R/C Soaring DIGEST

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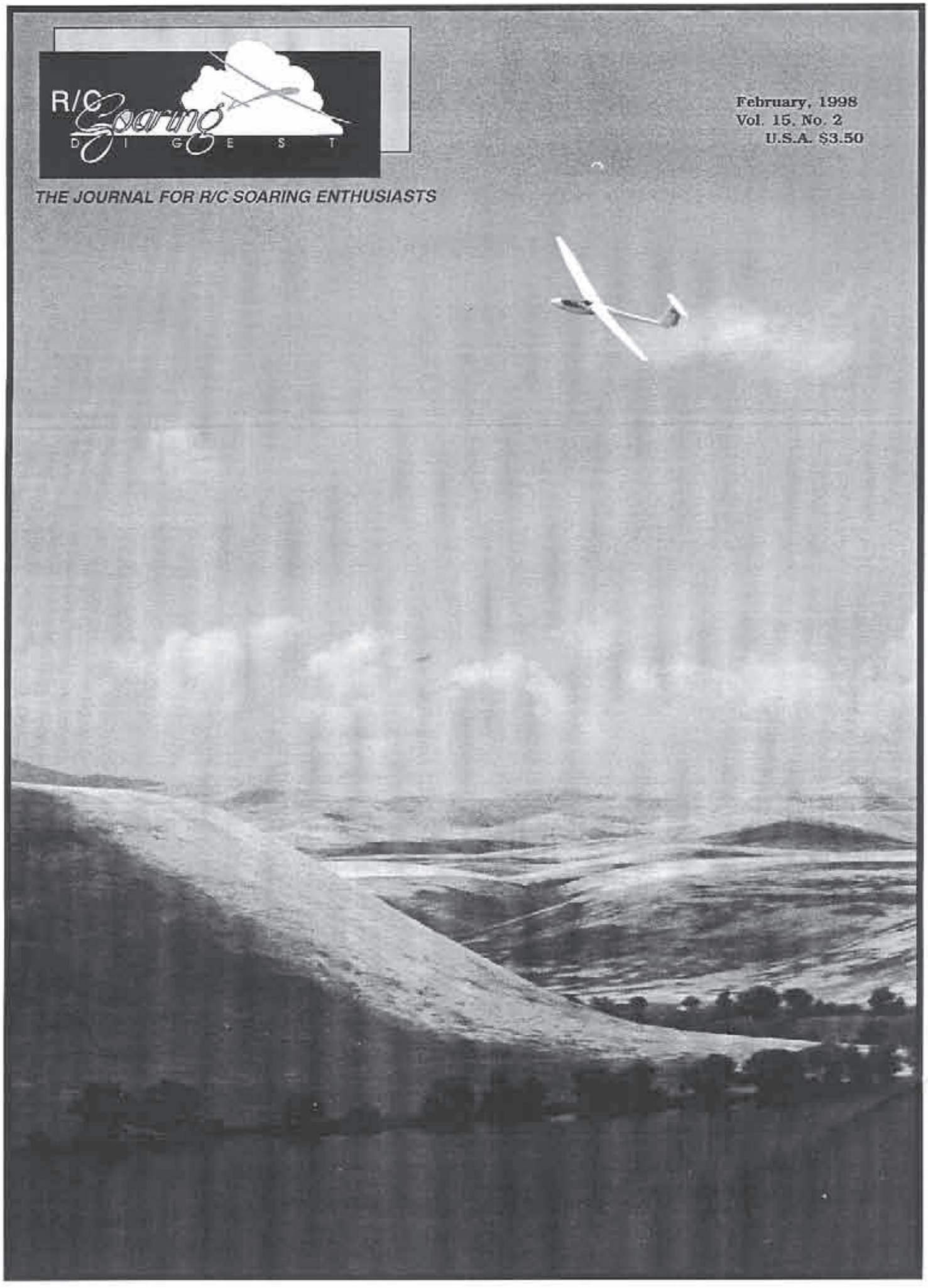
THE JOURNAL FOR R/C SOARING ENTHUSIASTS



# SAILPLANES UNLIMITED, LTD.

## In stock

### Krause

| | | | |
|---|---|---|---|
| 1/4.75 | Discus | HQ2.5/12 | 158" (4m) |
| 1/3 | Salto | HQ3/14 | 179" (4.53m) |

### Roedelmodell

| | | | |
|---|---|---|---|
| 1/4.5 | ASK 21 | E393 | 165" (4.2m) |
| 1/3.6 | Ka6E | E392 | 165" (4.2m) |
| 1/4.75 | Fox | RG12 | 149" (3.77m) |
| 1/3.6 | DG 800 | E207 | 163" (4.15m) |

### Roebers

| | | | |
|---|---|---|---|
| 1/4 | Pilatus B-4 | Ritz3 | 147" (3.75m) |

### Buechele

| | | | |
|---|---|---|---|
| 1/4.75 | Fox | HQ1.5/10-12 | 149" (3.77m) |
| 1/4.4 | Nimbus 4 | HQ3/14-13 | 237" (6m) |

### FiberClassics

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

### PriBeck

| | | | |
|---|---|---|---|
| 1/3 | ASW27 | HQ2.5/12 | 196" (5m) |
| 1/2.7 | ASK18 | E203-201-193 | 209" (5.53m) |
| 1/3 | Ka6E | E207-205-205 | 196" (5m) |
| 1/2.7 | ASW19 | Ritz3 mod. | 212" (5.4m) |
| 1/3 | ASK13 | E68-67-66 | 209" (5.33m) |

### Mueller

| | | | |
|---|---|---|---|
| 1/3 | Discus | HQ2/12 | 196" (5m) |

## TOWPLANES

**Frisch:** 1/4 Wilga 109" (2.78m)
**Brauer:** all glass 1/4.5 Pilatus Porter Turbo 139" (3.52m)
**Roedelmodell:** 1/4 Jodel Robin 86" (2.18m)
**Roedelmodell:** 1/4 Piper Super Cub 105" (2.18m)

## SPECIAL ORDER

### PriBek

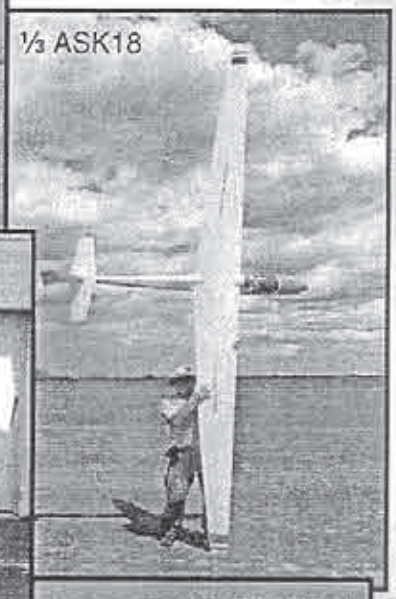
| | | | |
|---|---|---|---|
| 1/3 | ASW24 | E203-201-193 | 196" (5m) |
| 1/2 | ASW27 | HQ2.5/15 | 294" (7.5m) |
| 1/3 | Fox | E374 | 183" (4.66m) |

### Bruckmann

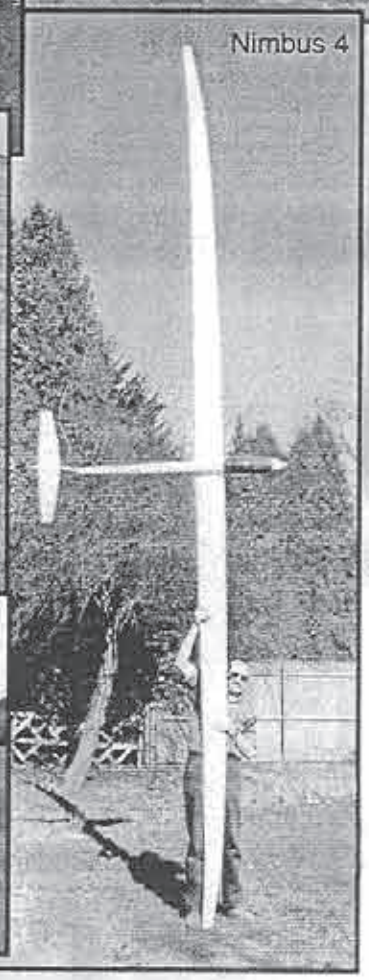
| | | |
|---|---|---|
| 1/2.5 | Fox | 222" (5.65m) |

### Schueler & Fleckstein

| | | |
|---|---|---|
| 1/3 all glass Fox | RG12 | 183" (4.66m) |
| 1/3 all glass ASW24 | E203 | 196" (5m) |
| 1/3 all glass ASH 26 | HQ3/14-10 | 235" (6m) |
| 1/2.5 all glass ASW15B | HQ3/14 | 235" (6m) |



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**R/C SOARING DIGEST**
*The Journal for R/C Soaring Enthusiasts*

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*R/C Soaring Digest (RCSD)* is a reader-written monthly publication for the R/C sailplane enthusiast and has been published since January, 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 Jim Gray, lecturer and technical consultant. He can be reached at: 210 East Chateau Circle, Payson, AZ 85541; (520) 474-5015, <jimpeg@netzone.com>

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**Artwork**
Gene Zika is the graphic artist who designs the unique ZIKA clip art.



## OTHER GOOD STUFF




**WHITE WINGS**

Over Los Banos, 1996. Photography by David Garwood, Scotia, New York.

## The Soaring Site

**"What's new?"**

As some of you have undoubtedly noted, our lead time for printing has been significantly reduced. So, we've changed the cut-off date from the 1st to the 15th. While we still have a little slack to allow for dated material, and can do a "stop press" on occasion, our goal is to pull the mailing back up to the first of the month. Currently, most material published in *RCSD* is less than a month old.

We have received inquiries of late regarding how long it takes to get an article printed in *RCSD* from the time it is submitted. Some think that it takes at least 3 months, as it does with some full-size magazines. But, that's not the case with us, since we handle all the publishing functions (subscriptions, typesetting, layout/design, printing, and mail packaging).

If any of you have submitted an article, and have yet to see it in print, it's probably sitting in the stack labeled "to be typed". We're sorry not to have found the time to get the material on disk, but hope you'll continue to bear with us, as we're still in catch up mode!

**_RCSD_ Articles On-Line**

Bill and Bunny Kuhlman have recently added two more articles to the *RCSD* web page. Written many years ago for *RCSD* readers by Michael Selig, the first article, "Flys Faster", mathematically proves that sailplanes with lower drag fly faster than those with more drag. In the second article, "The Square-Cube Law and Scaling for RC Sailplanes", Dr. Selig shows how perception can vary greatly from reality. He first relates a personal experience involving the destruction on an XC 'ship, then shows exactly how such catastrophes happen. Both articles are excellent reading, and our thanks to Dr. Selig for permission to make them available, again.

http://www.halcyon.com/bsquared/FlysFaster.html

http://www.halcyon.com/bsquared/SquareCube.html

**Happy Flying!**
**Judy & Jerry Slates**

## T.W.I.T.T.

**(The Wing Is The Thing)**

T.W.I.T.T. is a non-profit organization whose membership seeks to promote the research and development of flying wings and other tailless aircraft by providing a forum for the exchange of ideas and experiences on an international basis. T.W.I.T.T. is affiliated with The Hunsaker Foundation which is dedicated to furthering education and research in a variety of disciplines. Full information package including one back issue of newsletter is $2.50 US ($3.00 foreign). Subscription rates are $18.00 (US) or $22.00 (Foreign) per year for 12 issues.

T.W.I.T.T., P.O. Box 20430
El Cajon, CA 92021

## Jer's Workbench

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### Building from Plans Part II

Last month, we concluded with all of the wing parts cut out. This month, we'll start the actual construction of the wing, which is the most time consuming part of building the Paragon. Taken one step at a time, it really is an easy process.

Simultaneously working on the two wing center sections and the two wing tips, the spars and trailing edges were layed out; the ribs were glued in place. Next, the sheeting was added to the bottom of each wing section, only.

*#1 - Hard points in wing for bolting wing onto fuselage.*

*#2 - Simple wooden mold used to lay up carbon fiber wing joiners.*

### Joining Center Sections Together

The two center sections were joined together by epoxying the 3/8 inch plywood wing joiner in place. Next, I added a hardwood, hard point, which is where the wing will be bolted onto the fuselage. (Photo 1.)

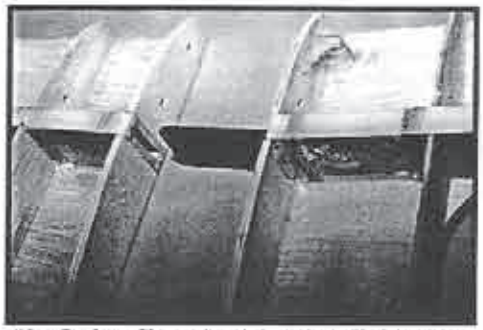
Let's skip over to photo 3. The wing joiner boxes were constructed using 1/8 inch plywood as shown in the plans. Then, they were wrapped with Kevlar™ thread to give them a little extra strength which, of course, is not shown in the plans.

The next change was to the wing joiner, itself. The plans called for the original wing joiner to be constructed of 1/8 inch plywood. This did not give me a warm, fuzzy feeling... I needed something stronger. Steel or aluminum were two options, but I didn't have any laying around the shop. But, I did have carbon fiber tow; so, as shown in photo 2, I constructed a very simple, wooden mold, and layed up a carbon fiber wing joiner.

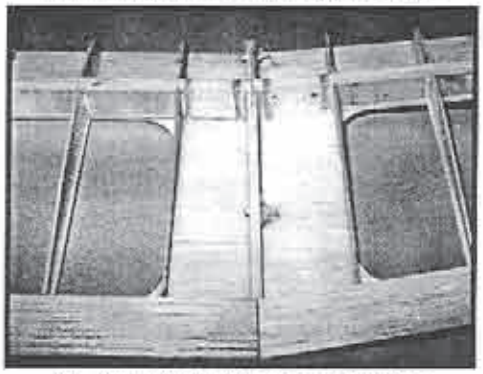
### Making a Simple Mold?

First, I cut the shape of the wing joiner out of 1/8 inch plywood; then, this was glued and screwed onto a piece of 5/8 inch plywood. The top half of the mold is another piece of 5/8 inch plywood. All wood surfaces of the mold were sealed applying a coat of very thin CA glue. It took less than an hour to construct the mold; it was ready to use. ■

Next month, I'll share how to complete the wing, by installing a set of spoilers. ■



*#3 - Carbon fiber wing joiner installed in wing tip being plugged into wing. Note Kevlar™ thread wrapped around wing joiner box.*

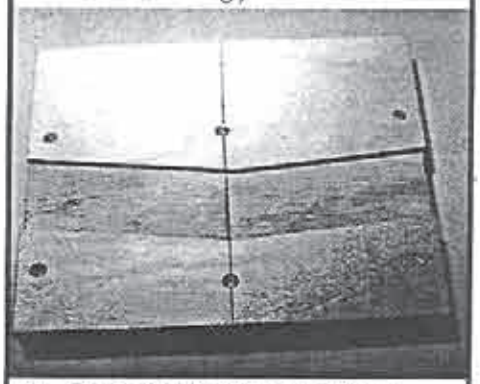


*#4 - Two wing halves plugged together. Note good fit; it's strong, too.*

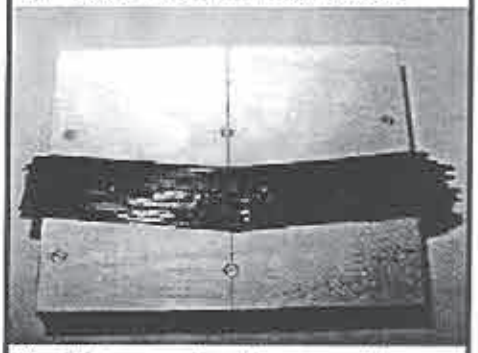
ZIKA

## Carbon Fiber Wing Joiner

Here are five easy steps for constructing a carbon fiber wing joiner:

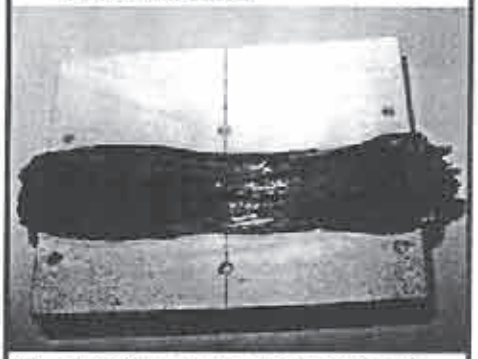


1) Cover mold with mold release.

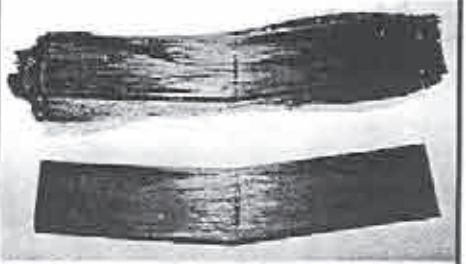


2) Wet out carbon fiber tow with epoxy; lay into mold.

3) Place top onto mold, and clamp. Set aside until cured.



4) Remove clamps and top of mold.



5) Remove carbon fiber wing joiner from mold. Trim off rough edges.

## Zoom Proof Wing Spars with Traditional Materials

By Oliver Wilson
Punta Gorda, Florida

Wood makes wonderfully strong and light spars, when properly designed and constructed. Ed Slobod's Gemini is, in my opinion, the pinnacle of that form. I've built two and seen many others over the years. No other kit I've seen, which uses traditional materials, so consistently stands up to the rigors of the modern winch and the loads it can dish out with an enthusiastic foot on the pedal. It differs from others because of its great spar depth. Thinner wings can be made equally strong by increasing the spar cap cross sectional area in proportion to the decrease in thickness. Additionally, the sparcap cross section needs to be increased proportional to any span increases.

I love the nostalgia event and the return of some of the old designs with new kit issues. The nostalgia rules wisely allow modification of the spar to strengthen it. Many of these old designs were successful in the days of 6 volt winches before the advantage of the zoom was widely practiced.

When the voltage is doubled, the power is increased four times, other things being equal. It's also true that the bending moment at the wing root is about four times the moment half way to the tip. The structure from the tip, half way to the root, is generally over designed for the 6 volt winch and adequate for the 12 volt winch. It is the spar from the root to about half way to the tip that generally needs to be beefed up.

Wood is about twice as strong in tension as in compression, so weight can be saved by making the top spar cap larger than the one on the bottom. Weight can also be saved by tapering the sister (additional) spar cap from full to zero cross section. If it is tapered in both width and thickness, its strength will closely follow the bending load as it decreases outward from the wing root to produce no stress risers.

