prepared, the hopes disappeared with a single pop-off on his first round. Hundreds of miles, hours of driving, dreams dashed...

Not all of those ships were lost on the winches though; a couple got caught by the thermal sirens, who called them high and far... Too far in fact, down wind. At least two will be harvested with the corn and beans, cuz they just couldn't make it against that wind. Oh, the pilots tried all right; they flicked up the reflex, and pushed in some down trim; but as the noses dropped, the wing tops presented themselves to the strong winds.

Instead of speeding back, they went down and back, to rest, hidden in the green fields past the museum. The crashing, folding wings, and dumb thumbing it, non-compare to the sick, lonely feeling of a losing a precious bird...

I was very lucky to have had the honor of timing for a couple of the guys, and an honor is the best way to put it. So much was on the line: the big competition, the time when a timer is spare eyes, adviser, almost co-pilot; honored to be asked barely says it. It was fantastic.

Dave Garwood was a blur each day, alternately flying, shooting photos and doing interviews. We spent the evenings comparing notes.

Why did Daryl win the Unlimited event? Well, in my opinion, he made his times and the landings. I know, duh! But here's how he did it. First, he had a plane that he knew really well; it was trimmed perfectly. His F3B and slope racing experience gave him the savvy to ballast up, which gave him the ability to follow the thermal sirens up and way out (suckering the followers with him), and then laughing at the wind by easily penetrating back to the spot.

Others may have used his landing

technique, but I didn't see 'em. He would come in from way out, really hot and on the deck, dead on, in line with the line. Most of the others used the usual technique, by coming in high, using a steep approach, and working crow to control speed and altitude. The problem with that strategy was that it left them literally blowing in the wind, floating and bobbing, landing short, or off the points line. A few of the Free Flight ships that wandered over, touch and go'd off the tents and managed to float into the landing zones, which really rubbed-in the missed, "controlled" landings!

The Nostalgia event was one man's dream to pay tribute to the super ships of the pre-1980 era. The format was designed to honor and showcase these ships under competition conditions. I saw Grand Esprits, Paragons, Sailaires, and Aquilas; their transparent covered, open wing bays glowed like jewels from the sun shining through. Why pre-1980? Pretty much because that was the year when



*Jeff Pfeiffer approaches the pin with his own design Vic HL Golf.*



*Smiles all around as Joe Hahn of DJ Aerotech gives Paul Griebenow a Monarch to replace the plane Paul lost in the HLG contest. Father Rick Griebenow looks on.*

composite, multi-channelled, and computerized ships ended the day of the balsa ribbed and monocoated era of contest ships.

Well the wind was still booming, the same winches were set up, and the batteries had fresh charges. How many of these fragile gems got blown up on launch??? None! Careful use of the power of those monster winches left every single Nostalgia ship ready to fly after the event ended. The real winners were those who got to see those ships fly a Nats against each other, again.

Am I glad I went? Yup. Is the Muncie site good for soaring? Yup. Was it that special airfoil, quintupled planform, the quantity of carbon, or the secret cambering or cross-mixing that won the prizes? Nope! It was mostly just good flying and luck that took the prizes this year.

What's the hot ship to buy? Well I think that design has, to a certain extent, finally exceeded our thumb's ability to use more technology improvements in our ships. The





Father Rick Griebenow prepares to launch a Great Planes Spirit for son Paul Griebenow in 2-Meter contest.



Brian Agnew prepares to launch a Great Planes Spirit for young David Elias in 2-Meter contest.

latest crop of ships all center on performance, but with a new emphasis on comfortable, easy handling, durability, and the ability to stay true in order to be able to repeat good performance.

Of course, that's just my opinion, written in a motel, somewhere in the USA...

Hope you enjoyed my Nats visit. See you on my next trip.

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## Wind Tunnel Tests of Wing Profiles

...by Martin Simons  
Stepney, South Australia

(An expanded version of a talk given at the LSF Conference held at Jerilderie, New South Wales, Australia, Easter 1996.)

### Part VI

#### The boundary layer

My parents had a chicken once which always laid its eggs on the extreme outer edges of the property. We called this hen the boundary layer.

But in aerodynamics, when we speak of the boundary layer, we mean a very thin layer of air close to the skin of the wing, only a small fraction of a millimetre deep at the leading edge, but normally becoming thicker as the air passes over the surface, perhaps a couple of millimetres thick (3.32nds of an inch), after passing over about 300 mm (12 inches) of the surface.

When a wing moves through the air, or putting it the other way round, when the air moves over and under a wing, some influence is felt ahead of the leading edge, air being a fluid. If the wing is at lifting angle of attack, the flow is already slightly upwashed when it arrives, and there is a point, called the stagnation point, slightly **under and behind** the extreme leading edge, where we can imagine a stream of air particles striking the wing at a slight upward angle. This stream of particles divides to form the boundary layer, some going round the leading edge and over the top surface, some going underneath.

The air pressure at the stagnation point is the highest pressure found anywhere on the wing surface. (The pressure at this place is the same as that felt in the open end of a pitot tube pointing directly upstream.) On charts showing pressure coefficient variations, the ordinary atmospheric or 'static' pressure is scored as zero, the pressure at the stagnation point is scored as 1 (unity). At all other places on the wing, the air pressure is less than at the stagnation point; but at the extreme trailing edge, there is another, relatively high pressure region, as the air

returns to the undisturbed atmosphere and, some little distance further on, recovers to the general, so called 'static' pressure.

The boundary layer normally begins laminar at the stagnation point, that is, very thin with very smooth flow in extremely thin layers, which more or less slide over one another with only a certain amount of friction and viscous 'stickiness' between them. We can think of the high pressure driving the boundary layer onwards. The lowest lamina is virtually stuck to the wing. It does not move with the main flow. The next little layer above creeps along slowly, the next a little faster, and so on until, at the limit of the boundary layer, the air moves just as fast as the main airstream. Remember, we are talking of the whole boundary layer being a fraction of a millimetre deep at this stage. All this creeping and sliding and slipping is going on at nearly microscopic scale.

On a large wing, especially if there are waves and humps in the skin, as on most ordinary full scale aeroplanes, the laminar flow usually breaks down after a short distance and becomes turbulent. The internal flow in this turbulent couple of millimetres is highly irregular, and the boundary layer thickens to some extent as it goes, because it begins to upset some of the main airstream flow, as well. A turbulent boundary layer produces more skin drag. If the flow could be laminar all over, wings, fuselages, tails, the drag of an aircraft would be very much less than it is with a turbulent boundary layer. Generally, this is not possible, but designers struggle to get closer to it.

