R/C Soaring Digest

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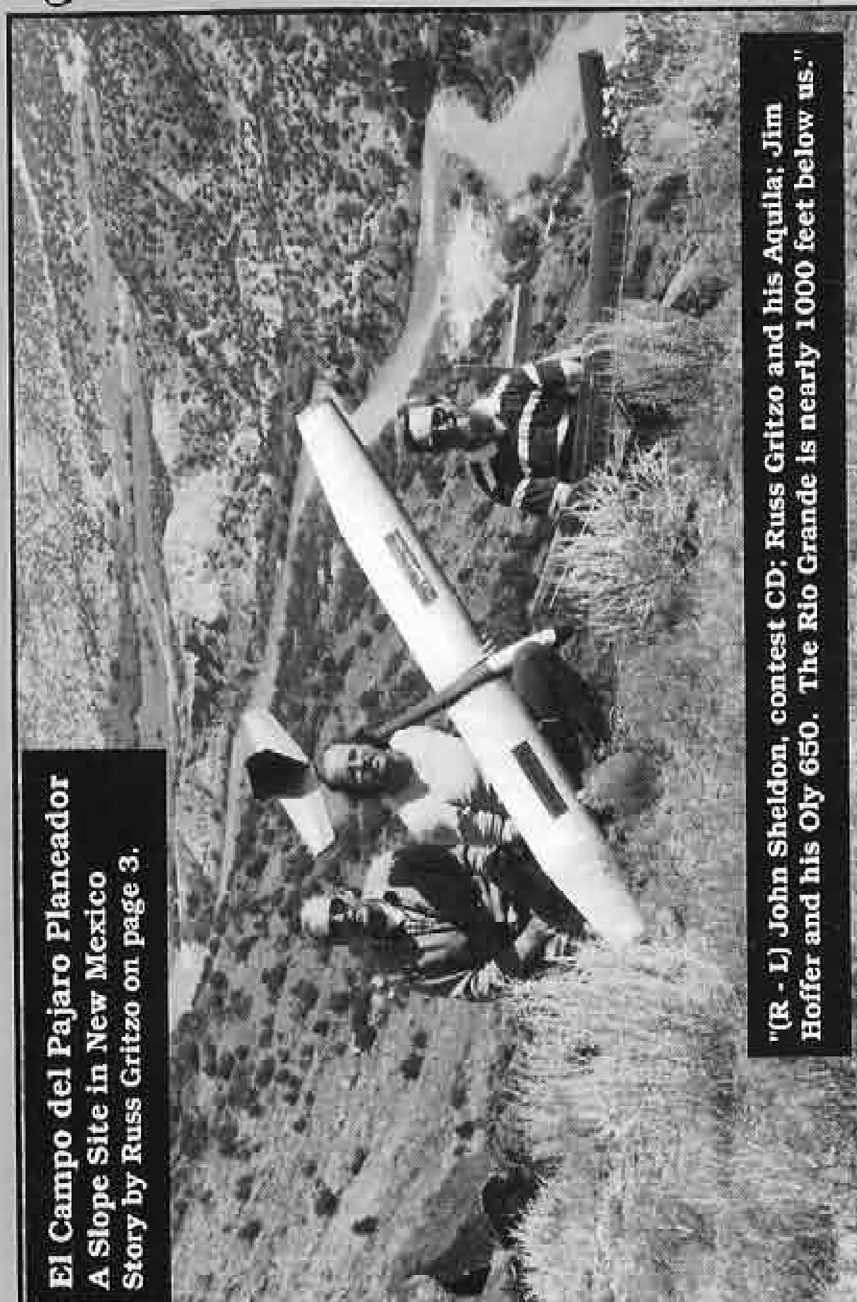
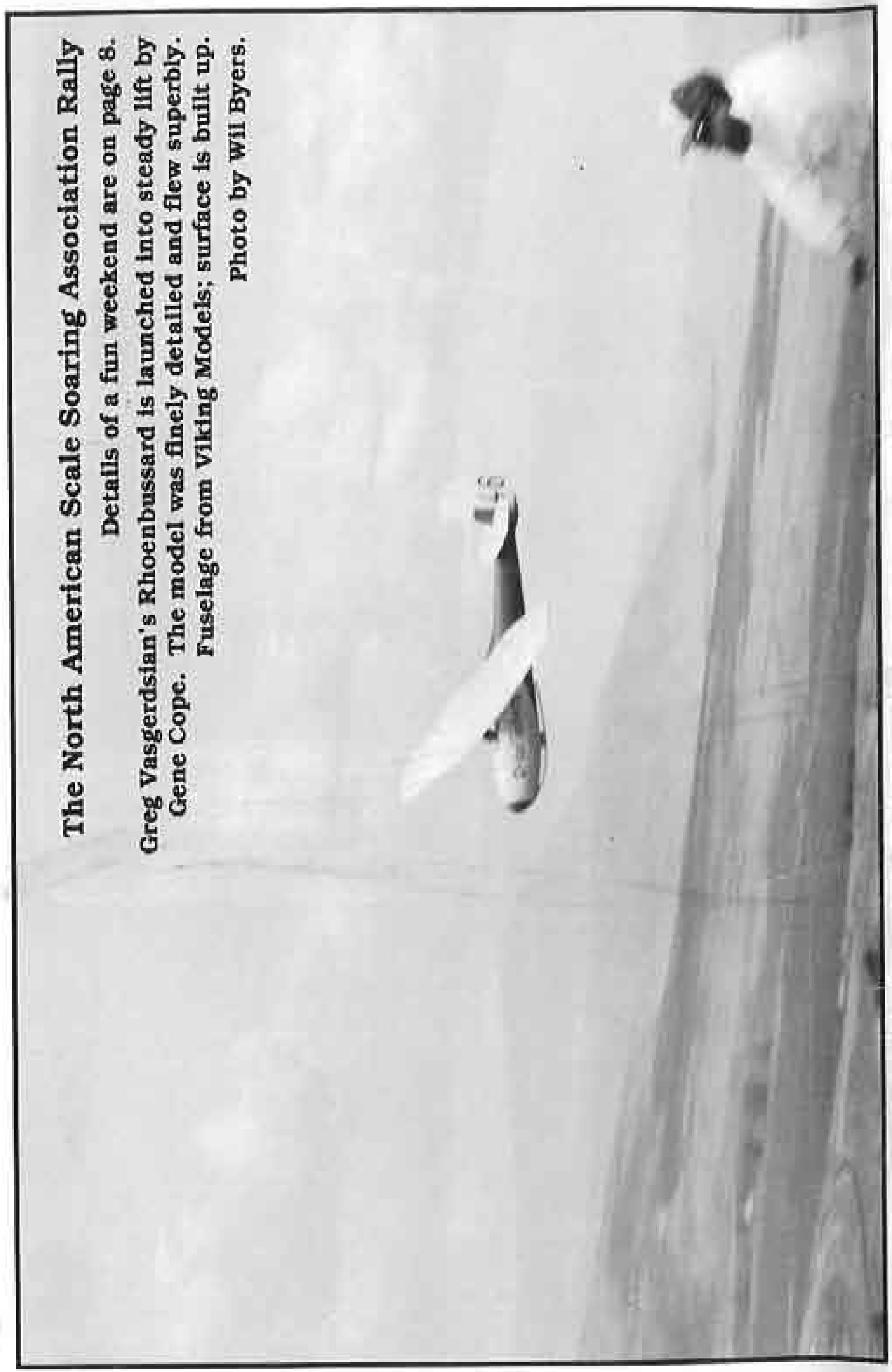