Increasing the total root spar cap cross section by four on the top and two on the bottom may present space problems in some designs. Since birch is about three times stronger than spruce, a top sister spar cap of birch can be the same size as the original and do the job. Hard maple, if straight grained and with little grain runout, will also fill the bill.

In thin wings, the distance between the sparcaps is an important consideration. Therefore, any increases in cross section should be in the width rather than thickness of the sparcap material.

Joiner rods at the wing center also need beefing up. Diameter can be increased; weight increase can be avoided by using carbon rods in light weight aluminum tubes. For the Windfree, as an example, 1/4 inch diameter carbon fiber rods epoxied into 1/4 I.D. KS aluminum tubes will weigh little more than the music wire they replace. Doubling up on the plywood joiner ribs, out to 3 inches from the root, will take care of transferring the load between the joiners and the spar. Since carbon rods bent to the correct dihedral angle are not readily available and there is too little depth in the ribs for straight rods all the way through, some other configuration is needed. I suggest beefing up the fuselage at the wing root with 1/8" birch plywood to hold crossover brass tubes in the fuselage to take the aluminum sheathed 1/4" carbon rods at the correct dihedral angle. A pair of carbon rods in aluminum tubes can be permanently glued into each wing half to project the width of the fuselage. The rods in the wings and the tubes in the fuselage will have to be offset fore and aft to avoid interference where they cross over in the fuselage.

Not all spruce is equally suitable. Sitka spruce from Superior Balsa and Hobby Supply or Aircraft Spruce and Specialty meets federal regulations for low grain runout, density of growth rings, and other requirements of full sized aircraft. Since we are trying to make the spar zoom proof, avoid lesser grades of spruce.

Sheer webs also need beefing up on the inner half of each wing. You can't go wrong with full width, vertical grain balsa, which are well fitted and glued between the spar caps. Use hard balsa near the root and less dense stock further out. Avoid doubling up on plywood joiners, which produce stress risers. If plywood joiners must be used, put fish mouth (half oval) cut outs in the joiner ends where stress risers would otherwise occur.

For one piece wings as on the Paragon, replace the pine joiner at the center with one made from 3/8" maple motor mount stock. The Paragon is already fairly strong because of the depth of the spar. It would benefit from an increase in the top spar cap to 3/16 by 3/8 cross section and full width balsa sheer webs on the inner panels.

If you have questions about applying these guidelines to a particular design, I will try to help. I can be reached at ocwilson@sunline.net or 1987 Nuremberg Blvd., Punta Gorda, FL 33983. My telephone number is (941) 627-2117. ■

# on the Wing

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http://www.halcyon.com/bsquared/

### Dr. Aldo Toni's TFW-01

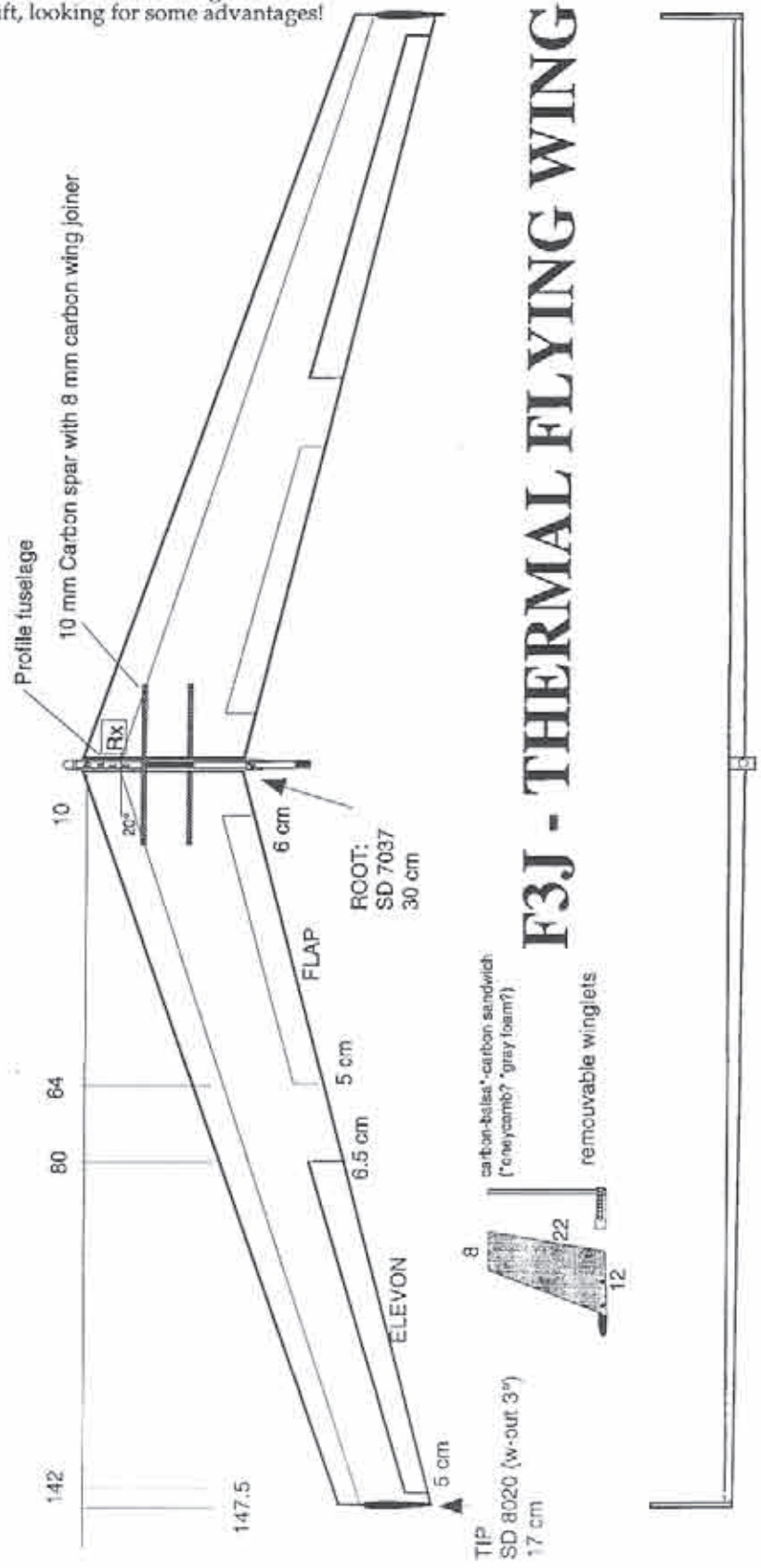
This month's design is named TFW-01 by its designer, Dr. Aldo Toni. Aldo is a specialist in biomedical technology as related to orthopedics and trauma, and works in the Technology and Materials Laboratory at the Rizzoli Institute of Orthopedics in Bologna, Italy.

Aldo first started building model aircraft in 1970, and entered thermal duration contests for a number of years. With his friend Casadei, he designed and built the glider which Casadei used at the first F3B Championships in South Africa.

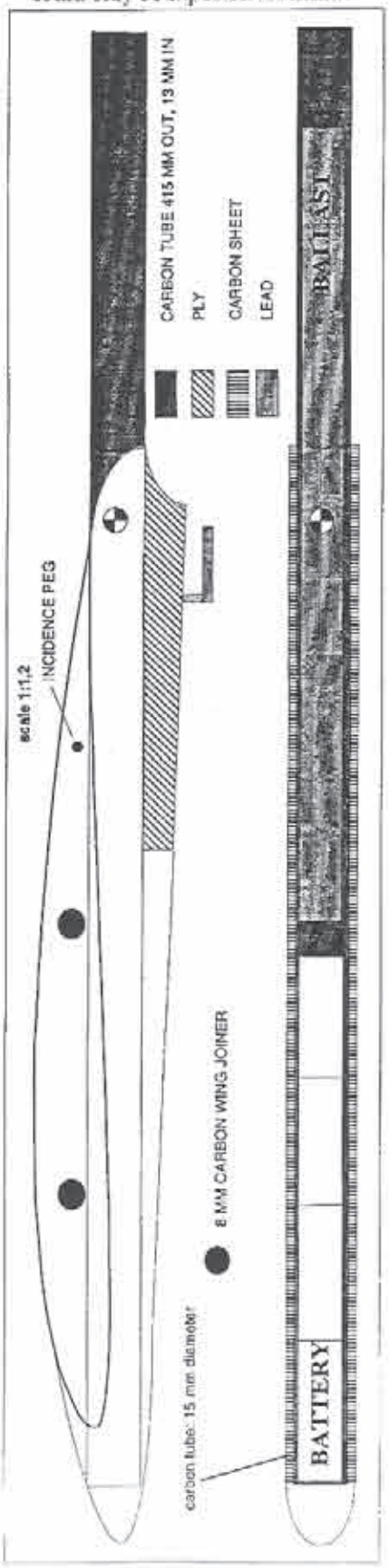
After a hiatus of several years for education, family, and career, Aldo returned to RC four years ago. He found thermal competition almost dead. With some friends, he founded the Association for Thermal Flight (AVOT). This organization has been extremely successful: there is now a AVOT Cup and an Italian FAI-F3J Championship. Additionally, an Italian team will attend the F3J WC in England in August 1998! Aldo is the F3J National Manager, and he is currently in third place nationally, so he has a good chance of being part of the team.

Why the Thermal Flying Wing (TFW) projects? First of all because he loves "'wings," then because he likes to experiment.

> Aldo says, "In the thermal flight envelope, two things are relevant (besides pilot skill, which is still THE key factor!): parasitic drag and inter-thermal efficiency. Just about any plane can stay up for minutes in thermals, but thermals are evasive, and sometimes they are far away from where you ping from towing. So you need a low drag glider able to escape sink efficiently! Isn't that the picture of a flying wing?
>
> "Well, I know very well that things ("'wings," if you stick to precision) are a little more complicated. Lift generated by 'wings carries more drag than conventional wings (but less parasitic drag!). For 'wings, keeping wing loading comparable to standard gliders requires a low-weight-but-still-strong construction. This is not an easy target! To control pitch you need a swept geometry, which worsens the wing surface lift properties, not to talk about the need of wash-out for the outer panels. Well, you could work with plank geometry, but then the reflexed airfoil would generate more drag anyway.
>
> "So what? To cancel fuselage, rudder, and elevator parasitic drag, I'm climbing the "big rock" of pitch control with more drag and less lift, looking for some advantages!
>
> "My experience is still short, and I did not see yet anybody solving the problems. This makes me even more interested in 'wings. I read about the project of less stable 'wings controlled by gyroscopes, forecasted as possible improve-



ments of efficiency of wings, together with Hans-Jurgen's efforts to use moveable C.G. It's not very clear to me how this could improve the 'wings in thermals, as it seems to me that real improvements could only be expected for multi-task contests, as F3B.




| DR. ALDO TONI'S TFW-01 | | | |
|---|---|---|---|
| root chord | 30 cm (SD 7037) | aspect ratio | 12.7 |
| tip chord | 17 cm (SD 8020) | wing area | 70.5 $dm^2$ |
| span | 300 cm | wing loading | 21.27 $g/dm^2$ |
| sweep | 20° along c/4 | aerodynamic center | 32.28 cm behind LE at root |
| weight | 1500 g | CG | 31.8 cm behind LE at root |
| calculated for $C_L$ | 0.6 | static margin | 0.02 c/4 |
| average chord | 23.5 cm | geometric twist | -3.0° |
| taper ratio | 0.566 | aerodynamic twist | -6.0° |

"For thermal contests I would like to work more on airfoils and on in-flight modifications, both for LE and TE. In fact, the 'wing has no inter-thermal efficiency problem, but suffers a lot in its ability to circle tightly and work small, vanishing thermals. Beside that, minimum sink rate is usually higher than for standard designs. What if we could adapt the airfoil camber to slow and better climb in a thermal? To balance the higher camber, I would then need adjustable aerodynamic wash-out, either with outer airfoil camber or with geometric wash-out modifications!

"Many servos (up to 12), gyroscopic pitch control, and computer transmitters may help the project — this is experimenting! Team work is required for such a project, but unfortunately modelers usually want to build and fly well-tested models, and don't like to spend time (and above all, money!) on projects with a high rate of failure!

"So I'm alone. For sure I need help in choosing the airfoil and defining its modifications for the next project. In the meantime I will continue to test fly my TFW-01 (Thermal Flying Wing). My program for next month is to check the influence of different flap deployment angles on pitch control and the thermalling properties of the model."

The fuselage in the photo is a provisional one, designed to protect the wing from

hard landings during first flights. Also, contrary to the included plans, the winglets shown on the prototype are not tapered. TFW-01 has been successfully launched via winch with the hook one centimeter ahead of the CG. If the tow hook is placed too far back, TFW-01 will loop smartly!

Aldo used the Panknin formula from our web site to calculate the required wing twist. TFW-01 uses four servos to control elevons and flaps. See the included table for all other technical information regarding TFW-01.

The rear of the fuselage is empty, and provides space for ballast. However, Aldo has not yet felt the need to add any. The main problem, as he sees it, is that most F3J aircraft are loaded to between 30 and 34 $g/dm^2$, while his TFW-01, at 21+ $g/dm^2$, acts as if it is loaded to 42 to 44 $g/dm^2$. To get a wing loading comparable to a conventional F3J glider, TFW would have to be built for a wing loading of just 15 $g/dm^2$. Since the present model exhibits a small amount of wing flutter at "ping" when winch launched, such a light weight model seems at this point to be next to impossible.

Aldo has promised to keep us informed of the results of future experiments. All information received will be relayed to *RCSD* readers through this column. ■

### 1997 Akro-Cup

Here is a photo by Alexander Frisch, the maker of the wonderful (Wilgas), taken at the 1997 aerobatic competition held in Germany this year. Hosted by the DMFV, over 50 sailplane pilots had planned to compete, but because the weather turned out to be just awful, with rain every day and low overcast, making it difficult to get high airtows, many pilots did not come. Brave souls all, 19 pilots from Germany & Austria actually competed in the event.

The photograph shows two 1/3 Wilgas, with 140 Kings up front for power, which shared much of the towing. Also in the lineup are a Salto, Kobuz, Fox and Swift.

Not surprisingly, the top three winners were a 1/3.5 Swift, a 1/3.5 Fox and another Swift. Interestingly, all of these models were fairly heavy for their size at 16+ lb., and yet they won the competition. What does this tell us? Light models are not necessarily the best aerobatic machines. The reason is inertia: in order to be able to execute many aerobatic maneuvers, you need airspeed. A heavier glider will retain its energy a little better than a very lightly loaded sailplane, giving the heavier model a distinct advantage. When you build up airspeed, a heavier model will tend to continue flying at that speed for a longer time than a lighter one, hence better aerobatics.

So, what's the best of both worlds? A nice, light aerobatic sailplane which will thermal and, when you REALLY get serious, ballast it up with a few pounds of lead on the wing rod; then, tear up the sky.

**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.

**November 1997**
- Practice the Split-S or Wing-over.
- Practice gaining sufficient airspeed to be able to complete a 360° Roll.
- Practice The Roll.
- Combine maneuvers to develop your personal, custom, aerobatic sequence.

**December 1997**
- Practice 1/2 Cuban 8.
- Practice the Cuban 8.

**January 1998**
- Practice the Outside Loop.

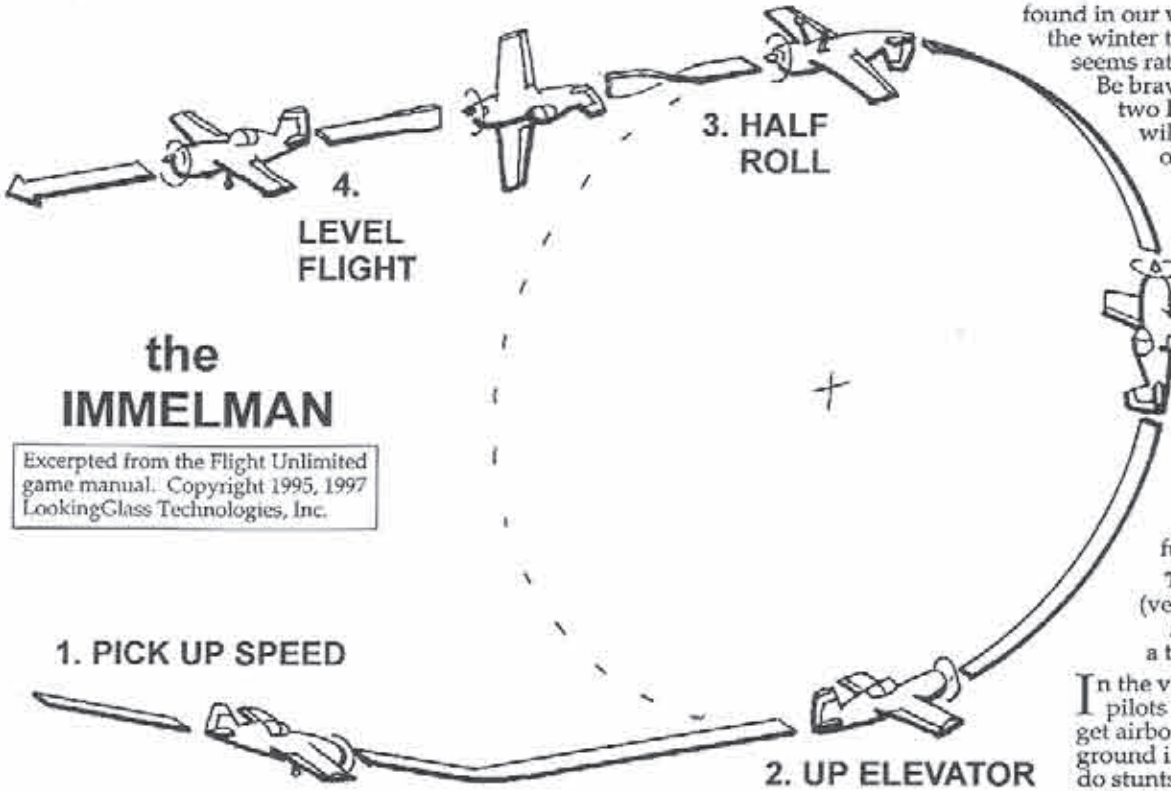
**February 1998**
- Practice the Immelmann and Reverse Immelmann.

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


Robin Lehman
63 East 82nd St.
NYC, NY 10028
(212) 879-1634

### Aerobatics

Some of us in the South are enjoying the best flying of the season. In the West, the winds are likely to blow in from the ocean, creating ideal slope conditions. Up North, a few hardy souls will prove to the rest of us that winter thermals are strongest in the early afternoon, when the light gets a chance to warm the trees and the few patches of bare ground showing above the snow. The rest of us are more likely to be




# the IMMELMAN



found in our workshops preparing for the winter thaw - an event which seems rather distant at this moment. Be brave of heart! In a month or two I just KNOW that the snow will be gone and we all will be out there flying again!