#### Separation bubbles

Usually, on a smooth model wing, and often on full scale sailplanes too, the boundary layer is not in contact with the wing skin long enough for a normal transition to turbulence. Laminar flow tends to persist, but then, unfortunately, a boundary layer laminar separation bubble and maybe two, one on each surface, appears. Without going into details too much at this point, a separation bubble forms where the boundary layer flow that

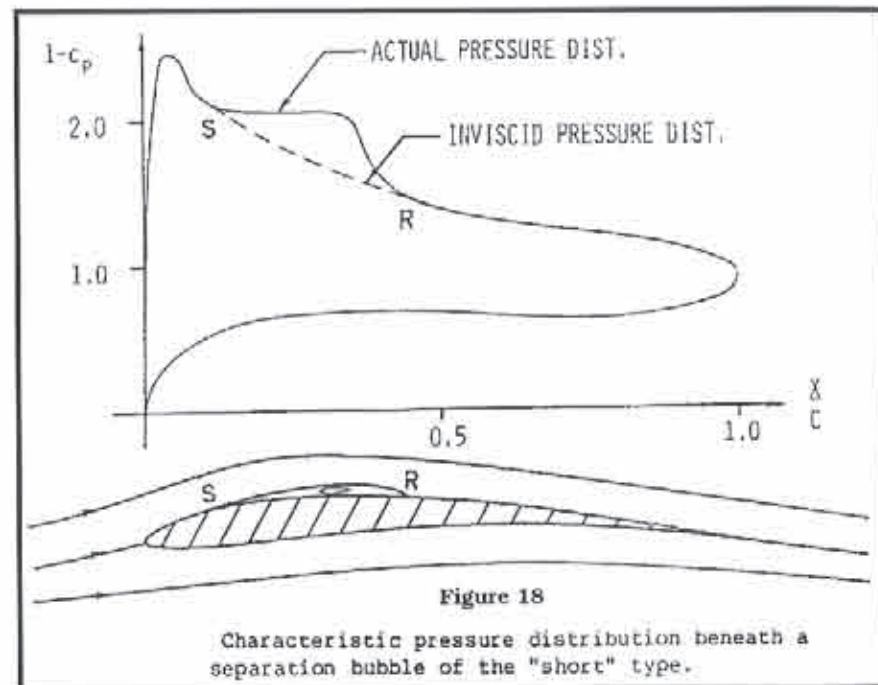


Figure 18

Characteristic pressure distribution beneath a separation bubble of the "short" type.

begins laminar at the leading edge separates from the wing and then reattaches as a turbulent layer after making a little leap. The leap of the boundary layer forms the bubble. (See Figure 18.) It is not a bubble with a skin like a soap bubble, but a small zone of stagnant air, which has a sluggish internal circulation of its own. Schmitz, years ago, described this as a small 'rolled over' vortex, which is not a bad phrase.

To have a separation bubble on a wing is rather like having a tiny air brake open. The boundary layer separates from the wing skin. This laminar separation upsets the smooth sliding of the laminae, they break down, and the boundary layer becomes turbulent and thickens sharply.

The sudden thickening of the turbulent layer after a separation bubble is important for several reasons. First, it has the effect of making the wing seem thicker to the mainstream flow all around it. This alone increases the drag of the profile, in addition to the increased skin friction of the turbulent layer itself. But also the thickening of the boundary layer behind the bubble

tends to bring it down back to the skin. It leaps, thickens and reattaches.

If the laminar boundary layer simply departed from the wing altogether, the main stream would be forced off too and the wing would stall. As Schmitz found fifty years ago, if the boundary layer does not reattach, the bubble, so to speak, bursts, disturbing the flow over the whole of the rest of the wing. This does happen at the critical low Re number.

Separation bubbles have been roughly classified into two types, long and short. On a given wing, a short bubble at one airspeed and trim may change to a long bubble at a different trim and vice versa. Some of the irregularities in the wind tunnel charts of lift and drag at low re numbers, and corresponding oddities of behavior of small, light models in flight, can be related to the ways in which separation bubbles move about and change in length. For instance, a long bubble may exist at a low angle of attack, persisting as the angle of attack increases up to a point at which there may be a general flow separation, the bubble bursting. In some cases, a further increase of the



angle of attack finds a rather sudden improvement with a short bubble forming near the leading edge, with flow reattachment behind. A considerable improvement in efficiency appears just before the stall of such a section. The stall is the final bursting of the short bubble. The drag curves tend to show a large hump in the middle of the so called bucket when this occurs, and there are corresponding irregularities in the lift curve, too.

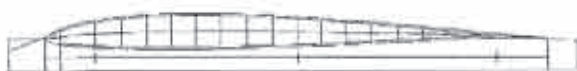
This kind of thing is one of the problems that face operators of small, slow flying models. To strike exactly the right trim for minimum sinking speed of a small glider, for example, requires the wing to be right on the edge of sub critical flow in one direction and total stalling in the other. A slight upset in the air caused by a gust of wind, can throw the flight

completely one way or the other and recovery takes time, especially when the phenomenon of hysteresis is present. ■

(Part VII continues the discussion with "Boundary Layer Vortices in the Wind Tunnel, Ed.) ■



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### Schedule of Special Events

Date	Event	Location	Contact
Oct. 25	TPG Fun Fly	San Diego, CA	Don Richmond, (619) 587-0226
Nov. 1-2	Aerotow Fly-In	Pensacola, FL	Asher Carmichael, (334) 626-9141
Nov. 2	2 Meter TD Contest	San Diego, CA	Patrick Dionisio, (619) 586-7997
Nov. 8	CSS Turkey Fly	Cincinnati, OH	Ed Franz, (606) 586-0177 edkim_franz@msn.com
Nov. 8	60" Slope Race	San Diego, CA	Bob Matheson, (619) 754-2657
Nov. 15	New England R/C Soaring Convention	Portland, ME	Steve Savoie, (207) 929-6639 jim.armstrong@juno.com
Nov. 16	Open TD Contest	San Diego, CA	Patrick Dionisio, (619) 586-7997
Nov. 28-30	24th Tangerine	Orlando, FL	Don Cleveland, (407) 696-7516
Dec. 6	HLG Contest	San Diego, CA	Tom Clarkson, (619) 486-4068
Dec. 6	Slope Combat	San Diego, CA	Arthur Markiewicz, (619) 753-3002
Dec. 7	Open TD Contest	San Diego, CA	Patrick Dionisio, (619) 586-7997
Dec. 13	60" Slope Race	San Diego, CA	Bob Matheson, (619) 754-2657
Dec. 14	F3J	San Diego, CA	Mike Ziaskas, (619) 484-7596