El Campo del Pajaro Planeador
A Slope Site in New Mexico
Story by Russ Gritzo on page 3.

"(R - L) John Sheldon, contest CD; Russ Gritzo and his Aquila; Jim Hoffer and his Oly 650. The Rio Grande is nearly 1000 feet below us."



The North American Scale Soaring Association Rally

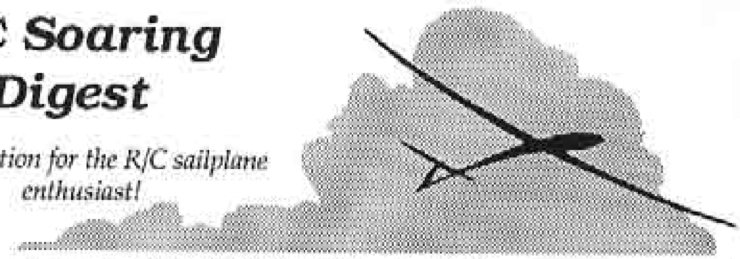
Details of a fun weekend are on page 8.

Greg Vasgerdsian's Rhoenbussard is launched into steady lift by Gene Cope. The model was finely detailed and flew superbly. Fuselage from Viking Models; surface is built up.

Photo by Wil Byers.

R/C Soaring Digest

A publication for the R/C sailplane enthusiast!



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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; (602) 474-5015.

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Martin Simons, Ed Slegers

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The Soaring Site

Sectionalization

We have received 6 positive comments about the new format. One is from Gene Gravelle in Rogers, Arkansas. He summed up our feelings and those of the others so well that we wanted to share his letter.

"Dear Judy and Jerry: Although I am a new subscriber, I already think your digest is great. The new format is also very good. The digest is not the average newsstand magazine, so the ads do not have to be mingled with the articles to attract attention. I read every ad in your book for information. The new format makes reading both articles and ads easier. Keep up the good work." Thanks, Gene!

Aerospace Composite Products

George and Barbara Sparr, Aerospace Composite Products, have recently moved from Irvine, California to San Leandro, California. Their new address is 14210 Doolittle Dr., San Leandro, California 94577; (510) 352-2022, FAX (510) 352-2021.

CIAM 93 Soaring Report

Terry Edmonds, Sub-Committee Member for the CIAM has sent in a soaring report. If any of you readers want a full copy of the report, please send us a SASE; portions are printed below.

"The biggest news from the soaring discipline of the plenary meeting is a change in chairman of the Soaring Sub-Committee. Well respected Rolf Girsberger announced just prior to the meeting he would be stepping down as chairman and it would be necessary for the sub-committee to recommend a new chairman. Thomas Bartovsky from the Czech Republic was elected the new chairman."

"The 1993 FAI Sporting Code has been printed and is available from AMA. It is up to date on all of the past rule changes, however there was action taken on a few clarification proposals at this meeting that do have immediate effect."

The proposals include: F3B working time definition clarification, stop watch clarification, F3J clarifications, and F3I (aero-tow) changes.

About the Photo

SWIFT (Soaring With Intent of Finding Thermals) is a club in Omaha, Nebraska. The photo was sent in by Larry Puls, CD, and was taken at one of their recently held soaring contests. Larry says, "The weather god smiled on us that day as it was sunny and warm with NO rain!! There were 25 entries for the contest. It was a fun filled day."

A Letter From Across the Pond

Dear Judy & Jerry,

"Another year, another subscription! Just where do all the years go? Last year I was making excuses for not writing a long and interesting letter. This time round I'm trying to think of a similar excuse.

"We've been quite busy making models since last I wrote, but few have made it into the air, so far. The carbon winged heavyweight has flown a few times and handles very well. It is not as fast as the computer predicted, which is pleasing and, with both flaps and ailerons down an eighth of an inch or so, it floats quite well. The key to this model has been the acquisition of a Graupner JR MC20 transmitter. This was bought from Brian Scott of Gliders who gave me an extraordinary amount of his time showing me how to programme the set. He even allowed me to play with his Ellipse - when it was safely bolted to its stand. The result was that within 24 hours virtually all my 'fleet' were programmed and in the memory.

"A group project in which I have been involved has meant the production of four sets of foam/wood-spar/glass covered wings. The fuselage for these models is (along the lines of) the Airtronics Sagitta, but is lengthened and suitably strengthened. My job has been the foam cutting and vacuum bagging. It took several months to locate the necessary materials for the job. We needed mylar sheet as a carrier and even du Pont couldn't help us locate the correct grade. Eventually, we found a supply from a manufacturer of hang-gliders who was very happy to cut us a length from one of his rolls. Anyway, they, the wings, are well on the way, now. Two sets are complete and the other two are nearly ready for the bag. All four of us are very excited about this project. We can't wait to see the first take to the air.