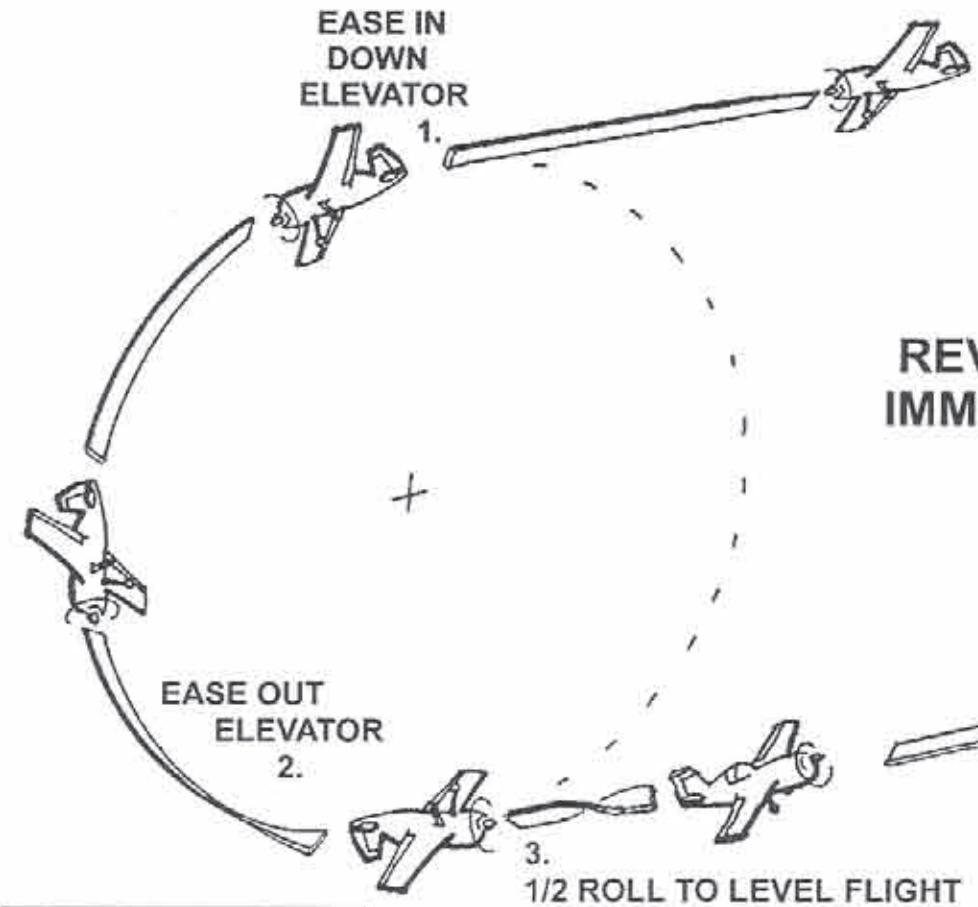
In the meantime, I'd like to introduce you to another old friend of mine, one of the nicest and most useful maneuver you will ever want to see. Best of all, with a try or two, you will quickly master this very handy turn-around and in no time it will become one of your most important aerobatic and everyday fun-fly maneuver.

**The Immelmann Turn**
(very difficult for R. + E. and fairly for A. + R. + E.)
a turnaround maneuver

In the very early days of aviation, pilots were happy to be able to get airborne and back down on the ground in one piece, alive, let alone do stunts! But little by little, as airframes were built stronger and pilots became more and more proficient, airplanes began to do much more than just fly straight and level.

First used for surveillance during the first world war, aircraft quickly evolved into lethal killing machines. The pilots, locked in life and death struggles, quickly invented new maneuvers and pushed their flying machines to the limit. It was in this atmosphere that Herr Immelmann invented the first Immelmann Turn; this maneuver has borne his name ever since. (Don't try a Robin!)

This is how you do it: "The model starts the Immelmann flying straight and level, pulls up into a 1/2 loop immediately followed by a 1/2 roll and finishes flying straight and level exactly 180 degrees from the heading at entry", (printed by permission from the AMA Rule Book).




# REVERSE IMMELMAN

The Immelmann is an easy maneuver for a powered aircraft, but somewhat more difficult for even the most aerobatic sailplanes. The reason is inertia, or energy management.

You must point the glider's nose down to get a lot of airspeed, pull up elevator into a half loop and, when you are inverted at the top of the loop, give full ailerons until you are straight and level. Voila! There you have it!

You've done an Immelmann. The key to this maneuver is getting enough airspeed for the ailerons "to bite" at the top of the loop. You might also need a little down elevator when inverted to keep the nose up.

As you would expect, the Immelmann is a very handy turnaround maneuver. What comes next is much easier for sailplanes

(again because of energy management). Let's call it the Reverse Immelmann. Because this maneuver is so much easier, you might want to tackle the Reverse Immelmann first, and then go on to the Immelmann.

### The Reverse Immelmann

(easy for A. + R. + E., more difficult for R. + E.)
a turnaround maneuver

The Reverse Immelmann is much easier to do than the Immelmann because now you're going down instead of up. The model starts the Reverse Immelmann flying straight and level, pushes down elevator down into a 1/2 outside loop, followed by a 1/2 roll, and finishes exactly 180 degrees from the heading of entry. Obviously, if you plan to try a Reverse Immelmann, you should have enough height for ground clearance.

No problem with energy management here. This is a particularly useful turn-around, because it ends, at the bottom of a 1/2 loop, going fast. You can immediately go for something else which requires airspeed.

One secret about putting a good series of maneuvers together is to use your airspeed to advantage. For example, after a Reverse Immelman you should go for something which requires airspeed such as a loop, a roll, or a stall turn.

Have you noticed that these maneuvers are getting easier and easier to understand and to practice? If you started at the beginning of this series, and mastered the basics, you've surely noticed that each new stunt is a little easier to learn. This is no accident. As I mentioned a couple of months ago, most maneuvers are simply rolls and loops put together in different ways. Perhaps for this reason, you found the Immelman very easy. If so, I promise to give you more of a challenge next month!

■

BOOK REVIEW

## "Aerodynamic Design of Radioguided Sailplanes" by Dr. Ing. Ferdinando Galè

Review by Jim Gray
Payson, Arizona

The name "Ferdi" Galè hardly requires introduction to the present generation of R/C soaring pilots, because of his prolific writings in the field. "Tailless Tale", "Structural Dimensioning of Radioguided Aeromodels", "Canard Configurazione" ("Canard Configuration"), and "300 Profili per Modelli Volante" ("300 Airfoils for Model Aircraft") are just a few of his published works in the Italian and English languages.

Ferdi has been involved with aeromodelling since 1934, when he built his first model — a free flight glider based on a sketch in the Italian magazine *L'Aquilone* (The *Kite*). He has authored many technical articles for Italian model magazines, as well as several books. He was co-founder and president of USAL (Unione Sportiva Aeromodellistica Lombarda) and member of the Aeromodelling Committee of the Italian Aero Club. Although retired in 1986, he is still active as a free-lance avio-engineering consultant and is deeply involved with radioguided sailplanes and old time models, both free flight and radio assisted. He lives in Baveno, near Stresa, on Lake Maggione, with his wife, Pia, and I also might mention that Ferdi is a valued long-time friend and correspondent.

This book is not for the lazy or faint-hearted, yet it's not difficult. However, it needs an effort reading, absorbing, thinking and applying basic mathematical and physical principles to the design of R/C gliders and sailplanes... Not because you can't design or build without them, but because the creation of a superior design requires them. In fact, Ferdi encourages us to first "brush up" on some of these basic principles and terms (Appendix A) before continuing with the rest of the book. Most of us who aren't practicing engineers and scientists have forgotten many of these things, because we don't use them on a daily basis, so Ferdi asks us to refresh our memories before beginning.

"Aerodynamic Design of Radioguided Sailplanes" contains nine chapters and two appendices, organized as follows:

1. Fundamental Aerodynamics
2. Airfoils
3. The Wing
4. Fuselage
5. Empennages
6. Complete Sailplane
7. Static Longitudinal Stability
8. Static Lateral Stability
9. Maneuverability

Appendix A: Math and Physics Refresher
Appendix B: Examples and Problems, with Solutions

Ferdi is a patient and understanding man, and guides us through rigorous applications easily and quickly. The reader, too, must be patient and understanding to make full use of the presented material. This is not a text one can read as a novel, for entertainment only, but it can be deeply satisfying for a reader who sincerely desires to learn.

You and your aviation library will benefit from the presence of this book on its shelves, and I heartily recommend that you add it for ready and frequent reference.

"Aerodynamic Design of Radioguided Sailplanes" is published in soft cover format, and its 8-1/4" by 10-1/2" size contains 254 pages of profusely illustrated text, plus 22 pages of Appendices, and six pages of bibliography. The price is US$28.00 per copy, including packaging and surface mail postage to any destination worldwide.

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■

# Gearing Up for Los Banos '98

By Donn Schifano
Hayward, California
Photography by Dave Garwood
Scotia, New York

Many of us got started watching the Sky King TV show, models of the X-15, B-52, B-58, F-102 and P51's hanging from the bedroom ceiling, attending an airshow with the Blue Angels or Thunderbirds performing, or a trip to a local airport to walk around the flight line on a quiet Sunday morning. Somewhere along the line, planes bit you. I read every scrap of information I could find on the X-15. Then, a friend and his dad got me into flying U-control. I made em, flew 'em and remade 'em! I was 13 at the time.

Life just happened to go differently than I hoped; I didn't wind up a fighter pilot even though my eyes were like Yeager's. ("Chuck, on the bogey, about 2 miles out... Check out the FLY hanging onto the third rivet on the left front cockpit frame... Whatta mean you can't see it? ...It's huge! ...It's a horse fly! How do they do that?? Must have glue on their feet...")

The 1988 Madera Airshow did me in. I saw Lefty Gardner's P-38 called "White Lightning" and a gull wing Corsair. Lefty did knife edge passes and even flew on one engine. I had to have a warbird. One little problem. A P-51 Mustang burns about 60 gallons of fuel per hour. And they were selling for about $600,000, never mind the yearly operational costs. Perhaps owning them in scale less than 1 would be more to my wife's liking 'cause I have a bad habit of eating at least once a day. (I said at least...)

At work on Monday following the airshow, a co-worker told me he flew gliders. He talked me into at least

**FIVE GOOD REASONS TO ATTEND LOS BANOS '98**

1) Have fun, overdosing on sailplanes.
2) Find out who's doing what, how they built it, and why.
3) Compare techie notes. Share ideas.
4) Find out what's new, hot, or coming.
5) See what manufacturers and suppliers have brought to sell.

**Lynsel Miller's TG-2 over Los Banos Reservoir, 1996.**

learning to fly R/C with a glider and said I could transition to power later. I would soon be propeller deep in warbirds! Yeah...

**Then I found PSS. More accurately, it found me!**

My friend Mark McGowan called out of the blue. "Wanna go fly the coast with a few of us?" I replied, "Sure. What do I bring? I've never been there." Mark inquired about how much lead I owned. I responded, and he said, "Four pounds isn't much, but bring it. You may need it. We are flying our thumb rockets over in Pacifica."

I took a balsa sheeted Swift AT and my video camera. He brought a 4 pound P-51B with fiberglass fuse and wings, with a loading close to 30 oz./sq. in. It was ballistic. It took me two days to calm down from the ADRENALINE DUMP I got from watching!

Years later, I have a warbird stable... But there isn't one single engine in my hanger.

I heard the RUMOR months before the first Los Banos Scale Fly-In; some CA (as in glue) crazed pilot had a German fighter/bomber the size of a small import car and he was going to SLOPE the thing at the Los Banos Scale Fly-In. I got a hold of the phone number and called to get more information.

"Yeah," Lynsel said. "It's true. Tom Overton's working on it now and it's big. I hope he finishes in time." I had to ask, "Lynsel, what's he making?" The reply sounded like, "A Bf-110! All 30 lb. of it." I WENT. I took my video camera, dropped an F-20 Tigershark on the ground, and spent the rest of the day staring at the sky, my jaw resting on my shoes. That is the way you pray in Sailplane Heaven!

Late in December 97, on RCSE (RC Soaring Exchange on the Internet), there was ANOTHER rumor about the Los Banos Scale Soar-in. It was confirmed by someone in contact with Lynsel Miller, the CD. PSS would *NOT* be part of the 1998 Los Banos Scale Soar-in. Only vintage and modern scale sailplanes would be allowed to fly.

For me, this announcement was extremely disappointing. However, what is even more disappointing is the number of people who have announced, via RCSE e-mail, they would not be going because of the decision regarding PSS.

**Why I Attend Los Banos**

I go to see FLYING WORKS of ART, sculpted into fantastic scale planes and mind blowing PSS models. I can't be alone. All of us spend hundred of hours each year building and flying our Scale and PSS models. Many people build and fly both types, yet have a preference for one. NOWHERE else in California do I get to see this spectrum of models, in one location, on one weekend. This event is special because people come out of the woodwork with works of


**Pilot, event director, Lynsel Miller, with Rich Spicer (R), 1996.**

art such as The Bee Gee, Alaska Airlines jet, the Elephant, TG-3, a U-2, the B-2, A-6 Intruder, A-7 Crusader, SG-38 Primary glider, and a full scale Albatross (the bird). I go because I can OVERDOSE ON SAILPLANES, for the entire weekend.

Have you ever had breakfast with Robin Lehman, or dinner with Brian Laird, Carl Maas and ten other sailplane addicts? Have you ever met Brian Laird and Carl Maas and asked them how 5-6 guys can find time to build, let alone bring, 50+ PSS ships? (There were more planes on the ground than weeds at their encampment.) Have you talked with authors such as Dave Garwood, Joe Chovan, or Dave Sanders about articles they have in the works? Have you asked them what their real flying passion is, or what they like to read? Have you talked techie stuff with John Higgins, Larry Jolly, Robin Lehman, Mark Foster or Mark Mech? Have you bought a plane or gizmo from one of the suppliers at the event? Have you asked Dave Sanders, Brian Laird or Mark Mech what planes they have in the works? If I don't go, I can't do any of that.

Some of these people have redirected and revitalized our hobby, while many, like myself, are just glider guiders. But, we get to talk face to face, exchanging ideas, and concepts; we also form relationships. We learn from them and they learn from us. We might even be giving them ideas for future plans, planes and articles. I say, "Thanks for devoting time and money to this hobby." I have enjoyed the benefit of their efforts, which comes from the passion we all have for this hobby.

### Introducing Others to Los Banos

Aside from the pilots at my home slope, I have told many friends and business acquaintances about Los Banos. None had ever heard of R/C sailplanes, let alone PSS or Scale.

I brought a visiting co-worker from the east coast to the second event. Last year, three people who are business associates showed up. Because it is such a unique event, period, they were all quite impressed. They had no idea this sort of hobby existed. One of them bought a plane and radio after the event, and I am teaching him to fly. So did his son. I have taken my videos to work and shown them at lunch. I am already telling others about the 98 event.

I urge all who have gone before to go again. If you have never been to Los Banos before, I urge you to come. Regardless of your flying preference, for the May 15th and 16th weekend in Los Banos, what you can't fly is less important than what can. And what you can fly is less important than YOU being there, supporting this hobby.

I will try to have a scale ship by May so I can fly. (Robin's Lehman's articles in the magazines have made me take notice and now I want one.) AND, I will also take a PSS ship and lay it on the ground, just to add to the collection. I hope to see other planes, both PSS or scale, flying or not. It's hard to admire superb workmanship and fine detail on an ASW-24 or even a 1/5 Scale Spitfire going by on a low, fly by, but easy to admire the detail when one can see it close up.

This event is scheduled as our weather changes in California. We have had rain, winds, 90 degree temps and just plain nice days. We have had no wind, heavy wind, shifting winds, hat sucking thermals and slope lift strong enough to fly a brick with servos. BUT, no matter what the weather has been, I always have one hell of a good time, talking flying and looking at all the sailplanes on the ground.

### A PSS Proposal

The success of the Los Banos Fly-In has limited flying time, unless you have a plane for all categories and aren't sharing a frequency. This change will mean more flying time for the pilots. I suggest having another event for PSS. Perhaps we can find a venue relatively close to Los Banos, but more appropriate for PSS planes. A location with more certain chance of lift and wind direction. Just think: two weekends of sailplanes. This event will allow more flying time for the PSSers.

John Raley's PWS-101 taken at Los Banos '97. Photo by Sean Sharif.

Power Slope Scale planes are flown with "attitude". Real warbirds were build to have an "attitude", so it is not surprising the models are flown that way. But flying with "attitude" is not "in tune" with how scale planes are flown. Scale sailplanes are "using the laws of nature" to allow them to fly elegantly. They really are different types of planes, with a different cadence to their flight envelopes and each deserves to have a separate showcase event. Besides, since when do we have too many opportunities to go flying?

I don't know if a PSS event can be staged this year, but attending this year's Los Banos Scale Fly-in, with a PSS to toss on the ground, may help draw a crowd come the day of a PSS FUN-FLY. I will support the scale event, 'cause I know scale pilots would support a PSS event. Perhaps more people who now only fly scale will build a PSS ship for the separate event. Many already do build and fly both.

Two years ago, I called John Higgins to see if he was going to LB. "Not sure if I am, Donn. My truck broke down this week." I drove 35 miles due north to pick John up, along with his planes, and drove 225 miles due south to the Fly-In. John, a prolific scale builder, brought a 1/3 scale ship among others. The sorta Scale PSS F-104 that I brought, to put on the ground, is John's design and "kit". He does both PSS and Scale very well.

As a group, we must support all the forms of R/C flying! We ALL need each other to make this hobby large enough for the people, clubs and companies who support it and provide it with fresh ideas and products, to continue to do so.

### A final thought

If this change makes it easier for Lynsel Miller, CD, to handle all the work it takes to put this on, then I support his decision to make the change, as well as supporting the event itself. But I am disappointed to see the number of people who have said they will not come. Lynsel, I'll be there, and I hope to see everyone else there, too!!!

■

BOOK REVIEW

## "On the 'Wing... the book, Volume 2" by Bill & Bunny Kuhlman

Review by Jim Gray
Payson, Arizona

They've done it again! Another great book from B²Streamlines. "On the 'Wing... the book, Volume 2" is a compilation of 58 articles about tailless (flying wing) sailplanes and gliders that appeared between January 1993 and December 1997 in *RC Soaring Digest*.

"Well, what about Volume 1" did I hear you ask? The articles from Volume 1, now its second printing, appeared in *RCSD* from February 1988 through December 1992... and it's still available!

After eight years of publication, the series "On the 'Wing..." remains the ONLY column dedicated to tailless soarers in the modeling press — a unique and valuable accomplishment.