1998

June 11-14 Elmira Aerotow '98 Elmira, NY John Derstine, (717) 596-2392 johnders@postoffice.ptd.net

### Schedule of Special Events - Outside U.S.A.

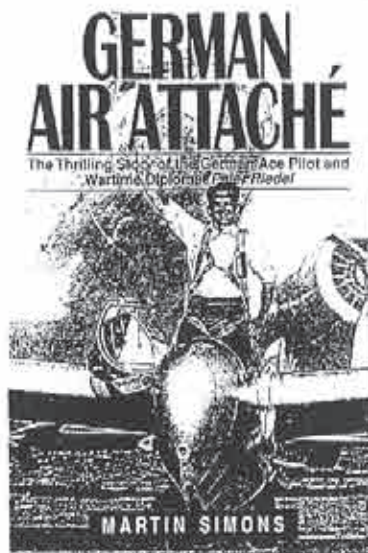
Aug. 1998 F3J World Championships, organized by BARCS

## NEW BOOK INFORMATION

### GERMAN AIR ATTACHÉ

The Thrilling Story of the German Ace Pilot and Wartime Diplomat Peter Riedel

Martin Simons



Airlife Publishing are pleased to announce the publication of *German Air Attaché - The Thrilling Story of the German Ace Pilot and Wartime Diplomat Peter Riedel* by Martin Simons.

Peter Riedel became one of the world's greatest glider pilots in the years before the Second World War. It was the time when Hitler's Reich was flexing its military muscle and when the frontiers of aeronautical design were moving forward at speed. Because of Riedel's excellence in breaking records in gliding events he was dispatched from Germany to the USA to take on the best. This he did and broke many flying records in his brilliantly designed German gliders. His success and popularity lead to him being coaxed into taking the position of Air Attaché to the USA for the Nazi regime - a position which led him into the world of espionage and Nazi officialdom. When America joined Britain in its war with Hitler, Riedel was forced to return to Germany where another fascinating episode in his life unravelled, leading finally to a dramatic escape by fishing boat from Sweden to Casablanca and by yacht across the Atlantic to Venezuela.

The author, Martin Simons has had a long friendship with Peter Riedel born of their love of gliding. He has written the definitive history of the Slingsby glider manufacturer and their aeroplanes and edits a gliding magazine in Australia where he lives.

- A thrilling true story of flying and espionage in America and Germany at the outset of WWII
- Riedel is part of the legend of flying

This book will be available from Airlife Publishing in November 1997 priced at £19.95

234 x 156mm, 288 pages, 16 pages of b/w photographs plus 8 line drawings, Casebound, 1 85310 879 0

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## Aerotow "97" Elmira

...by Bruce DeVisser  
San Jose, California

An International Gathering of Aeromodelers  
at Harris Hill, New York  
June 13 - 15, 1997

The Elmira Aerotow "97" is fast becoming a premier scale soaring event in the USA. Of course, it pales in comparison to the level of activity enjoyed in Europe, but then they have over a 20 year head start.

Elmira is unique in several respects, all of which combine to make it a special experience. The event was held at a private, full-scale airfield, which is the site of the National Soaring Museum, in Elmira, New York, the Birthplace of Soaring in America, and the site of the Schweizer Aircraft Company, America's premier glider manufacturer. For those with an historic interest, Harris Hill soaring activities started in earnest in the 1940's, with wartime glider pilot training. Further information is available in libraries and from the National Soaring Museum.

Harris Hill overlooks the valley in which Elmira is located, along with the Chemung County (Elmira) airport. A flat-topped hill, Harris Hill is an ideal soaring spot. One can observe full scale gliders in action, from a Ka6E to a Schweizer 1-26, ASW-20D and 27's, to Schleicher gliders, and many more, towed by a Piper Pawnee and a Super Cub. The Super Cub was also available for powered sightseeing rides, and Michael Schellberg, one of the German visitors, took a few short flights to get airborne action shots with his digital camera, which were then put onto the EMS World Wide Web site within 30

DG-800 on final. Photo by Bruce DeVisser.

minutes, so anyone around the world could "attend" remotely, especially the fellows back in Germany! The speed of technology - amazing!

The other unique aspect of Elmira is the airfield operation. It was quite common to hear the Flight Line Staff announce "full-scale taking off", "glider landing", "tow plane landing", "full-scale tow plane landing", etc. Although the operations were carried out in a safe a manner, the potential for an incident is obvious. Only safe procedures and diligent observers can prevent problems, and the Aerotow Staff, the pilots and their observers did a very commendable job.

Ralf and Heike Schiefele, proprietors of EMS (Exclusive Modelbau Schiefele) organized a trip for several German pilots and their wives to the Aerotow. They all appeared to be enjoying themselves and the early summer weather in the USA; lots of smiles all around, and a great group of friendly people. The EMS Team were the unfortunate victims of circumstance, when their towline parted at low airspeed and altitude, exactly when they flew into the rotor at the edge of the hill, causing their beautiful 4m Ventus 2C to tumble and crash over the edge of the hill. EMS displayed some of their scale sailplanes (Duo

Discus 2.5m and 5.4m, Nimbus 4D 3.3m, Minimoa 3.8m), cockpit kits, and protective carrying bags for the models. Their flying display included the Ventus 2C, Duo Discus 5.4m, and the Minimoa.

An interesting device used by the EMS pilots was a tiny programmable variometer that could easily be placed in the cockpit of a 2m and up glider. A pocket-size receiver unit with earpiece completes the set. You can adjust the reporting rate by switches on the sender, and it also will give the pilot a remote low battery warning if the model's receiver pack falls below 4.6 volts. This unit, while expensive at around \$400, is available direct from the manufacturer in Germany.