Did I write about the little 60 inch flying wing I built last year? It uses a 9% thick, 1.5% camber, EH airfoil, and has a blue foam, epoxy-glass, obechi pressed wing, an epoxy-glass pod, and not a lot else. It is the first model that I put into the car when going to the slope, the first that gets flown and, often the last. It's not that it is better than all the other models, but that it is so pleasant to fly. It's not totally foolproof and will 'fall out' if you treat it roughly in very light air or, surprisingly enough, very, very strong conditions. Overall it is great fun and a big one is planned for the future.

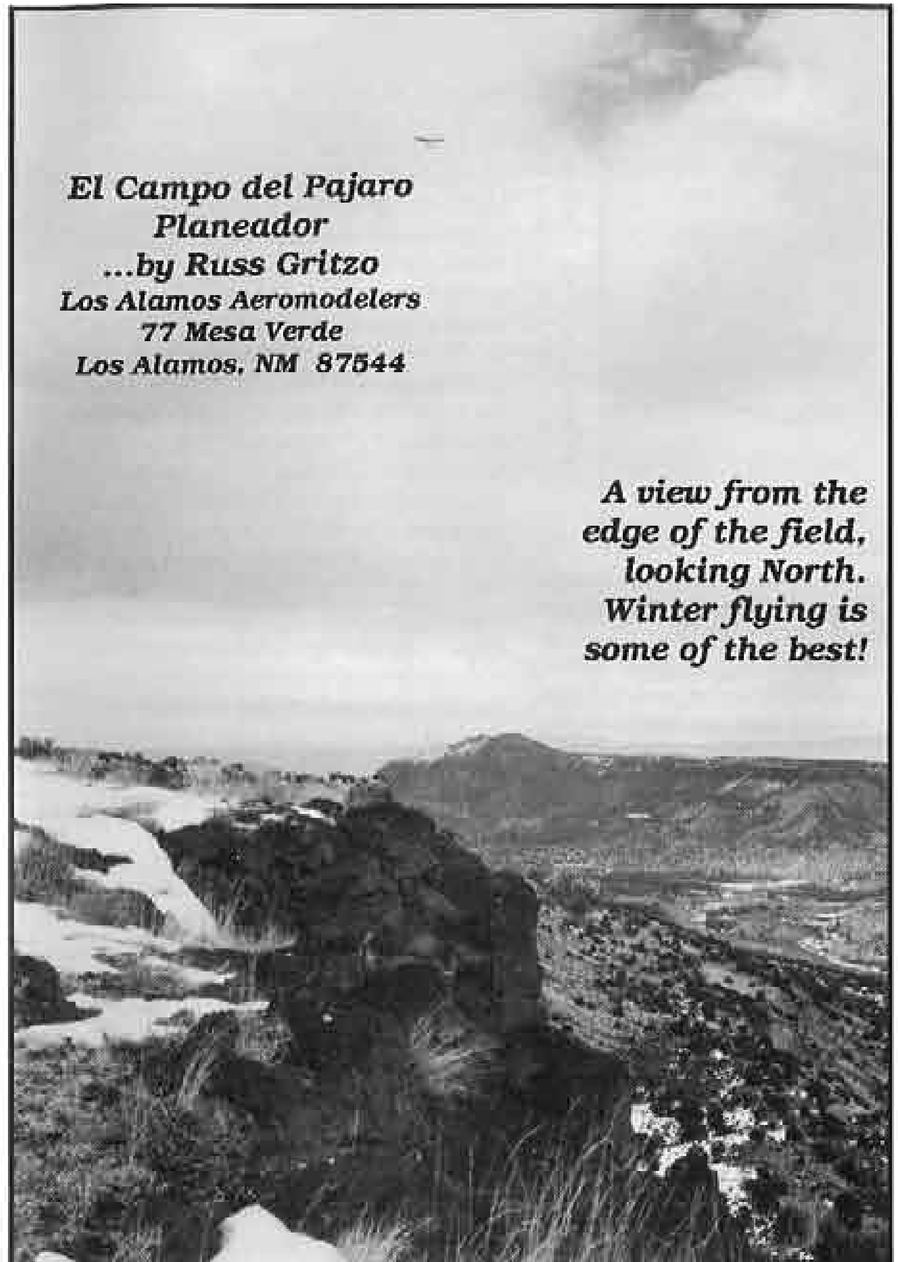
Well, the north wind is blowing hard onto our little slope here and friend Baz will be coming round very soon. So, I must get out the models, food and drink, pack the car, and stop wittering on!