Admittedly, flying wings are not everyone's cup of tea, but they have a long history and many avid supporters who continue to try to extract the hoped-for ultimate potential of these low drag machines. Tailless aircraft were pioneered in the 1920's and '30's in Germany by Lippisch and the Horten brothers, and reached their culmination in the extraordinary rocket powered Me 163 "Komet" of Lippisch, and the Hortens' magnificent H IV sailplane of the 1940's.

My own fascination with the type occurred much later, when — in 1957 — I saw for the first time the delightful Fauvel AV-36 at Harris Hill, near Elmira New York, where I had just begun flying full size sailplanes. On the long Thanksgiving Day weekend that year, The Elmira Area Soaring Corporation (now Harris Hill Soaring Corporation) hosted its annual "Snowbird" fun-fly invitational meet, which attracted sailplanes and pilots from the northeastern United States and Canada. I well remember the little cream-colored Fauvel — built and owned by members of the Montreal Soaring Council — appearing on its small trailer, wings aligned fore and aft, with one extending over the top of the towing vehicle, the other slanting down and rearward, with the tiny pod-like fuselage extending cross-wise on the trailer... A neat, slim, and most astonishing package.

Later that weekend, I had the privilege of flying the Harris Hill ridge lift in relatively close formation with the AV-36, sometimes above, sometimes below, but usually alongside, we soared together... And I had a marvelous opportunity to see all aspects of that bird in its natural element... And was hooked right then and there!

In November 1993, "On the 'Wing..." presented an article about the AV-36 in *RCSD*, and it now appears in Volume 2 on page 33. So, if you missed it first time around, here's your opportunity to revisit the late Charles Fauvel's interesting machine.

The Kuhlman's latest "On the 'Wing..." book covers almost every aspect of R/C model tailless gliders and sailplanes, with articles which discuss, elaborate, depict and analyze these machines. Among the gems, you'll find a model derivative of the Horten XV (a full size sailplane built in Argentina in the 1950's), a quarter scale model of Jim Marske's Pioneer II, the Northrop-Grumman "Spirit" B-2 stealth bomber, and several excellent articles with data on suitable airfoils for tailless model aircraft. There are many three-views, graphs and photographs to get your constructive and creative juices flowing: articles on control systems and methods, ways to determine the center of gravity, sweep angles, neutral point locations, and much, much more. Briefly, one might be inclined to say that the book includes "everything you wanted to know, but didn't know where to find" about flying wing sailplanes. I — for one — am totally enthralled.

The book, of course, is an ideal means of sharing information, advancing knowledge and inspiring additional work by readers. The goal is achievement of low drag tailless aircraft whose full potential is yet to be realized. There is scarcely a better way to reach toward that goal than by designing, building and flying R/C flying wing models... And this book is a big step UP in that direction.

From an "entertainment" perspective, I hugely enjoyed and was greatly amused by the pithy quotations from famous writers, philosophers and engineers randomly salted throughout its pages, and pertinent to our quest for aerodynamic excellence. I won't quote any of them here. Instead, I'll let you discover them for yourself with surprise and delight... But you'll find Plato and Leonardo di Vinci among them.

"On the 'Wing... the book, Volume 2" is published in soft cover format, and its 8-1/2" by 11" size contains 234 fully illustrated pages. The price is US$28.00 per copy, including packaging and surface mail postage to any destination worldwide.

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*Happy unlimited winners on day two (L-R): Jim Standafer, Ed Slegers, Jim Thomas, Brian Agnew, Jim MacLean, Ingo Donasch, and Jeff Allen. (Photo by Charles Fansler.)*

**Contest Report**

## 24th Annual Tangerine Soaring Championships

Written by Terry Cusack
Statistics Compiled by Lewis Gray
Photographs by Terry Cusack & Charles Fansler

Every year at Thanksgiving, the Orlando Buzzards Soaring Society host three days of exciting thermal soaring competition. The 24th Annual Tangerine Soaring Championship was no different, drawing 67 contestants from 13 states (including California!) with over 150 registered entries. The Buzzards do a great job of running a contest and catering to the contestants. There were no long registration lines (due to discounted pre-registration), and each pre-registered contestant received an individually engraved name tag and a big bag of tangerines (the event's trademark, provided by Red Hill Groves). Other great offerings included free chocolate chip cookies (courtesy of Velma Goodwin, who also bakes for Florida Soaring Society events), a $1 lunch, and a massive raffle containing the latest and greatest soaring equipment. Add the size and quality of the contest field, lots of powerful winches, and some big shade tents, and you have all the ingredients of a national level soaring contest.

Friday is two-meter thermal duration, while Saturday and Sunday are reserved for the big guys in open (unlimited) thermal duration. During most of the three-day weekend, a high overcast prevailed with temperatures in the upper 60's and light-to-moderate winds. Saturday afternoon ended with misting rain showers, while a cold front with steady rain arrived mid-morning on Sunday. This year the contest broke tradition and changed to a more familiar three-class format; Sportsman, Expert, and Master. Although the classification criteria resulted in about twice as many contestants in Master as in either of the two other classes, most participants were in favor of the change.

If you saw the landing triangles at Mid-South then you understand the landing targets incorporated at Tangerine. The triangles are laid out with the peak at the approach end of the landing area. The very small peak area is worth 100 points while each successively larger wedge is worth 75, 50 and 25 points. The peak only measures approximately 15 inches wide at the base and 24 inches long. Most pilots opted for the 50 point area to avoid missing the peak and getting 0 points. (Although I was in last place, I DID get a 100 point landing!)

This year's Tangerine also repeated a new competition format called ProAm. The ProAm is a team event with each team consisting of three members, one from each class, selected by random drawing. The winning team must accumulate the highest score (sum of the individual members) in the two days of open class flying.

After contest flying on Saturday, Ed White challenged all pilots to an informal Handlaunch Glider competition. Lift was very light due to the misting rain and many pilots flew conservatively to avoid warped wings. The all-up, last-down method was used to determine the winners of each round. Brian Agnew (flying a Maple Leaf) demonstrated that he is still "The Man" in HLG. Ed White (another Maple Leaf) took second and I was third (flying a Monarch).

On Sunday, the approaching rain made it obvious that the number of rounds would be a minimum. But that did not influence the contest crew. They arrived early and initiated a complete 180 degree turn-around of the winches to accommodate the change in wind direction. That kind of spirit is typical for the character of this contest. The motto "the customer comes first" seems so true at Tangerine. Four rounds were flown before the rain became solid and participants retreated under the big tents for the final awards and the long anticipated raffle drawing. The top Masters battled it out all three days; Mike and Brian Agnew, Ed Slegers, and Jim Thomas constantly exchanged places and often varied by only single digit points. On the last day, the smoke cleared (more like rain), and Ed Slegers stood as the Tangerine Soaring Grand Champion. Unfortunately, due to a scoring oversight, Jim Thomas was awarded the Grand Champion Trophy at the time! This error had to be corrected later. I hope that wasn't too hard on Jim!

Then came that raffle. (Whoa! The prizes were unbelievable!) "Mr. Sailaire", Tony Rogers, won the brand new Airtronics Stylus Transmitter! Pete Petrowske took in a gift certificate worth $300 from Slegers International and I scooped-up the hot new Helix HLG from Mark Kummerow Models. Other top raffle prizes included: Airtronics discount certificate, Airtronics and Futaba micro servos, RCD Hi-Tec receiver, Bird-of-Time kit, JR radio items and lots of goodies from Orlando hobby shops (Rune Stone Collectibles, Grave's and J&B Hobby).

This event can simply be summarized as a class act run by quality people. I look

*Don Harris shows how to do a tight-lip, high-tension zoom launch with his two-meter Osprey.*

*Contest Director, Rick Eckel, Congratulates Ed Slegers for one of his many wins. Ed was Tangerine Grand Champion.*

*Contest Director, Garnett White, congratulates Brian Agnew for First Place in Unlimited Masters on day two.*

*Jerre Ferguson gets ready to release his 2-meter Kummerow Searcher while Ben Cleveland prepares to time.*

*Garnett White tells a joke while waiting for a "sign" to launch.*

*A whole gaggle of competitors with their two-meters (L-R): Gerry Armstrong, Ollie Wilson, Pete Petrowske, Garnett White, Rick Eckel, Rob Rierson, John Diener, and Bob Hart.*

*Vic Manget tightens the winch line for his high performance Sisu.*

*Gerry Armstrong (Gorgeous Gentle Lady) and Rob Rierson (Spirit) placed third and second respectively in two-meter Sportsman.*

*Rosemary Sowa and Jim Standafer with his big all-wood orignial. Looks like a good cross-country ship. (Photo by Charles Fansler.)*

**DAY 1: 2-Meter Thermal Duration**
Contest Director: Rick Eckel

| Place | Class | Pilot | Radio | Model |
|---|---|---|---|---|
| 1 | Master | Ed Slegers | Vision | Fazer |
| 2 | Master | Brian Agnew | JR 388S | Super-V |
| 3 | Master | Jim Thomas | Stylus | Laser |
| 1 | Expert | John Diener | Vision | Dove II |
| 2 | Expert | Rick Eckel | JR 388S | Fazer |
| 3 | Expert | Garnett White | JR 783 | Searcher |
| 1 | Sportsman | Oleg Golovidov | Airtronics VG6 | Simba (original) |
| 2 | Sportsman | Rob Rierson | JR 783 | Spirit |
| 3 | Sportsman | Gerry Armstrong | Futaba | Gentle Lady |

**DAY 2: Unlimited Thermal Duration**
Contest Director: Garnett White

| Place | Class | Pilot | Radio | Model |
|---|---|---|---|---|
| 1 | Master | Brian Agnew | JR 388S | Super-V 2M |
| 2 | Master | Ed Slegers | Vision | Condor |
| 3 | Master | Jim Thomas | Stylus | Sapphire |
| 1 | Expert | Ingo Donasch | JR 10SX | Super-V 100 |
| 2 | Expert | Pete Petrowske | JR 388S | Esteem |
| 3 | Expert | David Veatch | Vision | Peregrine (mod) |
| 1 | Sportsman | Jeff Allen | Futaba 8UAF | Edger |
| 2 | Sportsman | Jim Maclean | Futaba 9V | Mystery Ship |
| 3 | Sportsman | Jim Standafer | Cirrus | (original) |

**DAY 3: Unlimited Thermal Duration**
Contest Director: Ed White

| Place | Class | Pilot | Radio | Model |
|---|---|---|---|---|
| 1 | Master | Mike Agnew | Futaba | Falcrum |
| 2 | Master | Jim Thomas | Stylus | Sapphire |
| 3 | Master | Ed Slegers | Vision | Condor |
| 1 | Expert | Rick Eckel | JR 388S | Fazer |
| 2 | Expert | Pete Petrowske | JR 388S | Esteem |
| 3 | Expert | Bob Stewart | Futaba 7UGF | Sapphire |
| 1 | Sportsman | Michael Conte | Futaba | Spirit 2M |
| 2 | Sportsman | Rob Rierson | JR 783 | Shadow |
| 3 | Sportsman | Jim Standafer | Cirrus | (original) |

**Overall Champions**

| Class | Pilot(s) |
|---|---|
| Individual (3 days) | Ed Slegers |
| Team (2 days) | Mike Agnew, Pete Petrowske, Rosemary Sowa |

forward to it every year and I can't wait for next year when the Orlando Buzzards celebrate their silver anniversary of the Tangerine Soaring Championship. I'm sure that they will be planning something special.

For information or entries, contact Orlando Buzzards President, Jerre Ferguson, 4511 Pageant Way, Orlando, FL 32808 (E-mail: jerre@bellsouth.net).

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## CONDOR

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The Condor is designed by Mark Allen, who is considered one of the best model sailplane designers in the United States, if not the world. Mark has taken all of his previous experience in competition thermal duration flying, plus all the knowledge he has gained from his earlier contest and sport designs, to design the Condor. Mark Allen's previous planes, to name only a few, are: Falcon 880 and 800, Falcon 600, Swift, Thermal Eagle, Vulcan, Night Hawk, Sky Hawk, Electric Hawk, Falcon 550E, Rocket, Pocket Rocket and, of course, the molded, world championship F3B Eagle. By taking the best of these designs and the new construction techniques available today, Mark has come up with, what we feel, is the absolute best open-class sailplane available.

The wings are made in America by Ron Vann, owner of Spectrum Enterprises. Ron is also an avid competition flier, and is considered to be one of the best wing manufacturers in the industry. Taking his years of experience in manufacturing wings, Ron has produced wings and stabs for the Condor that we feel are world class. Starting with the spar that Mark Allen designed, Ron uses only the best and most accurately cut foam cores available. He then uses hand-picked obechi from Kennedy Composites, which is applied with West Systems epoxy. 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 hingeline. 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 building time, and those who don't like to paint, there is an optional pre-painted, in the mold, fuselage which includes a unique carbon fiber canopy.

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

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

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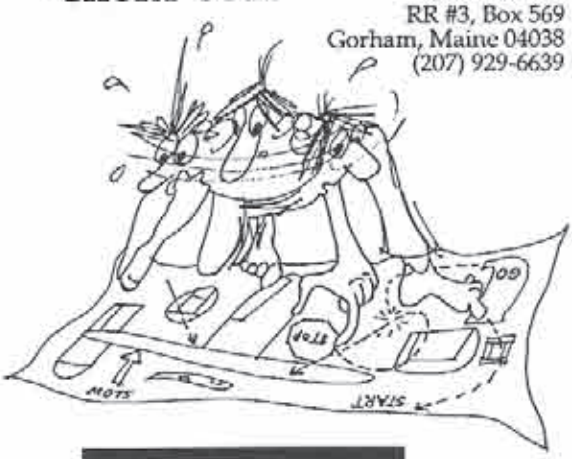




### An Interview with George Sparr, Aerospace Composite Products

***Steve:*** Can you give the readers a brief history of Aerospace Composite Products?

***George:*** It all started about 11 years ago, when I was working for Cyba Gygee. I had the opportunity to get carbon fiber and Kevlar™ from the lab, and utilized these materials in the construction of my son's planes. Eventually, when we would fly at the NATS, people would come up to me and ask where they could get the same materials that I used on my son's plane. So, we started supplying material; we'd buy in bulk and cut it up for resale.

Then, we began manufacturing the carbon fiber laminates; soon thereafter, the business really began to grow. So, we moved to California and expanded our product line through the acquisition of additional shop equipment and brought our press on line.

***Steve:*** Besides glider enthusiasts, what other hobby groups and industries do you manufacture or supply to?

***George:*** We supply a lot of end-grain balsa carbon laminate panels to the ducted fan jet builders; these are also manufactured with glass on each side in lieu of carbon. We sell materials to the 1/4 scale power builders and, most recently, vacuum bagging has been picking up outside of the glider field. We also manufacture the wing rods for gliders, as well as carbon fiber tapered tubes for tail booms and tubular spars. Outside of the hobby field, we manufacture carbon fiber laminate strips that are inserted within the necks of electric guitars. They stiffen the neck without adding much additional weight, and buff out to a beautiful color. One of our more unusual projects was the manufacture of a carbon fiber enclosure that was attached to whales and contains electronics to monitor their position and activities.

***Steve:*** What raw materials do you supply?

***George:*** We supply fiberglass, Kevlar™, a little bit of Spectra (which is getting hard to find), and Carbon Fiber. The fiberglass, Kevlar™, and carbon fiber are available in three mediums: uni-directional, woven (which is bi-directional), chopped light weight mat, and also tape. We also supply carbon rod.

***Steve:*** What about carbon and graphite - is there a difference between the two and, if so, what is it?


Wing Rod Molds

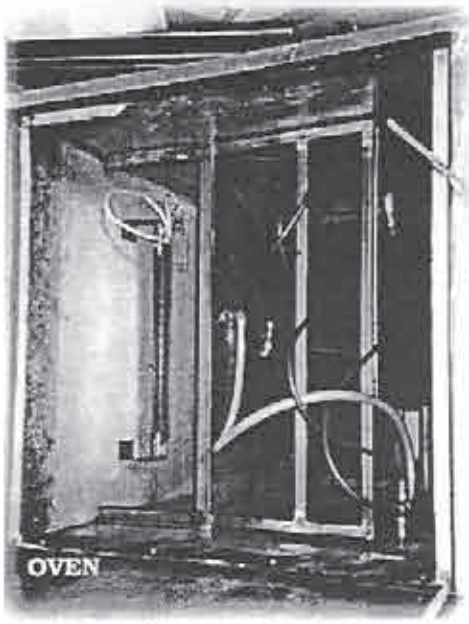
***George:*** They're basically the same, but technically the graphite is a bit stiffer; graphite just sounds sexier than carbon. There are only three manufacturers of the fiber, which is commonly called tow. The cloth is woven from yarns of tow, commonly 1K, 3K, 6K and 12K; a 6K tow has 6 thousand fibers per bundle of yarn. For example, my 80/20 carbon/s-glass cloth has a 3K tow.

***Steve:*** What are the advantages of carbon fiber, and are there any disadvantages?

***George:*** The advantages are stiffness, strength and light weight. It's the best return for the weight vs. strength. But it's not always the cure all. For example, one gentleman was using 3 oz. glass on a wing and wanted to change to carbon. The same weight cloth in carbon (very light) would cost about $90 a yard, so there were no cost/performance savings. So, if the glass is working, he's not gaining anything cost wise. A more useful application would be to use carbon selectively to lighten up a fuselage laid up with 12 oz. fiberglass, by reducing the amount of glass to yield a lighter/stronger part. You always have to look at weight vs. strength; those two always have to work together.

***Steve:*** Are there any disadvantages?

***George:*** Carbon is brittle, and its yield is very close to its ultimate strength, so you really don't know when it's going to break, until it does. Other materials will yield (wings bending) long before they break.


OVEN

***Steve:*** Where should hobbyist (glider guys) consider using carbon?

***George:*** Well, I recommend they use a cured laminate (tape). Our uni-directional laminates are commonly used to cap over wood wing spars.

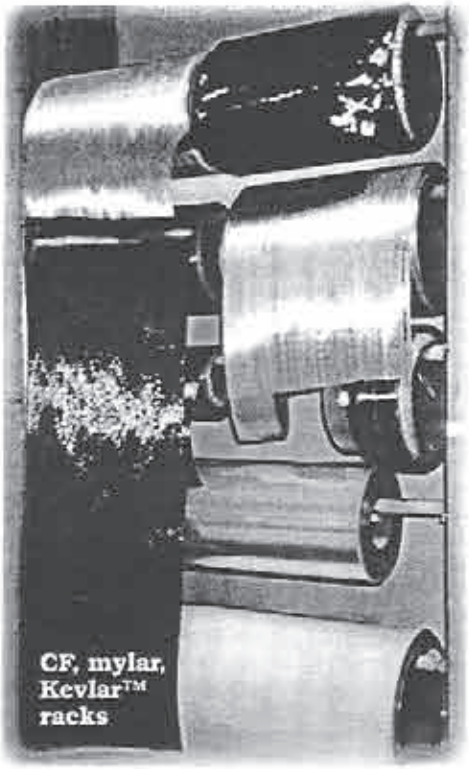
***Steve:*** Since wings load up less towards the tips, isn't is wasteful to use the same thickness laminate?