### The Flying

Wow, what a great event! The towplane pilots worked continuously to keep two launch lines going, sometimes having 3 towplanes in service at the same time. The pilots of the gliders need not have had aerotowing experience - the organizers provided experienced pilot coaches to assist those



EMS 5.4m Duo Discus on final.  
Photo by Bruce DeVisser.



EMS 5m Duo Discus cockpit.  
Photo by Bruce DeVisser.



Pete DiStefano, L1SF, 1:5  
Schweizer TG-2 winner. Photo  
by Bruce DeVisser.

needing it. The flight line organization was very efficient, with the gliders staged with tow loops already in place, the towplanes able to land and be in position to tow immediately, and every pilot having a safety observer by their side at all times during flight activity. In addition, the flight line marshals kept an additional watch for air traffic, both models and full scale, and regularly announced pending and in progress activities. Just like any model glider field, sometimes full-scale gliders are forced into downwind landings, as was one ASW-22. In such a case, safety observers are indispensable, and this actually happened twice.

### The Towplanes

Here are some of the highlights in terms of models present, both tugs and gliders. Tugs varied from Jim Blum's OS BGX-1 powered modified Telemaster to Wayne Parrish's King 96cc-equipped Pilatus Porter PC-6 by Kuhlman. Robin Lehman brought his aerotowing fleet, including his trusty Spacewalker with Brison 3.2 power, a G-62 powered Airworld Yak-112, and a Frisch PZL-30





Wilga with a 3W-70 twin. Wow! That last one could tow a wheelbarrow full of bricks up!

For those interested in starting aerotowing on the towplane end of things, pick a model design, which is known to be good for this mission. An example is the Senior Telemaster with BGX-1 power. In conversation with Jim Blum, I learned that this represents an excellent, possibly ideal, specification for a first towplane. It is a taildragger, has a robust fuselage design, a large wing, and it is very stable throughout a wide speed range. Jim modified his specifically to use for aerotowing, and for teaching other pilots to aerotow. Jim changed the wing to 3-pieces, with polyhedral outer panels, allowing easier transport in small autos. The fuselage was strengthened by using lite ply with glass cloth and epoxy at stress points, such as the firewall, landing gear mount, wing mount, and tail.

I noted the flying techniques of the better towplane pilots included a gentle application of power at the start, followed by rapid acceleration to establish positive rudder control. The climbout was fairly steep, except for the fastest gliders which required a flatter tow attitude to maintain a safe margin above stall speed. Once at altitude and released, a steep return was made with power at high idle until final approach, followed by a wheel landing, as this allowed better directional control after touchdown, a definite consideration with several yards of towline dragging along behind! Perhaps tail draggers are better suited to this mission.

*PC-6 on final. What honkin' flaps! Photo by Bruce DeVisser.*

My personal favorite was Wayne Parrish's PC-6. It was beautiful to look at, very scale, powerful enough for the larger gliders, and flew in a most realistic manner. Of course, Wayne is an excellent, expert pilot, and takes care to fly the plane in a proper scale manner during aerotows. This also makes it much easier for the glider pilot on tow, and eases any nervousness of those new to aerotowing. I guess I can mention now that I have a 105 inch MCM PC-6 being assembled as this is being written, although it is fractionally smaller than Wayne's; with OS-BGX-1 tuned pipe power, it will haul over 20 lb. of glider! For smaller models, I already have a GP Trainer .60 with OS .90 4C, equipped with oversize tires.

#### Gliders

Although there were many beautiful gliders present, you'll have to put up with my choice of favorites to describe. At the top of the list has to be Ralf Schiefele's EMS 3.8m Minimoa - a truly classic vintage glider. The sight of this graceful machine in the air over Harris Hill seemed like a trip back in time, especially with a full-scale vintage Schweizer on tow at the same time. It is hard to get too much of this type of fun! Another interesting sight was the formation and graceful aerobatic flying of the EMS 5.4m Duo Discus and 4m Ventus 2C with their unique forward-swept wing planforms - a stark contrast to the vintage types.

Etienne Dorig of Icare Sailplanes in Quebec brought his 1.9m Swift and demonstrated electric aerotowing with the assistance of his friend, Alex Wenzl, using a geared (superbox 3.1:1) Astro 40 powered Piper Cub model; prop is 18x6/10, 20 x 1000AE cells. I hope this aspect of aerotowing takes off in the USA - it seems a natural thing to happen with the increasing popularity of electric's, and the wonderful advances in power system efficiency. I'm contributing to the effort, having purchased a Voster Modellbau 1.8m Dornier Do-27 from Unbeaten Path Imports, with an Aveox 1415/2Y w/ Rovox 3.7:1 gears on 27 x 2000 cells. Of course, at this point it seems to make most sense to E-tow scale gliders only up to 3 meters or so span.

Pete DiStefano should be justifiably proud of his efforts in building his beautiful 1:5 scale model of the Schweizer TG-2 military training glider from the 1940's. Particularly scale is the fact that the prototype was developed and built down in the valley below Harris Hill, and used to train wartime glider



*Pete George with award winning Vintage - Roke ASK 18. Photo by Bruce DeVisser.*



*Note interesting camera set-up mounted to fuselage. Photos by Steve Savoie.*



pilots at the Harris Hill site. Sitting pretty next to Pete's TG-2 was Lauren Taylor's TG-3, also 1:5 scale; both weighed in at 11 lbs. Lauren is from Piedmont, NC and flies with Wayne Parrish. Lauren also brought along a gorgeous Schweizer 1-26ab - yes, that is the correct designation - it's right on the full scale nameplate, which Lauren had a photo of in his documentation. He was heard to comment, "I thought they said the MOST"

*(Bottom Photo) The youngest pilot was David Derstine, who flew his Robbe ASW 24. He and his brother, Michael, also did a lot of helping out during the event, with flight lines, spotting for pilots, fueling up towplanes, and many unseen and most necessary chores. Many others from the Harris Hill L/D R/C club gave up their weekend, just to make this all happen, not to mention John Derstine, whose year-long work and e-mail efforts made this a truly unique international gliderfest! Thanks to all of you! John Sans photo courtesy of Robin Lehman.*



John Sans photo courtesy of  
Robin Lehman.



Schweizers, not the best," referring to the Pilot's Choice Awards categories.