Keep up the good work.

Yours, (signed) Bryan Nicholson
Kent, England

(Well, Bryan, it certainly sounds like you folks are having fun! Thanks for the good words and keep us posted on your project.)

Happy Flying!
Jerry & Judy



El Campo del Pajaro Planeador

...by Russ Gritzo
Los Alamos Aeromodelers
77 Mesa Verde
Los Alamos, NM 87544

A view from the edge of the field, looking North. Winter flying is some of the best!

It was one of those little ironies of life. Wayne Taylor and I had looked over just about every square foot of Los Alamos and the surrounding area for a possible soaring site, with little luck. We both thought that some location along the canyon would be great flying, but the only open area we knew of had recently given way to houses. One lunch time we were walking along the rim of the canyon, thinking about how great the flying would be and watching the birds play in the air currents, when we stepped out into an opening in the trees. We both stood there for a few minutes sizing up the area. Although it was small, had a

Jim Hoffer launches his Windfree. Note the raven off the left wing tip.

few trees, and was half-covered in sagebrush, it was substantially open and ideally located, right on the rim of the canyon! Had we finally found our soaring site? As we drove away Wayne and I had a good chuckle over our recent discovery. As a kid I had spent countless hours in these woods and yet never remembered seeing that site. In the past few years we had both flown from the soccer fields only a few hundred yards away, and yet never realized the site was there!

So begins the story of El Campo del Pajaro Planeador, which is Spanish for 'the playing field of the soaring bird'. The field was named in honor of the local inhabitants, as ravens, hawks, and even the occasional eagle soar regularly in the canyon area. This little field with the big name now plays host to RC sailplanes most every weekend. Although you can still walk right past the field and never know it, El Campo has become the focus of a great deal of attention lately.

Situated in Los Alamos County, in north-central New Mexico, our soaring site sits on the rim of a 1,000 foot deep basalt rock canyon overlooking the Rio Grande river. To the east of us is Santa Fe, backed up by the Sangre de Cristo mountains towering to over 12,000 feet. To the west, Los Alamos and the Jemez mountains, and to the south, Bandelier National Monument. At an elevation of 6,500 feet, the air is clear and clean. The land is owned by Los Alamos County, and the field is maintained by our local club, the Los Alamos Aeromodelers.

At present we have about 1.5 acres cleared, with plans to clear another 1.5 acres. Three sides of the field are bordered by pinon and juniper trees, and the fourth is the canyon rim. To make the field flyable we only had to remove a few trees, but have had to clear off a significant amount of sagebrush. Since all the work was done by hand, a few small tree stumps still remain. The grass is sparse, and parts of the field are covered in small river gravel. At present the field is a bit rough on planes as they land, but we are planning several improvements. We hope, with the help of the county and the club, to eventually seed the entire field in natural wild grasses, and to remove all traces of gravel and any remaining stumps or rough spots. Although seeding the field is several years away, volunteers continue to improve the conditions each year.