***George:*** You're correct; because of that type of loading, we developed a series of tapered laminates that start off at .007" thick and taper to .024" at the root; other sizes are available. We make this by staggering multiple layers of uni-directional pre-preg carbon fiber, until we get the correct taper, and then cure it in a press under heat. It's then cut up into varying widths.

***Steve:*** You mentioned "pre-preg". Can you elaborate for the readers?

***George:*** It's an term for Pre-Impregnated System. The aircraft industry quickly realized they couldn't rely on wet lay up to make parts of uniform weight and strength; there are just too many variables and it was too slow. It began when they started using adhesive on the B-52s, instead of rivets, on the doublers. This was a film adhesive. They then decided to adapt this technology to hi-strength fibers such as carbon. The process starts off with the woven, or uni-directional fiber, being wet out by machines that disperse a uniform amount of resin on the fibers. The catch is that the resin is not allowed to completely cure; it's kept in what's call the B Stage. This is achieved by applying a paper backing and rolling the fiber/resin onto rolls, which are then frozen to retard the cure. Even frozen, these systems will eventually cure in many months, so they are stored and shipped frozen. We keep it here in several freezers. This same system is also used on Kevlar™ and fiberglass.

***Steve:*** Is this the same resin system that's used with wet lay up?



CF, mylar, Kevlar™ racks

***George:*** No. It's a special resin that must be cured at 250, or sometimes 350 degrees, though some systems are now available with 180 degree cures. Another resin system used is "toughened epoxy", where conditioners are added to the resin to improve impact resistance. This is used especially on aircraft tail surface components. It's not especially adaptable for the hobbyist, due to the high curing temp and limitations of tooling, as well as the refrigeration requirements for storage.

***Steve:*** Any safety concerns with carbon?

***George:*** The dust is hazardous just like balsa dust, especially when cutting and grinding; always use eye protection. It can give nasty splinters, especially when cured in uni-directional form.

***Steve:*** We've spoken a lot about carbon, but what about Kevlar™? We don't hear much about it with gliders.

***George:*** Again, you want stiffness in your wing, and carbon is the best fiber for that application. Kevlar™ is not as stiff as carbon, because it has a high elastic resistance, which makes it better for impact resistance. We commonly see it used on fuselages to absorb impact hits. But then again, its cost can make it prohibitive to use as a direct replacement for glass. We do supply one kit manufacturer, who incorporates uni-Kevlar™ tapes down the length of the fuselage during the lay up. Kevlar™ is expensive, it's hard to get, and is tough to find in light weights (usually 1.7 oz.). It's used in limited applications.

We also use Kevlar™ in our Kevcord. Kevcord is a braided Kevlar™ in a vinyl jacket. The reason for the vinyl jacket is that Kevlar™ tends to fuzz and the jacket stops that. What's great about it is that it's thermally stable, tends not to change with temperature, and is used for pull-pull control surface applications. We carry a neat connector that ties the Kevcord into a 4-40 clevis and it's adjustable to control tension.

***Steve:*** I've heard Kevlar™ is real tough to cut and tough to sand. Any tips for those of us working with Kevlar™?

***George:*** If you cut it a lot there are shears developed just for Kevlar™; we carry some here. They're expensive, but they work very well. For just a weekend job, I tell my customers to buy a Fiskas shear (scissors) and stone it down so that the planes are a little flatter; that works very well. You'll have to stone it a lot. The shears we carry have a tungsten carbide ceramic. They will last about a year. You don't want to sand Kevlar™; always cover the Kevlar™ with a light layer of glass and surface finish the glass.

***Steve:*** Isn't glass pretty simple stuff?

***George:*** Yes, but you have to be careful about the sizing on the glass.

***Steve:*** What's sizing?

***George:*** Sizing is a treatment that's applied to the fibers. When glass is woven, it gets grease and dirt on it. So, the manufacturers scour it; they actually burn off the contamination. It's pure glass, and then it's sized. The sizing (Volan, one of the first.) is used to coat the glass, which allows the resin to bond to it. All of our glass is sized for epoxy, but there are sizings developed for other resin systems, such as polyesters, phenolics, and others.

Carbon fiber/fiberglass rack

***Steve:*** Any cautions for glass that's already been sized?

***George:*** Not normally; just keep it clean and dry. If liquid is spilled on it, just throw it away, because the sizing has been damaged.

***Steve:*** What are some common applications for glass?

***George:*** Glass is used to manufacture fuselages, reinforce wings, vacuum bag wings, and strengthen joints, just to name a few.

***Steve:*** What is S-glass? I've heard of it from time to time, but don't know that much about it.

***George:*** It was developed by Owens Corning. It's a high strength, silica glass. It's a better purity of glass. The literature states it's 30% stronger than standard glass (E-glass). The readily available S-glass was developed for the surfboard industry; that's why it's 27" wide, and 3.7 oz., but is equal in strength to 4.5 oz. E-glass.

***Steve:*** I recall seeing Spectra listed in one of your catalogs. Do you still carry it, and where is it commonly used?

***George:*** Spectra is a high strength, polyethylene fiber. It's so light weight, it actually floats over resin. The other problem they had with it, was that they could not get epoxy to adhere to it. It has to be plasma treated, which drives up the cost. Plus, the weavers are no longer weaving it in light weights. It has, unfortunately, fallen out of favor with the aircraft industry, which brings up a good point.

The composite hobby industry is a piggy back to industrial and aircraft industries. I'd love to have the ability to order this material, but it's just too difficult to get in the volumes associated with the hobby industry.

***Steve:*** If you could get it, where would you use it?

***George:*** Leading edges. Put it in leading edges, and you can sand right down to it; it maintains a great leading edge profile. I keep my eyes out for it.

***Steve:*** Do all the materials we spoke of work just as easily with CA as they do with resins?

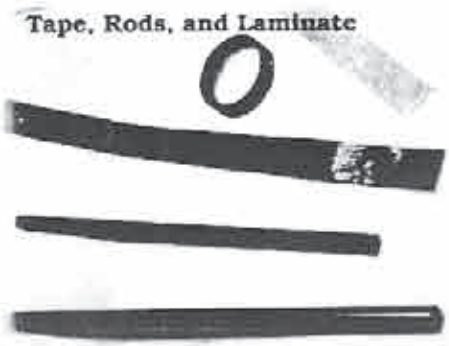
***George:*** Yes they do, as long as the viscosity allows them to penetrate.

***Steve:*** I notice there is a lot of building going on utilizing Spyder foam. What is Spyder foam, and where is it being used?

***George:*** Spyder foam is a new type of styrofoam; I believe it was developed for the wind surfing industry. I've got a report here, and as you can see, it has about an 83 psi compression strength, perpendicular to the sheet, which is more than double that of conventional blue/pink foam. The reason it works so well is that it's just like end grain balsa; it carries the shear loads for the upper and lower wing skins. They found a way to orient a vertical cell structure into the foam; it also hot wires very nicely. Other structural foams, such as Rohacel, can't be hot wired.

***Steve:*** Where is it typically being used?

***George:*** In the wings as a core. It's slightly heavier than blue foam, but its



Tape, Rods, and Laminate

strength allows for a lighter lay up when vacuum bagging.

***Steve:*** Speaking of vacuum bagging, any tips?

***George:*** Well, vacuum bagging is nothing more than a clamping device. I don't think Northrup would have spent millions of dollars on autoclaves for the B-2 bombers if there wasn't an advantage to this technique. They essentially built wings of carbon laminate, which were cured under heat at up to 300 psi. This generates a very consolidated part with virtually no voids; it looks homogenous under the microscope.


Vacuum bagging gives the builder a better laminate, and a way of clamping the structure down. For example, 6 inches of Hg yields about 3 psi which, spread out over an entire wing, is a lot of force. I consider vacuum bagging a way of bonding sheet balsa down over foam; you use less resin, and get a better joint.

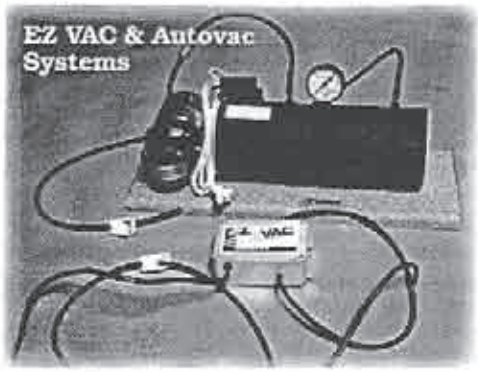
***Steve:*** Any precautions with vacuum bagging? Seems like anyone could just get a bag and drop in a wing.


***George:*** There are a lot of cautions. When you're working with epoxies, you need to protect yourself, cover your exposed skin, and use gloves. Most epoxies are corrosive; use eye protection, so as not to splash any in your eye. The pressure on the wing can be considerable, so if you're using a very soft foam, you must limit your pressure; a wing of white foam could be crushed down to 1/8" under high vacuum. I tell my customers to go no more than 6" of Hg on white foam, no more than 14" on pink foam, and 18" on blue foam. Vacuum can be controlled by either a switch or a bleeder.

I do want to mention that, before the epoxy is mixed, the bag being used should be checked under vacuum for leaks; you don't want to chase a leak around all night.

***Steve:*** Besides wings and control surfaces, where else can vacuum bagging be used?

***George:*** It can be used along with tools (molds) for making molded wings. Some people use it to make solid laminates.




***Steve:*** I just reviewed your *Vacuum Bagging Video*. It was very good. Are there any plans to do a sequel?

***George:*** If I did a sequel, it would be on advanced techniques such as for molding, painted mylars for paint transfer, spar construction, etc. I don't see that happening for a few years, though.


***Steve:*** You mentioned painting mylars. When a glass bagged wing is made, how is it finished?

***George:*** When you don't paint mylar, you sometimes transfer wax to the wing. Most guys who wax their mylar, don't let the wax harden up; it sometimes leaves a dull finish on the wing. It's best to let the wax harden up. If you're going to paint a wing after bagging, it's best to wash the wing with a degreaser to remove all wax residue. Then, lightly sand it to break the gloss.

***Steve:*** What are your thoughts on resin conditioners, such as microballons, cabosil, and pigments?

***George:*** I'm not crazy about pigments, because they don't give the same color as paints; you have to be careful. A lot of folks use polyester pigments such as those used for boats; that really screws things up. Also, some folks don't realize that they are changing the mix ratio; add the pigment to the resin, mix it, and then add the proper amount of hardener to the resin/pigment volume/weight.

Cabosil is interesting, as it's really a thickening agent used by the food industries. It adds no strength, and is just a basic thickener. I use it to thicken up the epoxy, so that it doesn't bleed through the grain of balsa or obeche. When I need to sand a thickened resin mixture, I use microballons. I caution folks against using the dark brown ones; that's a phenolic, and they have all kind of toxicity problems associated with them. You don't want to breath any of them in. We do carry a dark one that blends well with balsa in way of color.


***Steve:*** Why do you think some folks have a fear of vacuum bagging?

***George:*** They think it's a lot of work and requires a lot of equipment. People only see the work; they don't see the great results. Even the 1/4 scale guys are getting into it. Most people can get into a kit for under $100.

■

I want to thank George and his family for their great hospitality during my stay. I had a wonderful time, and learned a great deal from George about composites: their applications, advantages and disadvantages.

■

## When the Wind Dies At the Slope

By William G. Swingle II
Pleasanton, California
bill_swingle@electro-test.com

I was at my local slope with my TG-3 from Dave's Aircraft Works (new 2M, EPP trainer). I was floating around in the 4 mph wind and delighting in the little thermal pockets that occasionally drifted through. A good friend, Roy, happened to also have the afternoon free and we were gleefully enjoying both the air and the camaraderie. Watching our planes gently ride the bubbles of lift was very pleasant and profoundly relaxing. Heck even the temperature was nice at 55 degrees Fahrenheit (remember: northern hemisphere, winter time).

Then the wind died. It was a sudden death, but not unexpected due to the storm front that was somewhere in the near vicinity. We had flown for about 20 minutes and were trying to consider ourselves lucky to have flown at all. Sadly, we were doing a poor job of it. The self-deception failed. We each wanted more flight time.

First, I tried my jerk-start. It's 10 feet of heavy latex and 30 feet of line. With a little wind, it can be fun; but, in the now dead air, we realized that the jerk-start was of no use.

Then, as we were standing around hanger flying, Roy picked up the TG-3, trotted about 30 yards away and said "catch". He then proceeded to throw me the TG-3! My radio happened to be on (Roy knew this), so I just flew it to myself and "whap", caught it.

I immediately realized that 30 yards is way too CLOSE. The TG still had more speed than I would have liked when it reached me. However, the convenience of having an almost unbreakable plane made approach speed only a minor issue. It couldn't hurt me and I couldn't hurt it. No problem. Nevertheless, it lacked style to have the plane just smack into me, so I backed up to about 50 yards. Now, energy management was important. I had to estimate energy just after launch; then bleed off enough to make a nice gentle approach at a reasonable altitude.

Throwing a plane is an art. One at which I've always been very bad. I've seen good launches. Like Phil Pearson's phenomenal, yet still top secret, HLG tosses (love those). Or, Joe Wurts' SAM launches in combat matches. Or, the tall guy, that I saw at the Laguna Nigel Turkey Shoot. I didn't get his name, but he could launch a Zagi into the stratosphere by gripping the trailing edge. I'm still amazed by this, though I hear it's common. It's an art and a skill. Or more specifically, throwing hard is a skill.

Again, the benefits of an almost unbreakable plane proved quite helpful. I would NOT try a hard throw with a conventional construction 2 meter plane. No thanks, I'll pass on that. However, since I had no fear of hurting it, I felt comfortable giving it a hard throw. To my surprise, it turned out I'm not quite as bad as I thought. Most importantly, I could see myself getting better!

On one of Roy's more upward tosses, I waited too long to push the nose down and it stalled. "Bonk," it nosed into the ground. No problem. It didn't really even hit hard. However, the next toss was horrible. It went up steeply, stalled badly and nosed almost straight into the ground. Turned out the previous "bonk" had knocked off some of the nose weight, creating a somewhat tail heavy condition AND turned off the airplane. Somehow, I must have installed the switch with too little clearance to the foam of the fuse, and at a point that flexes during impact. I felt better having an explanation for the previous crash. The good news is that EPP foam is amazing. There was no damage. I just turned on the radio, added some down trim and we continued our game of catch.

We continued to toss it back and forth like a couple of kids playing Frisbee, each having a great time. Wind could have been better but, oh well, that's slope soaring. ■

## 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 IX**

### Turbulators

It is well known now that sometimes, not by any means always, a wing can be made to work more efficiently if the boundary layer can be forced into turbulence before the separation bubble has a chance to form. If the air arriving at the leading edge is already turbulent, as when a wire turbulator is mounted in front, the boundary layer is never laminar and there is no separation bubble. Then the stall is delayed and the wing operates fairly well. After Schmitz's book was published, many modellers did fit wire turbulators on outriggers ahead of the wing. But the drag when the whole wing is in turbulent boundary layer flow is higher than it would be if there was some laminar boundary layer, providing there is no general separation of the main airstream.

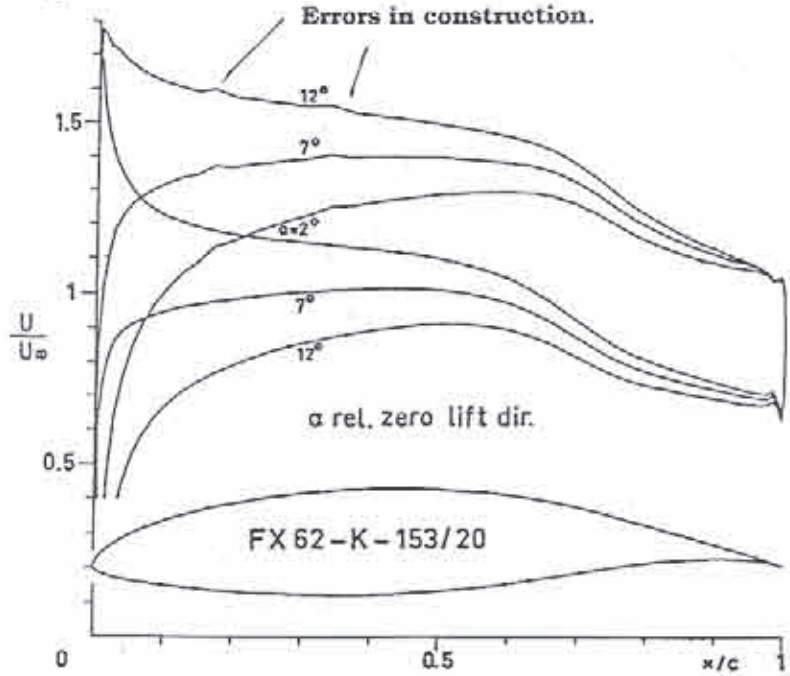
A popular device is to add a turbulator to the skin of the wing, in the form of a thin tape, perhaps 0.5 mm thick, or even a series of pin prick holes through which air can be blown, to make a laminar boundary layer become turbulent. The idea of this is to anticipate the formation of a separation bubble just before it happens, turbulate the boundary layer, and thus ensure no separation. If the turbulator is exactly in the right place, low drag flow is preserved as long as possible and the transition to turbulence occurs just in time to prevent a bubble forming. Even though there is some increase in drag, it is less than it would be with a bubble. Some of the profiles tested have been tried with strip turbulators mounted in various positions. The effects are, as would be expected, different for different wing sections and different Re numbers. That is, a turbulator which improves the performance at one speed and trim, may not be satisfactory in another situation. Much remains to be investigated here. (Incidental to this, on modern full scale sailplanes such as the Discus or ASW 24 and ASH 25, turbulators are used on the undersides of the wings at about the 70% aft chord location, because without them separation bubbles would form there. New work at Delft has allowed profiles for the latest Schleicher sailplanes, ASW 26 & 27, to have pneumatic turbulators on the flaps only and 95% or more laminar flow is claimed for these wings.) For modellers, a great deal more work has been done recently with 'trip' turbulators at UIUC. This will be described in the third volume of their Summary of Low Speed Airfoil data.