### The future

The international flavor of this Elmira meet was evident, with people traveling from Europe and Canada to attend. Hopefully it will continue to expand in popularity as an overseas destination event, along with the West Coast (Los Banos) meeting, as it would be more attractive to foreign visitors if they could travel to the USA for an extended vacation, which includes a scale meeting on both coasts, along with the usual sightseeing. Tour group operators could then organize an effective group tour package, according to information provided by Gerd Holzner of Flying Circus.

Support from vendors was good, and further support from other organizations, more vendor stands, and coordination of related activities such as seminars and the Los Banos Aerotow could be the key to growing this into the largest glider fun-fly event in the USA!

The Elmira Aerotow should continue to grow and become a truly world-class event, rivaling the European meetings in popularity, because it is relatively new for USA flyers, it offers a lot of fun, and it is a great international social event. Although lacking the grandeur of the typical Alpine setting of large Euro glider meetings like Fiss (Tirol, Austria), IGG (Switzerland) and the Dolomites (Italian Alps), hopefully there are other attractions for our foreign friends to enjoy on a visit to the USA, such as our unsurpassed slope flying sites. ■



*The Wilga is one of the preferred towplanes. It's easy to fly and tows very well. It shared duties with 2 Telemasters, 2 Space Walkers, a Pilatus Porter, and a few others. Robin Lehman photo.*



*More than 100 pilots from all over the U.S.A., Canada, and Germany came together for Elmira '97. Towing began before 10 a.m., and lasted well into the late afternoon on all three days. Thermals were to be had, new and old friends met, new sailplanes and towplanes to be seen, and a wonderful banquet meal to be shared. There was even airtow vintage wine. What will John think up next year? John Sans photo courtesy of Robin Lehman.*

## Elmira Airtow 1997

...by Joe Enhuci  
Laurenceville, New Jersey

Organized and run by John Derstine, many local volunteers from the Harris Hill 1./D club contributed their time and efforts to produce a well run and most enjoyable event.

A few pilots arrived on Thursday and did some aerotowing from the Horseheads flying field. After a short pilot meeting Friday, pilots readied their sailplanes for aerotowing. The first aerotow was made by Robin Lehman, with his fully aerobatic 1/4 Fox towed up by a Wilga piloted by John Derstine. The Fox dashed through the sky with high speed and violent aerobatic maneuvers.

Sailplanes and pilots lined up at the staging area for their turn. Each sailplane was inspected by a volunteer official prior to flight as a safety measure. It proved to be an important exercise, because reversed controls were found on several sailplanes; these deficiencies were quickly corrected.

EMS brought their own show team, and stole the show with their very impressive 5.43 meter Duo Discus, flown by the very capable Theo Arnold, who won the best pilot award. He wrung out that bird with very impressive aerobatics, including perfect 8 point rolls and high speed inverted flight. This ship also thermals!

The pilots' choice for Best Schweizer AND best overall was won by Pete DeStefano with his fabulous scratch-built TG-2. The trophy was a meticulously crafted, all-glass sailplane, static model made by Asher Carmichael of Alabama.

Other pilots' choice awards went to Pete George (Best Vintage - Roke ASK18), John Derstine (Best Modern - PriBek ASW27), Theo Arnold (Best Pilot - EMS Duo Discus), and EMS (Best Sponsor). The largest sailplanes were a 6.5m 1/2.5 scale LS-4, 6.0m 1/3 ASH-26E, 6.25m 1/4 Nimbus-4s, 1/4 5.3m Duo Discus, 5.0m 1/3 Ka6, 5.0m 1/3 ASW-27, and 4.85m Minimoo; most were 4 meter sized, modern glass slipper variety, but vintage sailplanes were well represented.



*We had 3 superb windless thermal days of flying. On Friday at the end of the day, a black thunder cloud came overhead, but only dropped a few raindrops. Robin Lehman photo.*



*The EMS team brought their nice large Minimoo to add a bit of vintage to their modern fleet. There is nothing like a Minimoo, one of the early sailplanes, which flew well, and is pleasing to the eye. Here, Thomas Schmitt is the first onto the field, at the start of another beautiful day. Robin Lehman photo.*



*There were over 100 scale airplanes counted at one point on Saturday. Robin Lehman photo.*





The EMS team brought a beautiful large Duo Discus, flown by Theo Arnold, who won the best pilot award. He performed beautiful aerobatics, including perfect 8 point rolls. The ship also thermals! Robin Lehman photo.

The sold-out, Saturday night banquet was held at the National Soaring Museum, adjacent to the flying field. The guest speakers included Paul Schweizer, John Derstine, Robin Lehman, Manard Hill, Dr. Larry Fogel and Michael Schellberg, who represented the German contingent. John Derstine really outdid himself by organizing a wonderful banquet, with delicious food, and good company; a wonderful time was had by all! It was also a great opportunity for the participants and their families to meet, get to know each other and to exchange ideas. Many prizes included T shirts, radio, sailplane kits and accessories, which were raffled off at the end of the banquet. Generous sponsors included EMS, Sailplanes Unlimited Ltd., JR Radios, Unbeaten Path Imports, RCSD, Dave's Aircraft Works, Plane Talk Videos, *Flying Circus Magazine*, Hobby Club, RC Forum (Germany), and Swedish Hill Vineyards. (John had a very unusual label put on those bottles of wine!) The 1997 Elmira Aerotow Meet was a big success and was gratefully appreciated by the many participants. Credit should also go to Harris Hill gliderport management, who generously offered their facility for the modelers' use, and

the National Soaring Museum. I would like to congratulate John Derstine and all volunteers for a job well done. I can't wait 'til next year! Mark your calendar for June 11 - 14, 1998 and I'll see you there!



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## Diversity

...by Bill Swingle  
Pleasanton, California  
bill\_swingle@electro-test.com

Saturday was a great day. A friend, David, called and suggested we try one of his favorite thermalling slope sites. With the promise of "big sky" flying from only a hand launch, I jumped in the car.

The site is a slope with a beautiful view. Very scenic, but there were numerous obstacles. To my sloper eyes the slope itself was not exactly inviting. Additionally, the breeze didn't appear sufficient to sustain flight. Heck, it didn't even feel strong enough to clear the trees, which were right on the face of the slope. There were houses not too far below, and the irregularly shaped face of the slope was littered with poison oak. I was skeptical.