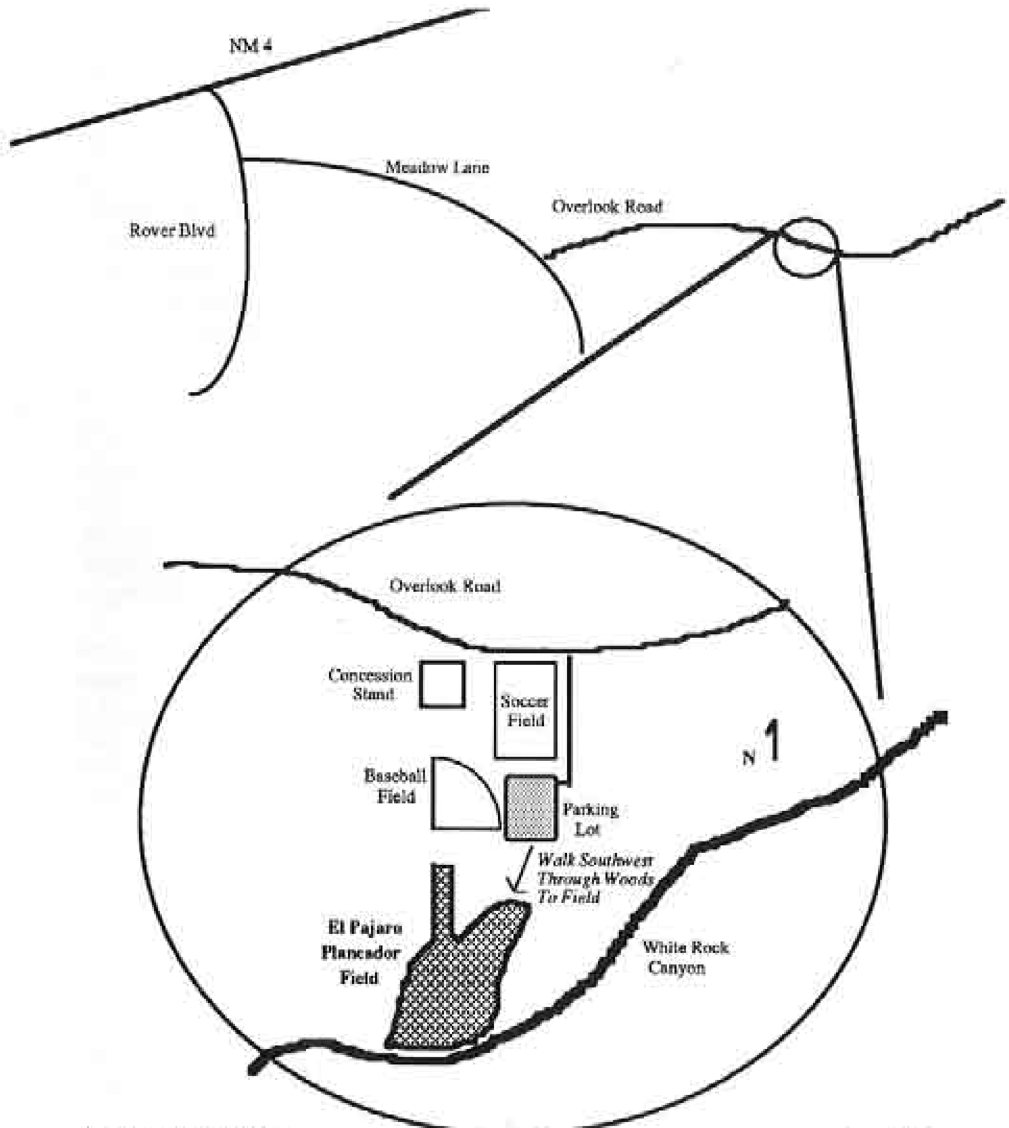
In contrast, the soaring conditions at the field need no improvement! The cliffs of black basalt rock are spectacular thermal generators. Since we fly off of the west rim of the canyon, the cliffs below the site start warming with the first rays of the rising sun. Large outcroppings of basalt below the rim are

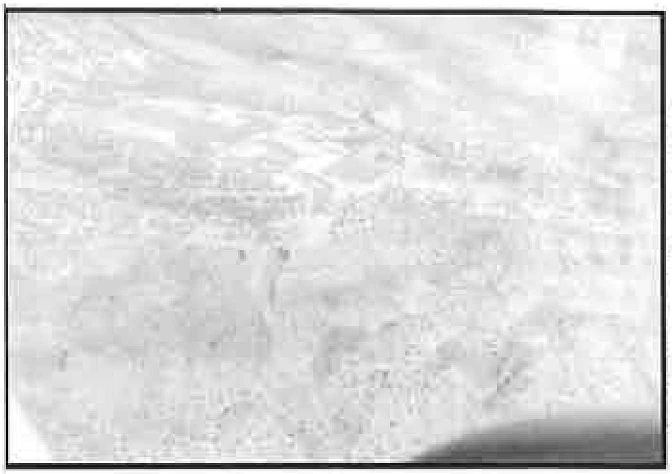
Jim Hoffer circles his Oly 650 just beyond the rim.

Directions

From Santa Fe:
Take US 285 North out of Santa Fe, approximately 16 miles,
At Pojoaque take NM 502 West towards Los Alamos,
After ~12 miles, Take NM 4 to White Rock (4 miles).