### Accuracy

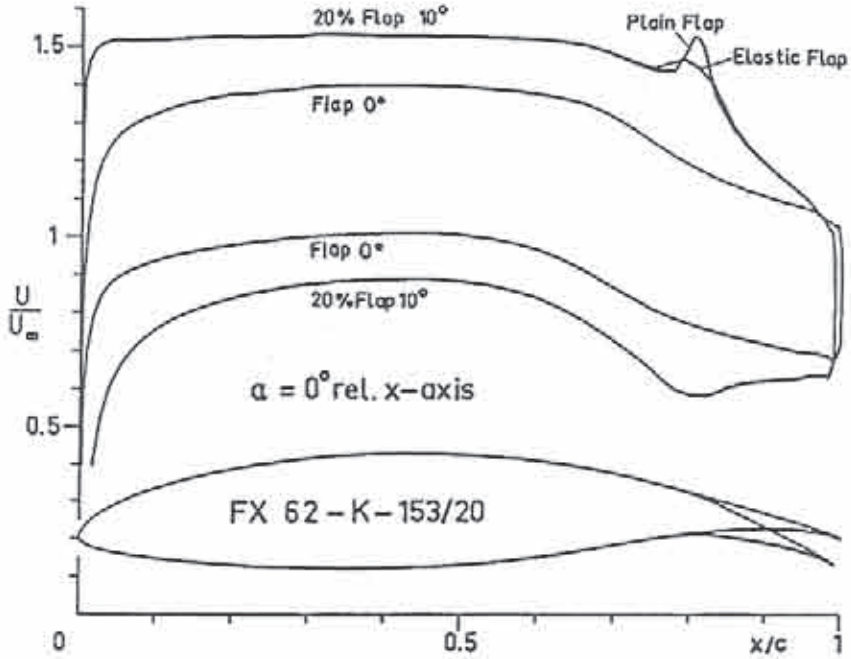
We have to remember that real wings are never perfectly accurate. A blob of paint, or a slight wobble in the skin of a wing (behind the leading edge for instance, or at a place where the covering overlaps) may sometimes (not always) be enough to turbulate the boundary layer and then no separation bubble appears. This is usual on full scale light aeroplanes, for example, which have, as a rule, very imprecise profiles. The first serious attempt to get the advantages of laminar flow boundary layers in full scale aviation, was with the P - 51 Mustang fighter in the Second World War. Although this was an outstandingly successful fighter, the speeds hoped for were never reached because the wings were not accurate enough with slight waves in the metal skins, rivet dimples and so on. Full sized sailplanes may start off with smooth and clean wings, but they pick up crushed insects in flight and the laminar flow is spoiled. (Some of them now have leading edge wipers, usable in flight.)

The situation with models is less clear. It is quite common to find that a beginner's model, constructed rather clumsily with irregularities in the covering and various humps and bumps, flies just as well as, or even better than, an expert's similar model

**Figure 25**

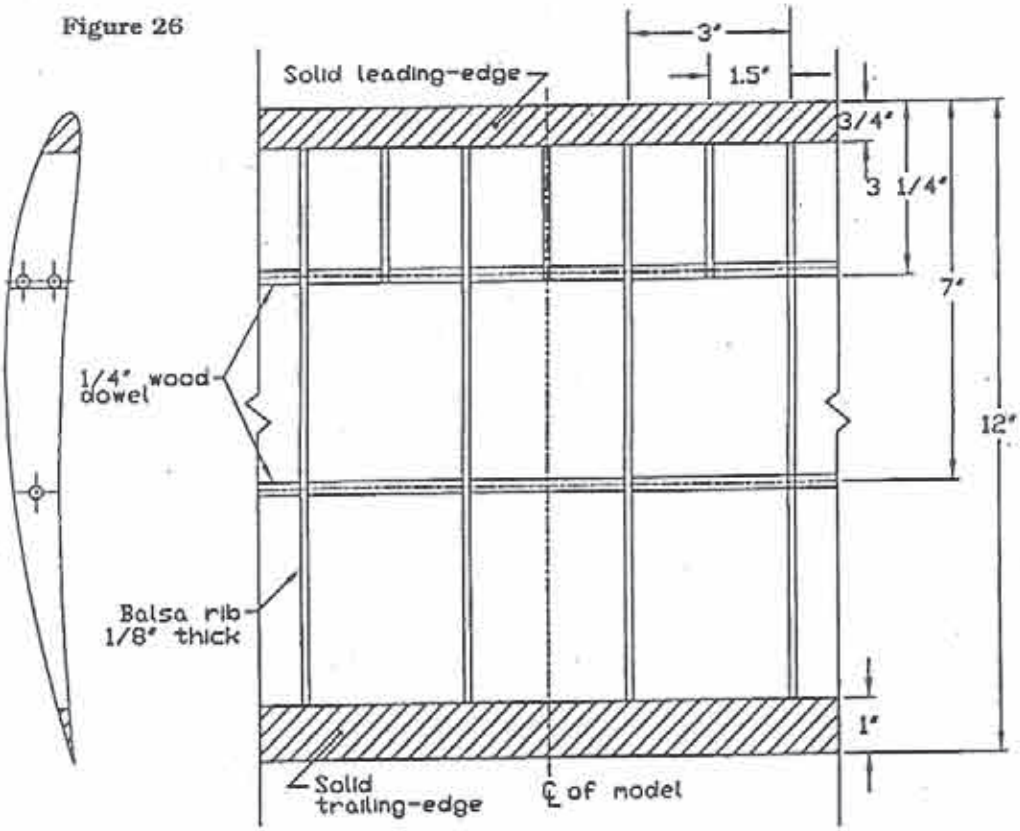


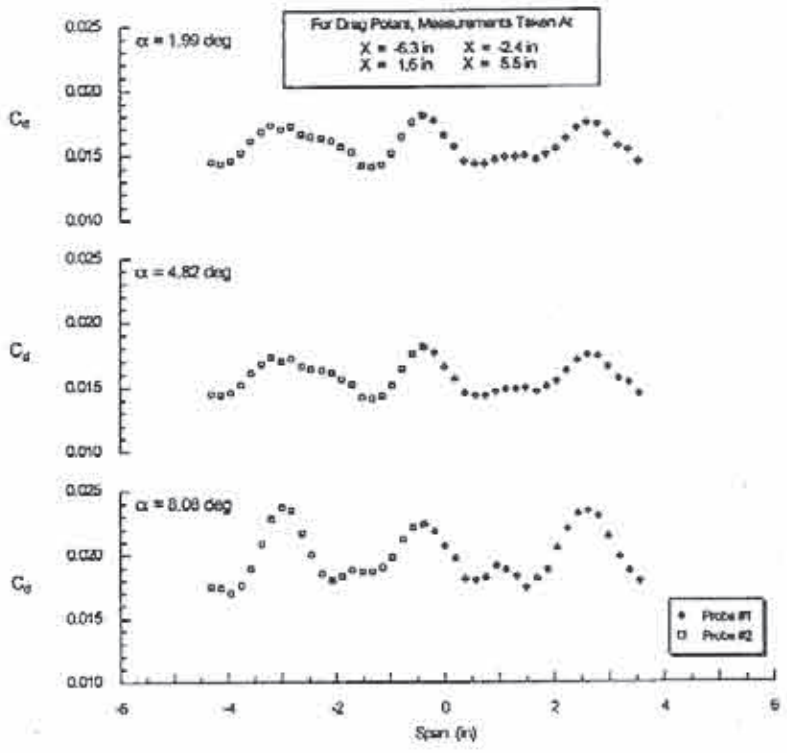

Velocity distributions for FX 62-K-153/20 airfoil; original coordinates.




Velocity distributions for FX 62-K-153/20 airfoil; smoothed coordinates.

Figure 26




**Drag measurements on a built-up, film covered wing, with drag rake in different positions.**

which has a more perfect shape, accurate and smooth. Even the kind of covering material used can make a difference - for instance, high gloss film as compared with the slightly rough texture of fabric. This is because, at a particular wing chord and flying speed, an irregularity forcing the boundary layer into turbulence ahead of time is better than having an ugly separation bubble. But with another model, a different aerofoil section, different chord, different flight speed, everything may be the other way round.

The computation of the various profiles assumes among other things that the wing surface will be exactly as the designer intends, free from all errors with no small waves or humps, no dust, no paint lines, blobs, bugs or rivets. In practice even the wind tunnel models are not as perfect as this, especially since those used at Princeton and UIUC were built by ordinary (though very expert) modellers. A valuable and interesting part of both the volumes is devoted to careful comparisons of the actual test models with the computed ordinates of the sections. Some of them were more accurate than others. The diagrams included in Figures 19 and 20 (last month) show the kind of variations that occur. A different example that should give many ordinary model builders food for thought, is given in Figure 23. A nominal Eppler 193 wing model here is compared with the exact ordinates for the Eppler 205. Because of inaccuracies in building, the section actually tested in this case was closer to the 205 than to its own ordinates.

Even full scale sailplanes are not exempt. Small errors in the actual profile coordinates are reflected in unintended pressure variations (Figure 25).

There are aspects of this both encouraging and worrying. In one sense, we may reassure ourselves that if the modellers who made the wind tunnel profiles can produce sufficiently accurate profiles for scientific work, then we ordinary builders should be able to do at least as well providing we make the effort. We have a real prospect of getting our wings to work as efficiently as the test figures suggest they should.

But we also have to remember that the materials we use are not entirely stable. Wooden wings tend to warp and shrink, covering materials develop wrinkles. Included in the UIUC tests are some on an open framed, film-covered wing. The drag measurements vary considerably depending on whether the probe is behind a rib or between two ribs (Figure 26). Calculation will not be of much use if we build wings in this way and there really is little point in using one of the new profiles in such a case. One of the traditional sections will work just as well, possibly better.

Even fully molded wings like those used on some models and on most full scale sailplanes, may develop waves and distortions over time. Resins shrink slightly with age, so a molded wing which

begins with nearly perfect shape may not be so good after a season or two of flying in varying weather and temperatures.

To obtain the full benefits of the new profiles, we have to be very careful in our methods of building and, in addition, we should check wings from time to time and be prepared to resurface them and bring them back to accurate from.

**The need for more research**

At the beginning, I said that the model designer will not find the ideal profile for a model by quickly skipping through the latest wind tunnel charts. I hope I have said enough to show this.

We would like to see many more tests. Some have already been carried out with different covering materials. Wing flaps at different angles have been tested. More of these are necessary and will be forthcoming, in Volume 4 from UIUC. Tests of variable geometry wings, wing tips, winglets and tip sails, wings with sweep, wings with crescent planforms, fuselages and tails, control effectiveness, and so on, will require different and more elaborate apparatus. Wing profiles are only part of the story.

Much remains to be done by the researchers and they deserve support of every kind and from every possible direction. Let's see that they get it.

Donations may be sent to Professor Michael Selig:

Department of Aeronautical and Astronautical Engineering
University of Illinois at Urbana-Champaign

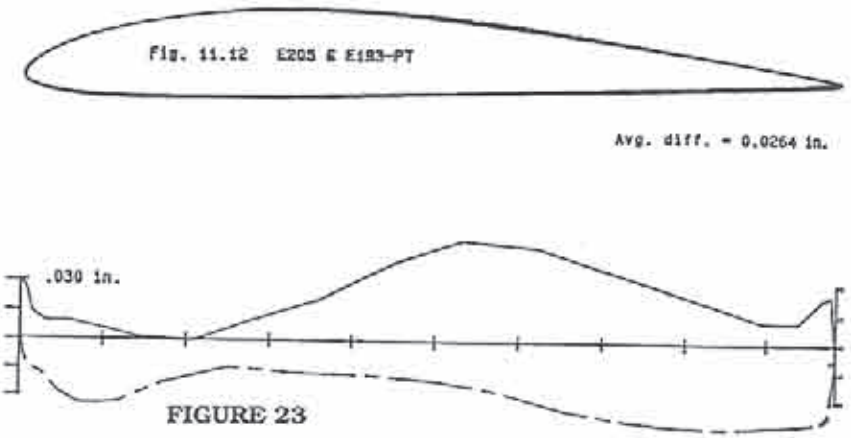



**FIGURE 23**

**A comparison of a model wing profile the Eppler 193, with an exact plot of the Eppler 205. The wing as built is closer to the 205 than the 193 intended.**

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http://www.uiuc.edu/ph/www/m-selig
e-mail: m-selig@uiuc.edu





**Midwestern Handlaunch Series**

The Cincinnati Soaring Society would like to announce an exciting new R/C handlaunch thermal duration series: The new Midwestern Handlaunch Series. This series will score, for each competitor, the best four out of the six events in the series. Scores for the series will be determined by a score in each event, for each competitor, normalized to the score of the overall winner at that contest. This will allow two "throw out" scores for those who fly in all six contests, as well as allow some leeway for those who cannot make all six events.

Winners will be recognized at the final event in the series, the CSS Fall Intergalactic Championship.

**April 25**
Lafayette, Indiana
contact: Ryan Woebkenberg
woebkenb@expert.cc.purdue.edu

**May 30-31**
CSS Spring Intergalactic
Cincinnati, Ohio
contact: Paul Siegel
(513) 561-6872
psiegel@fuse.net

**June 26**
Mid-South Soaring Championships
Louisville, Kentucky
contact: Ed Wilson
(502) 239-3150
ewilson1@bellsouth.net

**July 19**
Dayton Ohio
contact: David Rice
David_Rice@reyrey.com

**August 26**
Columbus, Ohio
contact: Paul Wiese
pwiese@avcomsmt.com

**Oct. 3-4**
CSS Fall Intergalactic
Cincinnati, Ohio
contact: Paul Siegel
(513) 561-6872
psiegel@fuse.net

*(L) Photography by Mike O'Donnell.*

*Aerial photography by Larry Landucci.*

*(top) Reese and his ship. Photography by Larry Landucci.*

## The Fifth Annual Sailaire One Design Contest

Contest Report By Rudy Siegel
Cincinnati, Ohio

Oh, I have slipped the surly bonds of earth... with a Sailaire, and I may never get down!

Thusly, many of us paraphrased John Gillespie Magee's immortal poem, "High Flight", at the Cincinnati Soaring Society's (CSS) Fifth Annual Sailaire One Design Contest. It was one of those weekends that defies the normal logic of lift.

Normally, the logic of thermal lift dictates that what goes up, must come down. The weekend of September 13 and 14, 1997, proved quite illogical; everything seemed to be up. But then, it might have been that we were all flying Sailaires, those gentle Amazons of the sky!

### Sweet Surrender

This CSS contest is rapidly becoming a must-do classic. CD'd this year by Paul Siegel, CSS hosted sixteen flyers from four states, including Ohio, Kentucky, West Virginia and Wisconsin. Yes, Wisconsin. We've found that Sailaire fanatics will go to, and travel, great lengths to fly with their brethren, whether in a contest, or just a fun-fly.

One such fanatic is Larry Landucci, driving all the way from Verona, Wisconsin toting two Sailaires; one a well-traveled veteran, and the other a brand new ship complete with on-board camera gear. Larry was sorting out his new ship over the weekend, but this didn't keep him from getting some amazing shots of our venue, and the aerial action. The aerial photo shows the CSS flying site along with fellow CSS member, Ken Moore's lovely lady on-the-wing.

I am a newly smitten Sailaire fanatic proven by the fact that, the Friday evening before the contest, I took a "quick" road trip to and from Indianapolis to purchase a Sailaire — sight unseen. Such is the intoxicating allure of the Sailaire. (My thanks to brother Paul for hooking me on these wonderful birds!) My new ship proved to be amazingly light and well trimmed; however, it lacked spoilers, which would challenge my landing accuracy throughout the weekend.

### Simple (?) Challenges

Paul called for us to fly straight duration, with a fifteen minute task and landings scored on a 100 point tape, on Saturday, and on measured runways on Sunday. Duration was not the problem. Remember, this was the weekend of bountiful lift. We all joked amid our spec'd-out revelry, that we were probably setting some kind of aggregate record for total time aloft. Let's see, sixteen flyers, eight rounds each day, 15 minute tasks with maybe five flights under 14 minutes — TOTAL! OK, so we're not Los Banos/Torrey Pines/Cumberland, etc., but for midwest thermal conditions, trust me, it was simply amazing.

Now, imagine my landing predicament: no spoilers, flights spec'd to where you literally had to come down to keep adequate visual contact —with a Sailaire. Then, having to get down and hit the tape. Life should always be so tough! You're thinking screaming F3B approaches to landing, right? You wouldn't be far off! I'd come down at Amazon warp speed (max. AWS!), arriving at tree-top level with about 90 seconds left in the task. The old girl would waggle like crazy with any over-control. While the speed bled off (I hear you laughing out there but, believe it!), I'd set up for a long downwind and final approach right down the tape.

As it turned out, I got better and better at energy management, which kept me from either doing an inadvertent touch'n go or getting a wing down while still at flying speed, resulting in a nifty little ground loop, while pivoting on the wing tip and coming to rest at least one wing span from the tape! Read, lousy landing scores.

Watching a Sailaire slide to a gentle stop in the grass has to be one of life's simple pleasures. You find yourself waiting for someone to get out of the glider and say, "Wow, what a ride!"

### Don't Try This At Home!

So, just how strong was the lift at the '97 CSS Sailaire One Design Contest?

About mid-afternoon Saturday, we all saw pieces of an airplane slowly drifting to the ground. We all wondered, "Uh-oh, who's broken? Where's the rest of the airplane. Where's the screaming pilot who's lost his ship?" Everybody asked the same question aloud, "Who's broken?" No one answered in the affirmative; all planes flew on normally.

As the birds came back to roost, one-by-one, the answer finally slid to a stop right before our eyes. Reese Brock was in from West Virginia, and on his fourth or fifth flight he encountered some of our legendary CSS hat-sucker lift. It seems that Reese's airplane got into a really strong thermal, as the lift literally peeled the covering off the top of both inboard wing panels. The craft sailed on effortlessly while we all tried to figure out who had broken.

Many thanks go to Jack and Karen Strother, who supplied Reese with new covering materials and the facilities to get his airplane back in the air on Sunday.

### Be There, Or Be Square!

You might be tempted to think that a contest with a bunch of over-sized poly ships would be for squares. But, believe me, you've never seen so many guys kicking back, enjoying the break from intense, full-house competition. This is as much fun-fly as contest. And it's a great way to lower your blood pressure. Plus, the 1998 CSS Sailaire event will be CD'd by yours truly. What more reason do you need?

The Sixth Annual CSS Sailaire One Design Contest is scheduled for September 12 & 13, 1998, at the CSS flying site. Check out details and maps to the field on the CSS web page (www.iac.net/~glide17/css). Then, get out yer ole favorite, dust 'er off, charge the batteries — and check the covering! You never know when you might slip the surly bonds and encounter some of our legendary lift.