David assured me that it was a prime place for thermal action. I decided to let him launch first. To my surprise he was able to clear the trees and actually found several small bubbles. His home brewed, 2M, aileron, TD ship did fairly well. Then a friend of ours, Bob, arrived with his Gentle Lady and also began to find lift. He found several good thermals and began gaining some significant altitude. I was convinced. I launched my TG-3, from Dave's Aircraft Works, and was delighted to also find some lift. A few bubbles later, I had gained 50 or so feet and was really enjoying myself.

We were all three up and in different areas of the sky. We searched and rode little bubbles here and there, always maintaining in the neighborhood of 50 to 300 feet of altitude. It was an enjoyable change of pace for this sloper. The three of us were standing only a few feet apart in stone silence. A very unusual experience for me. Very different from the raucous sloping environment to which I'm accustomed. I couldn't help but grin as I remembered a saying I had read recently: "Thou shalt not commit sloperly!" I was beginning to understand the sentiment. We flew for about 20 minutes before the thermal activity cycled down and we landed. A very nice flight indeed. However, the three of us are



slopeheads and we had begun to hunger for some good slope lift. We decided to adjourn to another nearby slope. Its topography is far from ideal, but it has the most consistent wind in the area.

When we arrived at the slope we were rewarded with a good stiff wind. It was actually too much for the Gentle Lady, which spent the majority of several flights just hovering in the wind and occasionally flying backwards. Sadly, the heavy wind brought little lift. We hovered around the slope for a while, but still wanted more.

Bob had to leave, but Dave and I chose to try a third slope. From the freeway, as we were approaching the slope, an airplane silhouette was clearly visible. This was from a good half mile away! As we packed up for the steep walk to the top of the slope, I grabbed my combat plane. I knew we'd have wind and you never know when a fellow combatant may show up.

We got to the top and found that the plane we saw from the freeway was a Synergy. We said hello to the pilot and asked the now ubiquitous question, "Wanna combat?" He said, "Sure," and brought the Synergy down with a hand catch!

We immediately launched the foamies and proceeded to dogfight for the remainder of the afternoon. What a great day. We started with some light sloping and thermalling, and ended up combating in a good wind. I love this hobby! ■





## Nylon Screws for R/C Model Sailplane Wing Mounting

...by Oliver Wilson  
Punta Gorda, Florida

The ideal wing mounting system should have low drag, stand up to any launch or flight loads and give, with impact and inertial loads, in a crash. Nylon wing mounting bolts can come close to meeting this ideal. Plug-in wings with rod shaped joiners do not meet the impact and inertial load objective. Rubber bands, if used in sufficient quantities to resist winch zoom launching, do not meet the impact and inertial load objective and, in any case, do not meet the low drag objective. Nylon screws at the trailing edge with an indexing pin at the leading edge do not meet the impact and inertial load objectives, either.

Nylon bolts, which are counter sunk to be flush with the wing surface, have low drag. Nylon bolts, which are just big enough to take launch loads and flight loads, meet the second objective. Nylon bolts which are small, close together and properly supported in the wing and fuselage will shear in a crash with minimum damage to the structure (if there isn't a bulkhead directly in the path of the wing). By placing the screws closer together, the force on the wing tip to shear the bolts is reduced, and the smaller the tip force the

smaller or less likely the damage.

I have used nylon screws for wing mounting in dozens of R/C sailplane models of various sizes over the last ten years and never had a screw break or pull out in the air. Over those ten years, I have gradually reduced the size of screws. My flying buddies will tell you that I have a very heavy foot on the pedal. They will also tell you about some of my spectacular crashes and the surprise at how little damage resulted. Based on that experience, here are my recommendations for screw size and spacing:

Model	Screw	#	Spacing (Max)
Handlaunch	6-32	1	1-1/2"
2-Meter	8-32	2	1"
Unlimited	10-24	2	1-1/2"
	(or 32)		
F3b	1/4-20	2	1-1/2"
Cross Country	1/4-20	2	2"

For handlaunch, two 4-40 nylon screws are big enough, but I have not been able to find a source lately.

The threads in the fuselage may be provided by a T-nut, plywood, or a slug of filled epoxy. The minimum number of threads which engage must be at least 6. The grain of the plywood must be perpendicular to the screw, and the threads must be reinforced with CA, then chased with a tap. The filled epoxy must be the thin, slow setting kind and the filler must be high strength (such as chopped glass, flax, or silica gel). The fuselage mounting must transfer the loads into the rest of the structure, so that the screws shear before anything else gives.

The threads must be chased with a tap and lubricated until the screw turns freely. A dry teflon spray lubricant works well in this application. This will facilitate removal of a sheared screw. A sheared screw may be removed by pressing the point of a No. 11 blade into the end of the screw and using the blade as a screwdriver. If that doesn't provide enough torque, then the No. 11 blade may be used to cut a slot in the top of the screw stub for a small screwdriver blade.

The wing must have a block to take the compression load of the tightened nylon screws. The block should be incorporated into the wing spar

structure and the screws located near the thickest part of the wing. The blocks may be made of a hardwood, plywood or filled epoxy. The block in the wing must be tied into the wing structure so that the screws will shear before anything else gives. The block should be carefully countersunk so that the screw heads are flush. Any gaps may be covered with a small piece of tape.

Two piece wings work well with this system. Just locate a nylon screw near each wing root and the screws will also keep the wing halves from separating on their joiner rods.

Maintenance is simple. When the nylon begins to turn yellow, the screws should be replaced. The screws should be inspected after each flying session or hard landing. If they show signs of distortion where the wing meets the fuselage they should be replaced. If the screws start to turn brittle they can be restored by boiling them in water.

I will be glad to answer any questions about nylon wing mounting (except the cause of my crashes). I can be reached on the internet at [ocwilson@sunline.net](mailto:ocwilson@sunline.net), by telephone at 941-627-2117, or by snailmail at 1987 Nuremberg Bl., Punta Gorda, FL 33983.

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## 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, Ron Swinehart, 8733 Edgehill Dr. SE, Huntsville, AL 35802; (205) 883-7831.

Alabama - Central Alabama Soaring Society, Ron Richardson (Treas.), 141 Broadmoor Ln., Alabaster, AL 35007; e-mail: <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 Glithero, (602) 839-1733.

Arizona - Southern Arizona Glider Enthusiasts, Bill Melcher (contact), 14260 N. Silwind Way, Tucson, AZ 85737; (602) 325-2729. SAGIE 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 - Inland Soaring Society, Robert Cavazos, 12901 Forman Ave., Moreno Valley, CA 92553, RCAV@aol.com.