■

# The 1997 ISSA Scale Cross Country Challenge
## Lucerne Dry Lake, California

By Gary Fogel
Los Angeles, California

*Photography by Mark Foster, Gene Serrano, Glyn Fontineau.*

*Mark Foster's 1/3 scale Grob Twin Acro.*

*Line up of gliders awaiting the thermals. Note the turnposts used for the start/finish gate of the cross country course complete with thermal streamers.*

*Mark Foster holding his Grob Twin Acro.*

Cross country soaring in full scale sailplanes is really quite amazing when you think of it. Our technology has progressed to the point that pilots can soar for over 1,000 miles and return to their home airport. Cross country competition in full scale soaring circuits usually takes the form of a triangular course of a specified distance. The fastest ship around the triangle wins the event. So why not use these same goals for an event with scale model gliders???

On October 18th, the International Scale Soaring Association (ISSA) hosted their first "Scale Cross Country Challenge" in the desert north of Los Angeles. The Lucerne Dry Lake bed was chosen specifically for its expanse of potential "outlanding" sites in the event of a loss of lift with a scale model glider. The thought of landing a scale model in the local desert sagebrush, or on a desert highway was less than appealing! But a dry lake... Take your pick of landing patterns. The dry lakes of California are the perfect proving ground for scale cross country performance. Each pilot was given the "challenge" to either make their best time around a triangle or to fly on a straight distance across the lake. The only trophies awarded were "self-awarded" by the pilot in the satisfaction of having a fun day flying in the desert and/or completing the course.

A equilateral triangular course of 0.5 mile for each leg was marked by a series of turnposts constructed by ISSA member, David Hall. Dave used 1/2 inch steel conduit and a four foot, 1/4 inch dowel extension from the top, complete with orange and pink ribbons that could be used as thermal indicators. Two winches with approximately 1000 feet of line were used to launch the scale gliders. Unfortunately, the local aerotugs were not available.

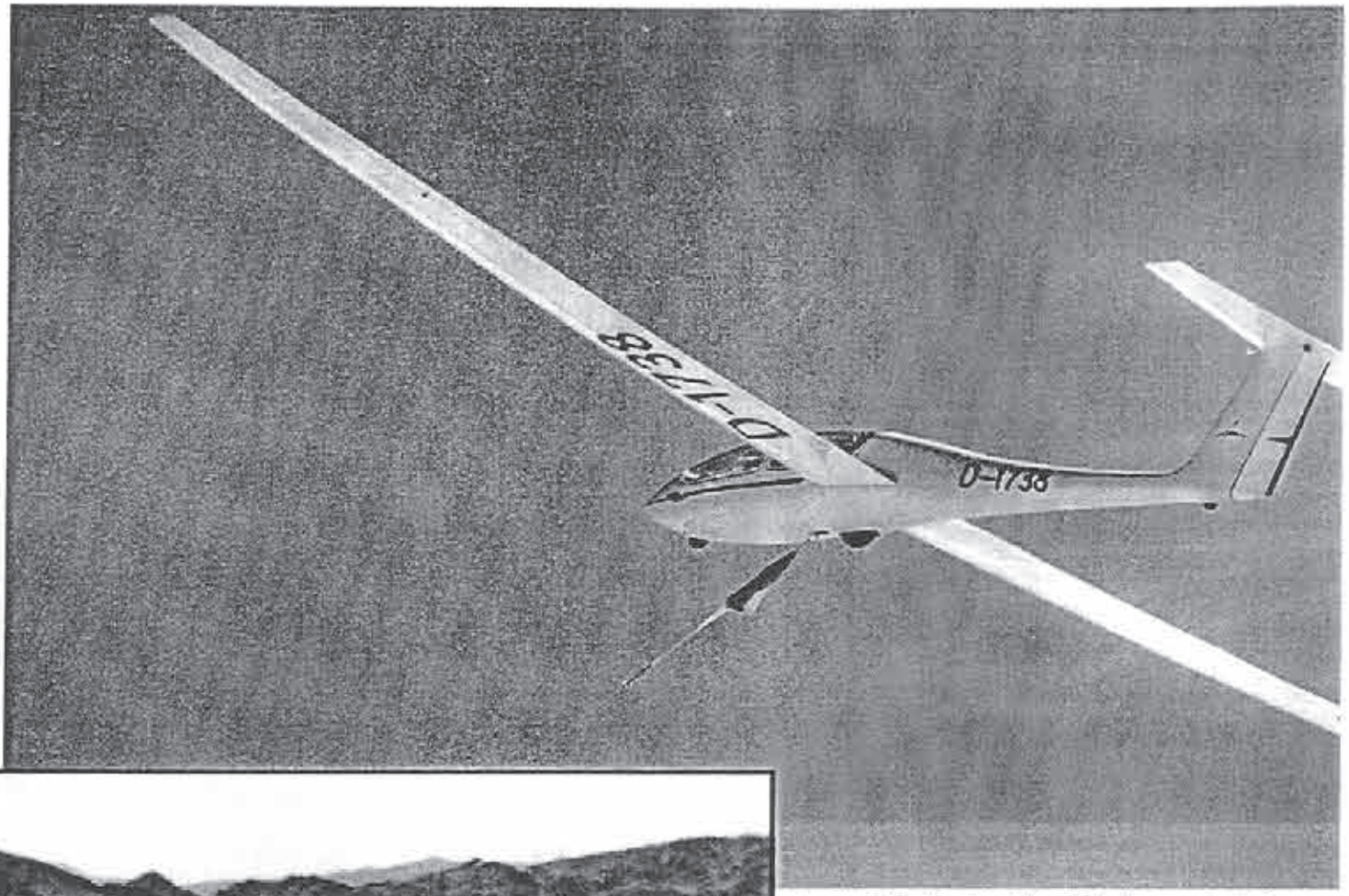
Since this was our first attempt at a scale cross country event, Stan Sadorf made the first "test" of the course using his 1:1 scale Super V at about 1:30 p.m., when the desert thermals finally started to bloom. With myself as the driver, we made it around with little trouble, although my Geo Storm sports car had difficulty negotiating the unusually large ruts that were found on the second and third legs of the course. Time to break out the big birds and use a better car...

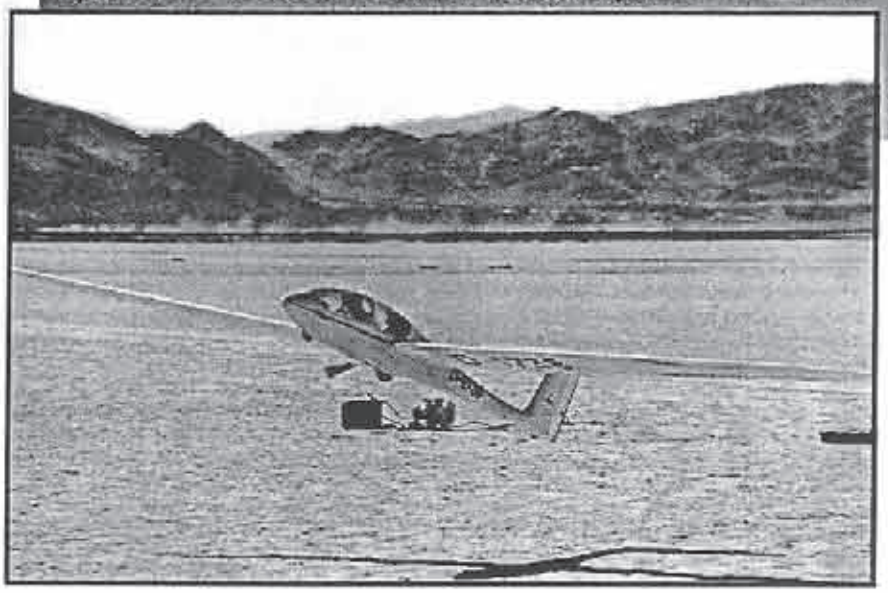
Mark Foster launched his 1/3 scale Grob Twin Acro, but never did find a thermal strong enough to give him enough altitude to start the course. Stan Sadorf launched with his 1/5 scale Salto and made it easily around the course in 4 minutes 20 seconds, with Dave Hall driving his Toyota Pathfinder. Dennis Brandt followed soon after, with his 1/4 scale ASW-24, and zipped around in 6 minutes, 1 second. Later in the day, I finally broke out of a nice thermal with my 1/4 scale DG-600 and completed the course in 5 minutes 21 seconds. Clearly, the gliders were much faster than we could drive around on the dry lake, yet we were making good times around the course.

Gene Serrano, a newcomer to thermalling scale gliders, managed to stay up for 1 hour and 10 minutes with his 1/4 scale ASH-26 and Rick Briggs, flying his 1/4 scale Discus, nearly squeaked out one hour. It was really a challenging day for thermal flying... The thermals broke in the mid afternoon and were slow and wide. A good test of pilot skill.

No one attempted the straight distance category, perhaps due in part to the model rocketry activities occurring on the opposite site of the lake (4 miles away). Scale fodder for anti-aircraft practice didn't sit well with any of the pilots, although we had cleared our activities with their Contest Director should we pass through. British scale modeler Glyn Fontineau and his wife were in southern California at the time of the meet, and enjoyed seeing the open expanse of the Mojave Desert.

With a successful trial event, I think this type of scale cross country activity might be the perfect solution for pilots that are tired of competition, yet still want a challenge. The scale gliders clearly performed at the level of an SB-XC type cross country glider; yet, the conditions were such that skill was required to find the first boomer thermal. For future events, flagmen might be used at the turnposts instead of having to drive the course (resulting in a faster course speed). By placing the launching and landing site at the center of the triangle, and by equipping the turnposts with a flagman and a walkie talkie, we should see much better times in the future. However, we will need some serious volunteerism in the form of flagmen that are willing to sit at the



turnposts in the desert heat. Perhaps each pilot can take a turn. Also, anyone willing to volunteer their Cadillac convertible for cross country work would certainly be appreciated.

The average modeler does not generally think of scale gliders in terms of performance, but instead thinks of their beauty. While there is no doubt they are beautiful in the sky and even on the ground, there is a growing movement to demonstrate that their performance is equal to the thermal and cross country competition gliders. While it would certainly be very difficult to make a vintage Bowlus Baby Albatross perform at the level of a Super V, it is quite possible to make a 1/4 scale fiberglass modern sailplane fly with the best of them. Let's hope that this sort of "challenge" will inspire others to achieve such performance from their scale sailplanes and might encourage others to try scale gliders at their cross country events. ■

## NEWS BRIEFS

### A Reader Writes "Spot Bashing"

"I'm writing to let you know I'll be renewing my subscription to *RCSD* and to pass on an opinion that has bothered me for some time now.

"I've been a modeler since 1966, and attended my first sailplane contest in 1979. I still soar occasionally, but most of my "hobby" time has been consumed by the construction of a full-scale Acro Sport biplane. I expect to get more active again as this project matures but in the meantime your magazine helps me soar. "The LSF Story" was a nice reminder of our roots, thanks for running it.

"I was originally attracted to R/C soaring for its beauty and simplicity - I design fighters for a living, so I already get all the complexity I can stand in my work. Silent, soaring flight is wonderful to watch and participate in. Buzzards and sailplanes alike are a mesmerizing treat and a graceful, sliding, controlled landing is a wonderful end to a perfect flight.

"R/C soaring has changed, some for the better, some not. Today's equipment is far superior in performance to that being used 18 years ago. The airplanes are hotter and the launches are higher. It's interesting that with all the additional capability of these airplanes, the basic soaring task hasn't changed. Pilots still fly for the same time goals, but it's much easier to max now. Because of that, the competitive discriminator has shifted to the landing. I'm bothered that at the '97 Fall Fest, landing in a 12 inch circle was worth 25% of the flight score. I'm bothered by the photo of the "all-out go for broke contest landing" on page 10 of your December '97 edition. I'm bothered by the skegs and teeth that adorn these beautiful aircraft. And I'm bothered that this type of flying has been awarded its own term; "spot bashing".

"It takes a lot of practice to develop the skill required to "land" on a 12 inch circle and some flyers have honed this to a high degree. But other than to win a contest, what's the value of this? Does it make our hobby more attractive to future participants? Does it help keep current flyers involved? If a modeler gets into Quickee 500, it's to race. If a flyer is attracted to our part of the hobby, it's for the beauty of soaring flight and probably not for the opportunity to fly an expensive airplane into the ground.

"Please consider a contest format with longer maxes and fewer rounds. Longer duration (perhaps 15 minutes) shouldn't scare off a flyer armed with a $1000 sailplane. The trade is that longer maxes require fewer rounds to be flown. That's OK, full scale soaring flies only one round a day. If at the end of the contest a short tie breaker round is required, spot landings might then be used. This would be similar to tie breakers in soccer and hockey with shots on goal, but only the top pilots would need to bash their models into the ground for the glory of victory.

"Competitive soaring is no longer driven by soaring, it's driven by landing. I wonder how many fliers have been lost because of this, and I wonder how many future participants will be lost as well. This isn't a new issue, I remember similar arguments in the '80s, but it has gotten worse. Let's please shift the emphasis back to what attracted us in the first place - soaring."

(signed) Bernie Olson AMA 21777
Fort Worth, Texas

### Pibros

"I am writing in regards to Pibros, a delta winged glider, published in the soaring magazine in the U.K. I trust you have seen this magazine and the features on the Net, concerning this little glider made of 1/4" foam material?

"Having played with this little whiz-bang-dart for a couple of weeks, now, I have had a lot of fun with it. I have been launching mine with a 20 foot piece of surgical tubing, with a 20 foot piece of 50 lb. cord, and a metal ring about 1/2" diameter as a tow hook on the end. I attach the other end to a park bench at my local park, and have had as many as 20 flights per hour.

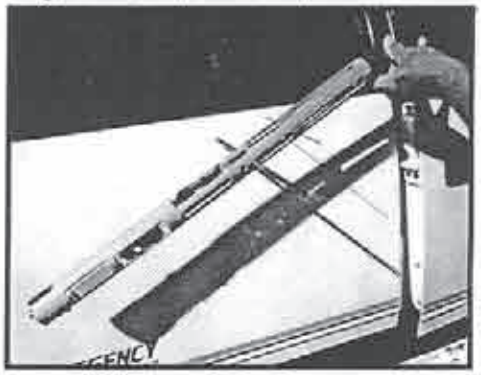
"The biggest problem has been the kids wanting to be too "close". I have to police kids during lunch. I had one of my first endeavors mangled by two kids falling on top of it, while trying to recover it for me. Nothing was broken; the tail was bent over, so I bent it back into position, and flew until darkness set in. This thing is a lot of fun. I would think our U.S. folks without computers would like this information on how to build them. The "foam board" is available from Seattle Art in sheets as big as 4x8 feet! A 40" by 56" sheet is just under $10, and will make one and a half planes. You have to soak off the paper before using the foam, or it will weigh a "ton". 3M type 77 glue works, but DAP contact cement for foam works best. The spray glue is messy to play with, but the contact cement is easy if you use a business card to spread it around. Cut blue foam is something I am going to try next.

"I have a bigger 40" version, using full size servos and battery pack. It too is quite nice to fly. The larger span launches just like the smaller one, but does not get the 150+ foot launch of the smaller 30" version. The bigger one gets about 2 minutes, thirty seconds per flight, in 40 - 50 degree weather. I would imagine it would soar in some wind and warmer weather."

(signed) Chuck Hough
Des Moines, Washington

### Bill Moore's Design

*The following letter and photographs were sent in by Brian Smith, Tullahoma, Tennessee.*



"While flying around Florida, I met Bill Moore of Punta Gorda, with his neat, own design. It's a wooden dowel, machined to hold the radio equipment, with a PVC pipe over it for the fuse. The wing rod holds it all in place. Talk about reduced drag!! It has a Leon Kincaid airfoil, and a 120" span. It's fast, and a neat flyer!"

■

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### New Video

## Aerotow "97" Elmira

...from John Derstine

The long awaited one hour video of the first international and largest scale aerotowing event in the USA is hot off the editing machines.

We have taken the extra time to produce what we feel is a high quality video experience of all the aspects of last June's landmark event. The tape includes aerotowing scenes, aerobatics, up close shots of vintage and modern gliders, interviews, product reviews, inside the National Soaring Museum, airborne video (both full scale and downlink from model), and vintage film from 1930-32 soaring at Harris Hill. Clips include German soaring pioneer, Wolf Hirth soaring in Elmira.

This tape was filmed and mastered on wide format professional video equipment.

Computer special effects emphasize some of the more dramatic shots. Fully synchronized music soundtrack. The cost is $24.95 plus $3.00 shipping in the continental US, NTSC version only. PAL version will be available in the near future; please inquire. The video will start shipping in one week.

Send check or money order (US funds) payable to: John Derstine, RD#3 Box 336, Gillett, PA 16925.

A portion of the proceeds will go to promoting future aerotow events. This is a Ramsdell video production filmed in cooperation with Harris Hill L/D R/C, National Soaring Museum, and The Harris Hill Soaring Corp.

John Derstine
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phone: 717-596-4392
http://www.Geocities.com/CapeCanaveral/Lab/5739

■

## 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.

### Pilatus Porter PC-6 Turbo

...from Sailplanes Unlimited, Ltd.


The Braüer 1/4 all-glass Pilatus PC-6 Turbo Porter (larger and lighter than the one seen at Elmira '97) is the largest and, depending on the motor you choose, the most powerful scale towplane available.

The Pilatus Porter PC-6 will take anything up to a 3W140R2 or 3W140B4. These in-line twins or four cylinder motors are the best choice for this incredible, scale towplane, because they are long, making the motor installation much easier; they run very well, with very little vibration. This Pilatus will accept a variety of single cylinder motors up to a 5.8 Saks. With the 120 or bigger motor up front, this Porter will tow the very largest of sailplanes with ease. With flaps deployed, it will also fly quite slowly and can tow smaller 1/4 sized sailplanes, as well.

This is a very complete "kit"; even the spinner is included! This all-glass beauty comes in two colors, all-white or all-yellow, complete with molded panel lines and rivets. The enormous cowling is cutand ready for installation. The fuselage already has the landing gear assembly attachments in place, reinforcing and alignment wing rods, windows cut out, stab assembly ready to screw on, and rudder post installed and drilled to fit the hinges on the finished rudder. Simply plug the hinges inplace and glue. The shock-absorbing main landing gear (with wheels) is completely finished and ready for installation, as is the tail wheel unit.The glass-reinforced wings have the alignment holes drilled and ready to plug into the fuselage, with the ailerons and flaps already hinged and on the wing. The all-glass ailerons, flaps, stab and rudder are molded with simulated scale corrugation. There is very little building required.

You will need to complete motor, radio and window installation, check and glue all hinges, attach the struts, landing gear and tail wheel assembly, and add a bulkhead or two. Weighing in at around 35 lb., depending on the power plant selected, this very stable and gentle scale model is sure to be a show-stopper, whether in the air or on the ground.

For more information, contact Sailplanes Unlimited, Ltd., (212) 879-1634, or visit web site <http://www.sailplanes.com>. ■

### Axel's Pilots

...from Sailplanes Unlimited, Ltd.

We've just run across a wonderful new source for very beautiful and REALISTIC scale pilots. These Pilots are unique, because not only are they extremely well made, THEY LOOK LIKE REAL PEOPLE. They come with anatomically correct hands, faces, clothing, shoes, seat belts and hat. The product of an excellent artist, the shirts or sweaters and pants are all hand-made, while the faces, eyes, eyebrows and hair are meticulously well painted.

For the past 25 years, Axel has worked as a glass artist. He makes unique art objects in glass and mirror, as well as church windows, and is also a Watercolor Restorer and Illustrator. His occupation is called: glass-Porzelanmalermeister (Glass & Porcelain Master Painter) and Glasdesigner.

Scale model sailplanes have been his passion since 1979, and he especially loves the vintage era. He carved the plugs for the PriBek 1/3 ASK13 and Ka6E, and has recently completed the plug for a 7 meter Ventus 2c.

Axel is very creative and, for a long time, he flew a 1/3 Ka6E with a 1/3 self-portrait as the pilot. His latest project is a .5 scale sailplane instrument set.

In 1984, Axel carved the first pilot for himself. Everyone who saw it wanted to buy one, but because of the difficulty and the amount of work involved, none were for sale. Lucky for the rest of us, in 1995 he began to create pilots for sale. The development took 2 years.

These pilots have only been available for sale since April 1997, but have not yet been introduced in Hobby Trade Shows in Europe.

Available in several sizes, Axel's full body pilots come in two styles: Old-timer (in Wasserkuppen Outfit ca. 1925-1935) and Modern in contemporary everyday dress (with very classy loafers, no less).

Pilots include seatbelt, parachute belt & sailplane hat (Extras include sunglasses, a headset with microphone and even a camera!):



| | |
|---|---|
| **1/2.5:** | $275 |
| glasses: | $ 6 |
| watch: | $ 6 |
| headset: | $ 22 |
| **1/3:** | $265 |
| glasses: | $ 6 |
| watch: | $ 6 |
| headset: | $ 21 |

**1/3.5:** Prices are not yet available.

| | |
|---|---|
| **1/4:** | $195 |
| glasses: | $ 6 |
| watch: | $ 6 |
| headset: | $ 19 |

Bust Pilot prices include baseball cap & seatbelt (If Axel can make them with parachute belt as we requested, it will be extra.):

| | |
|---|---|
| **1/2.5:** | $195 |
| parachute belt: | $ 36 |
| glasses: | $ 6 |
| watch: | $ 6 |
| headset: | $ 22 |
| **1/3:** | $185 |
| parachute belt: | $ 34 |
| glasses: | $ 6 |
| watch: | $ 6 |
| headset: | $ 21 |

Sailplanes Unlimited, Ltd., 63 East 82nd St., New York, NY 10028; (212) 879-1634, or web site <http://www.sailplanes.com>. ■

## SCHEDULE OF SPECIAL EVENTS

Fayetteville '96, Lehman photo.

**Feb. 20-22**
(raindate Feb. 27-March 1)
Pensacola '97 Scale/Airtow — Pensacola, FL
Asher Carmichael, (334) 626-9141
ACarmic985@aol.com

**March 28**
Torrey Pines Scale Soaring Classic — Poway & La Jolla, CA
Ron Scharck, (619) 454-4900, scharck@aol.com
Gary Fogel, (310) 838-6068, gfogel@ucla.edu

**April 18-19**
ISSA April Fun Fly '98 — Apple Valley, CA
Stan Sadorf, Soareyes@aol.com
David Hall, DLHall@compuserve.com

**April 25**
HL Series Event — Lafayette, IN
Ryan Woebkenberg, woebkenb@expert.cc.purdue.edu

**May 1-3**
Fayetteville Airtow Fly-In — Fayetteville, NC
Wayne Parrish, (919) 362-7150

**May 1-3 or May 16-18**
Coupe du Quebec Slope Race — Leclercville, Qc, Canada
Jacques Blain, (514) 652-6167

**May 16-17**
Los Banos Slope Scale Soar-In — Los Banos, CA
Lynsel Miller, (408) 275-6403

**May 16-17**
CSS Memorial Contest — Cincinnati, OH
Ed Franz, (606) 586-0177, ejfranz@fuse.net

**May 15-17**
Lass Midwest Slope Challenge — Lucas, KS
Paul Wright, (402) 796-2175
paulw@isco.com

**May 23-24**
442-444 — Tullahoma, TN
Herb Rindfleisch, (931) 455-1836

**May 30-31**
CSS Spring Intergalactic — Cincinnati, OH
HL Series Event
Paul Siegel, (513) 561-6872, psiegel@fuse.net

Los Banos, Lehman photo.

Pensacola, Lehman photo.

**May 30-31**
Sailplane Weekend — Addison Oaks Park, MI
Ray Hayes, (810) 781-7018, skybench@teleweb.net

**June 5-7**
SBSS Golden State XCountry Race — California Valley, CA
Mike Gervais, (408) 683-4140

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

**June 13-14**
Land of Lincoln E-Fly — Springfield, IL
Tim McDonough, (217) 523-8625, tpm@inw.net
http://www.inw.net/~tpm

**June 26-28**
MSSC '98 — Louisville, KY
Ed Wilson, (502) 239-3150
ewilson1@bellsouth.net

**July 11-19**
Canadian Soaring Nationals — St. Jean, Qc, Canada
Jacques Blain, (514) 652-6167

**July 19**
HL Series Event — Dayton, Ohio
David Rice, David_Rice@reyrey.com

**July 25 - August 1**
LSF/AMA NATS — Muncie, IN
Cal Posthuma, CALPLSF@aol.com
Aldin Shipp, alden@bcl.net

**August 14-16**
GNATS Scale Fun Fly — Niagara Peninsula, Canada
Gerry Knight, (905) 934-7451
Don Smith, (905) 934-3815
mistral@niagara.com, linden@niagara.com

**August 26**
HL Series Event — Columbus, OH
Paul Wiese, pwiese@avcomsmt.com

**September 12-13**
Sailaire One Design Contest — Cincinnati, OH
Ed Franz, (606) 586-0177, ejfranz@fuse.net

**September 19-20**
442-444 — Tullahoma, TN
Herb Rindfleisch, (931) 455-1836

**October 3-4**
CSS Fall Intergalactic — Cincinnati, OH
HL Series Event
Paul Siegel, (513) 561-6872, psiegel@fuse.net

**October 17-18**
Pumpkin Fly — Cincinnati, OH
Ed Franz, (606) 586-0177, ejfranz@fuse.net

**November 7**
Turkey Fly (Winch & HL) — Cincinnati, OH
Ed Franz, (606) 586-0177, ejfranz@fuse.net

**Outside U.S.A.**
**Aug. 1998**
F3J World Championships, organized by BARCS

Elmira '96, Lehman photo.

**THE GREATER NIAGARA AREA THERMAL SOARERS (GNATS)**
Will Host their
**THIRD ANNUAL**
**SCALE FUN FLY for SAILPLANES & MOTORGLIDERS**
**August 14 - 16, 1998**
Approx. 30 Miles West of Buffalo/Ft. Erie
Niagara Peninsula, Canada

Emphasis will be on Aerotowing. Bring your Three Meter and larger sailplanes, fitted w/ ailerons and tow release. Enjoy the thrill of being towed by experienced tug pilots. Scale Motorgliders will be welcome at this event as will non-scale large sailplanes fitted with tow releases. This is an international event. Proof of MAAC or AMA membership is required, along with gold sticker radios for 1998. Warm-up day is Friday, August 14. Meals and accommodation are available nearby.

For additional information contact:
**Gerry Knight, (905) 934-7451**
**Don Smith, (905) 934-3815**
**E-mail: Mistral@niagara.com**
**Linden@niagara.com**

**Sailplane Homebuilders Association (SHA)**
A Division of the Soaring Society of America

The purpose of the Sailplane Homebuilders Association is to stimulate interest in full-size sailplane design and construction by homebuilders. To establish classes, standards, categories, where applicable. To desiminate information relating to construction techniques, materials, theory and related topics. To give recognition for noteworthy designs and accomplishments.

**SHA** publishes the monthly ***Sailplane Builder*** newsletter. Membership cost: $15 U.S. Student (3rd Class Mail), $21 U.S. Regular Membership (3rd Class Mail), $30 U.S. Regular Membership (1st Class Mail), $29 for All Other Countries (Surface Mail).

**Sailplane Homebuilders Association**
Dan Armstrong, Sec./Treas.
21100 Angel Street
Tehachapi, CA 93561 U.S.A.

## Classified Advertising Policy

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

### For Sale - Business

**PC-Soar Version 3.5 Sailplane Performance Evaluation Program** Optional Sailplane Library now expanded to 54 models including: Alcyone, Anthem, Genesis, Mako, Probe, Thermal Eagle, and Synergy-91. Free Library Upgrades. PC-Soar Upgrade to Ver. 3.5 $10, PC-Soar New Purchase $40. New Libraries of Sailplanes and Airfoil Polars $30. Please include $3 P&H for all purchases & upgrades. Also available: Laser cut airfoil templates. LJM Associates, 1300 Bay Ridge Rd., Appleton, WI 54915; ph: (920 ) 731-4848 after 5:30 pm weekdays or on weekends; <http://www.athenet.net/~atkron95/pcsoar.htm>.

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

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

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

**SOARING SIMULATOR** - for PC's. Ka-8, I.S-1f, SB-10, ASW-27. Realistic aircraft and weather model. Lift from thermals and slopes. Winch launch or aerotow. Target, target-return, and triangle courses. Dynamic scenery. MUCH MORE! Free Demo Available. geewiz@wwnet.com. (248) 932-0825.

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

**IMPROVE YOUR LANDING SCORES** with unbreakable injection molded polyethylene landing SKIDS, SKEGS and TEETH. Free catalog w/other unique soaring accessories. Tim McCann, P.O. Box 2091, Harrison, AR 72602, (870) 365-0023, <tmccann@alltel.net>, <http://www.alltel.net/tmccann>.

**RUBBER DUCK ANTENNA CONVERSIONS.** The Original Tuff Duck Tx conversion kit is available, again, for $32.50 + $2.50 S&H. Call Tom Overton, (707) 998-3348.

### For Sale - Personal

Rare West German sailplane kit, scale "Bjorn" by Wik Modelle, circa 1965, balsa, T-tail, 218 cm span, German (and, English) instructions, full size plans, all numbered parts, collectable... $100.00. Rick Powers, (650) 493-5502, California.

California Condor, 114" span, beautiful composite wings (RG-15) by Ron Vann, white fuse, wings w/fluorescent red tips & black bottoms, solid airplane flown roughly a dozen times, never crashed, includes JR341 servos in wings (metal gears for flaps) - $550.00 + shipping. Chuck Robinett, (973) 584-3117, New Jersey.

Robbe NIB kits + UPS: Kormoran... $95.00; Argus... $95.00; Arcus Pro... $135.00; Saphir Slope... $150.00; Saphir Thermal... $150.00; Charly (Sky Diver)... $125.00; Aeronaut Aerofly... $75.00; Greco Duration Modi... $300.00; Tekoa Shadow 118" ... $350.00; Multiplex Arriba... $375.00; Multiplex Cortina... $350.00. Craig Christensen, (612) 435-7406, after 4:30 pm, Minnesota.

2m Banshee, incl. 6 servos, painted (blue) wood carry case (very strong), blue & yellow... $275.00; 100" Dodgson Saber, incl. 5 servos, painted (red) wood carry case, white... $250.00; Airtronics Legend, incl. 6 servos, painted (red) wood carry case, white/red... $300.00; Airtronics 600 trans, receiver, battery pack, no servos (they're in Saber)... $200.00. Prices do not incl. shipping. E-mail direct for more info. Cases hand made from mdf particle board; painted w/auto acrylic paint, hinged w/clasps & leather handles. Wings & fuse are cradled inside w/cutouts. Planes in good shape. Bill Heishman, (972) 642-3355, <billh@computek.net>, Texas.

1/4 Roebers Pilatus B4, 3.75 meter span (147"), wing profile Ritz 3, NIB... $495.00; 1/4 Roedel Super Cub (towplane), 2.687 meter span, wing profile Clark Y mod. (suitable motors are 160 T, 300 T, OS BGX-1, Brison 3.2 or similar), NIB... $385.00; 1/4 Rosenthal Ralley Morane (towplane), 2.78 meter span (109"), NIB... $295.00; 1/5 Wik Twin Astir, all glass, NIB... $595.00. Contact Robin Lehman, 63 E. 82nd St., New York, NY 10028; (212) 879-1634.

**Closet Scale Stuff**
**At Sailplanes Unlimited. Ltd.**

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

1/3 Müller Discus - 5 meter span (196"), wing profile HQ 2/12, ca. 20 lbs.

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

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

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

1/4 Roebers Pilatus B-4 - 3.75 meter span (147"), wing profile Ritz 3, approx. 8 lbs.

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

1/3 ASK 13 - 5.33 meter span (209"), wing profile E 68-67-66, ca. 32 lbs. Completely built & ready to fly with all servos installed, brand new, unflown.

1/3.5 Roke DG 202 - 4.86 m span (168"). Completely built including all servos.

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

# SLOPE RACE!

## May 15-17, 1998

### Wilson Reservoir
### Russell County, KS

Contact: Paul Wright
(402) 796-2175
paulw@isco.com

*Sponsored by:*

L.A.S.S
Lincoln Area Soaring Society

## MARKET PLACE LISTINGS

**OBECHI & WHITE FOAM WINGS**
**BULLET CATAPULT LAUNCH SLOPE GLIDER**
Finney's Hobbies
3455 Peachtree Industrial Blvd. Suite 980
Duluth, GA 30096
(770) 495-8512 • fax (770) 495-8513
finneys@mindspring.com
http://www.mindspring/~finneys

**VACUUM FORMED PRODUCTS, CANOPIES**
Viking Models, U.S.A.
2 Broadmoor Way
Wylie, TX 75098
(972) 442-3910 • fax (972) 442-5258
RCSDigest@aol.com

## ELMIRA AEROTOW "98" AT HARRIS HILL

COME FLY WITH US AND SOAR TO NEW HEIGHTS!

**June 12-13-14 1998**
**HELD IN ELMIRA, NY**
**SOARING CAPITAL OF THE U.S.**
**HOSTED BY: HARRIS HILL L/D R/C**
co-sponsored by:
**The National Soaring Museum**
**The Harris Hill Soaring Corp.**

Our event this year will again be at Harris Hill. There are some new developments to report. This year we will be given exclusive use of the Harris Hill Soaring Corporation's airfield on Thursday and Friday the 11-12. Thursday will be open flying (aerotow or slope) for early arrivals. Friday will be the start of the official event with radio impound. The field will be shared with full scale sailplanes, including ASK-21's, and Schweizer Trainers on Saturday and Sunday 13-14. Rides will be available during these days. Factory demos are scheduled for Saturday afternoon. National and international vendors will be showing their wares. The emphasis will be on fun and aerotowing, as well as some fantastic slope soaring, if conditions dictate. Tow planes and experienced pilots will be there to tow you to altitude. Bring your 3 meter (118") or larger aileron sailplane with nose release and join the growing aerotow movement. Scale gliders are recommended, but not required. We will have a few scale sailplanes available on site for those who can't bring their own. This year we are going to have pilots choice awards and a special award for the best Schweizer scale sailplane. Other prizes to be announced. On Friday evening there will be a picnic at the Harris Hill Youth Camp adjacent to the flying field. We will have an evening banquet Saturday night at the National Soaring Museum. Guest speakers to be announced.

More exciting plans are in the works, so keep an eye out for further developments as they become available. Current AMA membership is required. There will be a $25.00 pilot registration fee. For details & info. (including shipping your sailplane to Elmira), contact:

John Derstine
717-596-2392
johnders@postoffice.ptd.net
http://www.Geocities.com/CapeCanaveral/Lab/5739

# 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, <ron.swinehart@svl.lmco.com>.

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

Alabama - Southern Alabama & NW Florida Aerotow, Asher Carmichael, (334) 626-9141, or Rusty Rood, (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; (520) 825-2729. SAGE welcomes all level of flyers!

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

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

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

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 (Pres.), (301) 898-3297, e-mail BadIdeas@aol.com; Bill Miller (Sec./Tres.), (609) 989-7991, e-mail JerseyBill@aol.com; Michael Lachowski (Editor), 448 County Rt 579, Milford, NJ 08848, e-mail mikel@airage.com, <http://www.eclipse.net/~mikel/esl/officers.htm>.

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

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

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

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

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; (847) 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 Hartland 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), RR#3 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) 744-2093.

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 Highsplint 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 E1, 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) 658-1996.

New Jersey - Vintage Sailplane R/C Association, Richard G. Tanis (President/Founder), 391 Central Ave., Hawthorne, NJ 07506; (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 2076482@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 perryl@sstaff.sunverie.edu; Jim Roller (Competition Coordinator), (716) 937-6427.

New York - Long Island Silent Flyers, Stillwell Nature Preserve, Syosset, NY, Ze'ev Alabaster (President), (718) 224-0585, or Peter DeStefano (VP), (516) 586-1731.

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

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

Northwest Soaring Society (Oregon, Washington, Idaho, Montana, Alaska, British Columbia, Alberta), Sandie Pugh (Editor - NWSS Eagle), 1119 SW 333rd St., Federal Way, WA 98023, e-mail: parrot2luv@aol.com, (253) 874-2429 (H), (206) 655-1167 (W).

Ohio - Cincinnati Soaring Society, Ed Franz, 7362 Ironwood Way, Burlington, KY 41005; (606) 586-0177, <ejfranz@fuse.net>.

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 tomnagel@freenet.columbus.oh.us.

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

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

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

Oregon - Salem Soaring Society, Al Szymanski, CD, (503) 585-0461, http://home.att.net/~aszy/sss/> for club's home page.

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

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West Virginia - Chip Vignolini, 1305 Perry Ave., Morgantown, WV 26505; (304) 598-9506, <ydne30a@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; (920) 731-4848, <74724.65@compuserve.com>.

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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.

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England (southwest) - Sean Walbank, Woolcombe Hays, 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, yanr@asiaonline.net.

Japan - Dr. Paul "Sky Pilot" Clark, 2 - 35 Suikoen Cho, Hirakata Shi 573, Osaka Fu, Japan; IAC+(81) 720-41-2934, <pclark@osk3.3web.ne.jp> http://www3.osk.3web.ne.jp/~pclark/skypilot/

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

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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.

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## 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.ocpapsych.com/yellow.htm, or contact Manny Tau at taucom@kaiwan.com.

Internet soaring mailing listserve linking hundreds of soaring pilots worldwide. Send msg. containing the word "subscribe" to 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. Post msgs. to soaring@airage.com. For more info., contact Michael Lachowski at mikel@airage.com.

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