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

California - South Bay Soaring Society, A.J. Angelo, P.O. Box 2012, Sunnyvale, CA 94087; (415) 321-8583, fax (415) 853-6064.

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 Scharck, 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 (President), (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.

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

Florida (Central) - Orlando Buzzards Soaring Society (www.specs-usa.com/~ingo/Orlandobuzzards), Don Cleveland (Pres.), 1515 Cuthill Way, Casselberry, FL 32707, (407) 696-7516, <dclavel30@aol.com>.

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

Hawaii - Maui Island Slope Soaring Operation, MISO, Hank Vendiola, 10-C Al St., Makawao Maui, HI 96768; (808) 572-5283.

Illinois (Chicago Area) - Silent Order of Aeromodeling by Radio (S.O.A.R.), Jim McIntyre (contact), 23546 W. Fern St., Plainfield, IL 60544-2324; (815) 436-2744. Bill Christian (contact), 1604 N. Chestnut Ave., Arlington Heights, IL 60004; (708) 259-4617.

Illinois (Northwest) - Valley Hawks R/C Soaring Club, Jeff Kennedy (President), 414 Webster St., Algonquin, IL 60102, (708) 658-0755, eve. or msg.

Iowa - Eastern Iowa Soaring Society (Iowa, Illinois, Wisconsin, Minnesota), Bob Baker (Editor), 1408 62nd St., Des Moines, IA 50311; (515) 277-5258.

Indiana - Bob Steele, 10173 ST Joe Rd., Fort Wayne, IN 46835, (219) 485-1145.

Kansas - Wichita Area Soaring Association, Pat McCleave (Contact), 11621 Nantucket, Wichita, KS 67212; (316) 721-5647.

Kansas - Aerotowing, Jim Frickey, (913) 585-3714.

Kentucky - Bluegrass Soaring Society, Frank Foster (President), 4939 Harland Pkwy., Lexington, KY 40515; (606) 273-1817.

Kentucky - Louisville Area Soaring Society, Ed Wilson (Contact), 5308 Sprucewood Dr., Louisville, KY 40291; (502) 239-3150 (eve), e-mail <ewilson1@bellsouth.net>.

Maine - DownEast Soaring Club (New England area), Steve Savoie (Contact), RR03 Box 569, Gorham, ME 04038; (207) 929-6639, InterNet e-mail <Jim.Armstrong@juno.com>.

Maryland - Baltimore Area Soaring Society, Russell Bennett (President), 30 Maple Ave., Baltimore, MD 21228; (410) 744-2095.

Maryland & Northern Virginia - Capital Area Soaring Association (MD, DC, & Northern VA), Chris Bovais (Coordinator), 12504 Circle Drive, Rockville, MD 20850; (703) 643-5513.

Michigan - Greater Detroit Soaring & Hiking Society, Greg Nilsen (Sec.), 2163 Highspind Dr., Rochester Hills, MI 48307; (810) 651-8598, GNilsen624@aol.com.

Michigan - Great Lakes 1.5m R/C Soaring League & "Wings" Flight Achievement Program & Instruction, Ray Hayes, 58030 Cyrenus Lane, Washington, MI 48094; (810) 781-7018.

Minnesota - Minnesota R/C Soaring Society, Tom Rent (Contact), 17540 Kodiak Ave., Lakeville, MN 55044; (612) 435-2792.

Missouri - Independence Soaring Club (Kansas City area, Western Missouri), Edwin Ley (Contact), 12904 E 36 Terrace, Independence, MO 64055; (816) 833-1553, eve.

Missouri - Mississippi Valley Soaring Assoc. (St. Louis area), Peter George, 2127 Arsenal St., St. Louis, MO 63118; (314) 664-6613.

Nebraska - B.F.P.L. Slopers, Steve Loudon (contact), RR2 Box 149 El, Lexington, NE 68850; (308) 324-3451/5139.

Nebraska - S.W.I.F.T., Christopher Knowles (Contact), 12821 Jackson St., Omaha, NE 68154-2934; (402) 330-5335.

Nebraska - Ken Bergstrom, R.R. #1, Box 69 B, Merna, NE 68856; (308) 643-2524, <abergst@neb-sandhills.net>.

Nevada - Las Vegas Soaring Club, Jim Allen (President), 7117 Caprock Cir., Las Vegas, NV 89129; ph (702) 658-2363, fax (702) 658-1998.

New Jersey - Vintage Sailplane R/C Association, Richard G. Tams (President/Founder), 391 Central Ave., Hawthorne, NJ 07006; (201) 427-4773.

New York, aerotowing Rochester area, Jim Blum and Robin Lehman, (716) 367-2911.

New York - Elmira - Harris Hill L/D R/C, aerotowing & slope, John Derstine, (717) 596-2392, e-mail 20764826@mcimail.com.

New York, aerotowing Long Island Area, Robin Lehman, (212) 744-0405.

New York - (Buffalo/Niagara Falls area) - Clarence Sailplane Society, Lyn Perry (President), (716) 655-0775; e-mail peryl@sstaff.sunyer.edu; Jim Roller (Competition Coordinator), (716) 937-6427.

New York - Long Island Silent Flyers, Stillwell Nature Preserve, Syosset, NY, Taylor Fiederlein (President), (516) 922-1336, or Joe Coppola (VP), (516) 798-1479.

New York - Syracuse area, Central NY Sailplane Group, Dave Zintek, Minoa, NY, (315) 656-7103, e-mail Zintek@aol.com.

North Carolina - Aerotowing, Wayne Parrish, (919) 362-7150.

Northwest Soaring Society (Oregon, Washington, Idaho, Montana, Alaska, British Columbia, Alberta), Sandie Pugh (Editor - NWSSEagle), 1119 SW 333rd St., Federal Way, WA 98023, e-mail: parrot2luv@aol.com, (206) 874-2429 (H), (206) 655-1167 (W).

Ohio - Cincinnati Soaring Society, Chuck Lohre, 3015 Beaver Ave., Cincinnati, OH 45213; (513) 731-3429, lohre@iac.net, http://www.iac.net/~lohre.

Ohio - Dayton Area Thermal Soarers (D.A.R.T.S.), Walt Schmoll, 3513 Pobst Dr., Kettering, OH 45420, (513) 299-1758.

Ohio - Mid Ohio Soaring Society (MOSS), Hugh Rogers, 888 Kennet Ct., Columbus, OH 43220; (614) 451-5189, e-mail tomnagle@freenet.columbus.oh.us.

Oklahoma - Central Oklahoma Soaring, George Voss, (405) 692-1122.

Oklahoma - Tulsa R/C Soaring Club (TULSOAR), http://www.mcservers.com/tulsoar

Oregon - Portland Area Soaring Society (PASS), Pat Chewing (Secretary), 16766 NW Yorktown Dr., Beaverton, OR 97006, (503) 645-0323, e-mail patch@sequent.com, web page: www.europa.com/~patch/

Oregon - Salem Soaring Society, AISzymanski, (contact), (503) 585-0461, aszy@teleport.com, www.teleport.com/~aszy/sss.html

Oregon - Southern Oregon Soaring Society, Jerry Miller, 3431 S. Pacific Hwy, TRLR 64, Medford, OR 97501, e-mail Miller@aol.com, ph/fax (541) 535-4410.

Tennessee - Memphis Area Soaring Society, Bob Sowder, 1610 Saddle Glen Cove, Cordova, TN 38018, (901) 751-7252, FAX (901) 758-1842.

Tennessee - Tullahoma (Southern Middle Area), Coffee Airfoilers, Herb Rindfleisch, 106 Inglewood Circle, Tullahoma, TN 37388, (931) 455-1836, <herb@cafes.net>.

Tennessee - Soaring Union of Nashville, Terry Silberman, PO Box 17946, Nashville, TN 37217-0946, (615) 399-0846.

Texas - aerotowing, Dallas area, Andrew Jamieson, 9426 Hillview, Dallas, TX 75231, (214) 349-9346, e-mail ajsleep@aol.com. Larry Sengbush, (972) 291-4840

Utah - Intermountain Silent Flyers, Tom Hoopes, (801) 571-3702 (eve), "Come Fly With Us!"

Virginia - Tidewater Model Soaring Society, Herk Stokely, (757) 428-8064, herkfstok@aol.com.

Virginia - Appalachian Soaring Association, Virginia's Southwest (Bristol area), Greg Finney, 106 Oakcrest Circle #5, Bristol, VA 24201; (540) 645-5772, e-mail <gfinney@naxs.com>.

West Virginia - Chip Vignolini, 1305 Perry Ave., Morgantown, WV 26505; (304) 598-9506, <vdne30a@prodigy.com>.

Washington - Seattle Area Soaring Society, Waid Reynolds (Editor), 12448 83rd Avenue South, Seattle, WA 98178; (206) 772-0291.

Wisconsin - Valley Aero Modelers, Lee Murray, 1300 Bay Ridge Rd., Appleton, WI 54915; (414) 731-4848, <7472465@compuserve.com>.

### Outside U.S.A.

Australia - Southern Soaring League, Inc., Mike O'Reilly, Model Flight, 42 Maple Ave., Keswick SA 5035, Australia. Phones: ISD+(08) 293-3674, ISD+(08) 297-7349, ISD+(018) 082-156 (Mobile). FAX: ISD+(08) 371-0659.

Canada - Greater Niagara Area Thermal Soarers (GNATS), Flat Field Soaring & Aerotowing, Gerry Knight, (905) 934-7451 or Don Smith, (905) 934-3815.

Canada - MAAC Men Gliding Club, Jim Holland, 168 Verona Dr., Winnipeg, Manitoba, Canada R2P 2R8; (204) 697-1297.

Canada - Southern Ontario Glider Group, "Wings" Programme, dedicated instructors, Fred Freeman, (905) 627-9090, or Bill Woodward, (516) 653-4251.

England (Thermal Talk & Europe), Jack Sile (Editor), 21 Bures Close, Stowmarket, Suffolk, IP14 2PL, England; Tele. # 0449-675190.

England (southwest) - Sean Walbank, Woolcombe Lays, Melbury Bubb, Dorchester, Dorset, DT2 0NJ, phone 01935-83316.

Hong Kong - Robert Yan, 90 Robinson Road, 4th Floor, Hong Kong; (852) 25228083, FAX (852) 28450497, yan@asiaonline.net.

Japan - Dr. Paul "Sky Pilot" Clark, 2 - 35 Suikoen Cho, Hirakata Shi 573, Osaka Fu, Japan; IAC+(81) 720-41-2934, <pclark@osk3.web.ne.jp>

Scotland - Ron Russell, 25 Napier Place, South Parks, Glenrothes, Fife, Scotland KY6 1DX; Tele. # 01592 753689.

### Seminars & Workshops

Free instruction for beginners on construction & flight techniques, week-ends (excl. contest days), "AJ" Angelo, South Bay Soaring Society (San Jose area), (415) 321-8583.



### BBS/Internet

Internet - Email list/resource of RC soaring related folks, including US and international club contacts, vendors, kit manufacturers/distributors, software, equipment and supplies. Check out the web site: [www.ocpapsy.com/yellow.htm](http://www.ocpapsy.com/yellow.htm), or contact Manny Tau at [taucam@kaiwan.com](mailto:taucam@kaiwan.com).

Internet soaring mailing listserve linking hundreds of soaring pilots worldwide. Send msg. containing the word "subscribe" to [soaring-request@airage.com](mailto:soaring-request@airage.com). The "digestified" version that combines all msgs. each day into one msg. is recommended for dial-up users on the Internet, AOL, CIS, etc. Subscribe using [soaring-digest-request@airage.com](mailto:soaring-digest-request@airage.com). Post msgs. to [soaring@airage.com](mailto:soaring@airage.com). For more info., contact Michael Lachowski at [mikel@airage.com](mailto:mikel@airage.com).

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### Reference Material

"Summary of Low-Speed Airfoil Data - Volume 1" & "Volume 2", Michael Selig wind tunnel testing results. Cost for each: \$25 USA (includes postage), \$29 surface outside USA, \$31 air Western Hemisphere, \$38 air Europe, \$42 air all other countries. Computer disk, ascii text files (no narrative or illustrations), is \$15 in USA; \$16 outside USA. Source for all "SoarTech" publications, also. Contact Herk Stokely, 1504 N. Horseshoe Cir., Virginia Beach, VA 23451. Phone (757) 428-8064, email: [herkstok@aol.com](mailto:herkstok@aol.com).

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