In White Rock, follow the signs to Overlook Park:
Turn off of NM 4 onto Rover Blvd,
After one block turn left onto Meadow Lane,
After 10 blocks, turn left onto Overlook Road,
In Overlook Park, take the first right after the concession stand,
See the map detail for directions to the flying field.





Aerial view of the Overlook Park area. El Pajaro Planeador is in the center of the photograph, along the canyon rim.

alternately warming and cooling throughout most of the day as the sun moves across the sky. We are convinced that the canyon is able to generate some lift by just being there. We think we even see lift on cloudy days, when the dense air that settled in the bottom of the canyon during the night starts warming up and expanding during the day. Slope flying can be quite exciting at the field, since the uppermost several hundred feet of the rim is sheer basalt rock. The field sits on a small promontory, and so generates usable slope lift over nearly 180 degrees of wind direction. Some of the most challenging days occur when we have a combination of slope lift punctuated with strong thermals.

Most of our flying is done close to the rim, as that is where the majority of the lift is. There are some days, however, when the only lift to be found is far out into the canyon. It takes a great deal of courage to range out deep into the nearly mile-wide canyon in search of lift.

Pajaro Planeador demonstrates pronounced mood swings, and can generate flying conditions varying from lazy Sunday afternoon circling to white-knuckle adrenaline sessions. In one day I had three flights over a period of three hours, and each flight was distinctly different from the others. The first flight was in turbulent conditions, with a strong wind shifting quickly. The conditions were so rough that after 20 minutes or so I was exhausted from struggling to keep my plane in some semblance of controlled flight. The next flight, only a half hour later, was in almost ideal slope conditions, with smooth lift as far up or down the rim as I cared to roam. Near noon, the field changed its mind once again as booming thermals started kicking up out in the canyon. It wasn't long before my sailplane and the ravens were little dots in the sky! With such a variety of flying conditions it is hard to predict what kind of day you are going to have until you are in the middle of having it!

With such a good source of lift, most of our flights are long ones. A flight of 15 to 20 minutes is normal, with the flights of an hour or more common. The longest flight recorded at the field so far is two hours, in nearly unbroken thermal lift. Although we don't get much landing practice, we can stack up flying hours quickly.

There is, however, the matter of the canyon. It is our friend, as it generates our lift, but it can also be the end of a sailplane. Nearly all of us who fly there regularly, and a few irregulars, have had to deal with the remains of our planes scattered on the rocks in the canyon below. There is a hiking trail that winds its way to the river just to the north of the field, so we rarely have to do rock climbing to rescue our planes. There are a few areas below the field suitable for landing out, but other parts of the canyon are so rough that crossing them requires both hands, both feet, and a great deal of determination. The other byproduct of the canyon is the viscous rotor that can form back away from the rim. It seems that the vertical cliffs generate a rotor with a mean streak, and in times of strong slope lift those who escape the rocky cliffs can find themselves caught in turbulence strong enough to overpower the plane.

El Campo's recent political history has been nearly as turbulent as its windy day rotors. We first received permission to use the land in January of 1991, and started clearing soon after. Nearly a year later, as we were clearing out some large trees on the west side of the field, some nearby residents decided that they objected to us being there. They managed to drag the issue of the field out into the arena of county politics, where it has been banging around now for more than a year. While the county government and nearly all of the townspeople support us and our efforts, it is still the true that it only takes a few people to make a lot of trouble. The problems are starting to get resolved this year, following numerous meetings and a great deal of effort. We are currently able to fly unrestricted on the 1.5 acres we have already cleared, and are in the process of getting the site plan drawn up to clear the remaining 1.5 acres. While 3 acres may seem like a small space for a flying field, we are thankful to have every square foot of it! We are still battling the land use issues, and a recent re-zoning move threatens to either remove us from the area or stop our expansion at the present 1.5 acres.

In the mean time, if you are able to visit north-central New Mexico, plan to stop by the field. A map with directions is included, and we encourage you to visit. If you can't visit, at least you have an opportunity to see what you're missing. Run down to your local video rental store and pick up a copy of the movie 'Silverado'. The opening sequence with the shack that gets shot up was filmed on the field, before any of us started flying there. The shack was set up right in the center of what is now our landing area.

If you visit, and bring a sailplane, the following information may be useful to you. First, bring a plane that you don't mind getting a scratched up a bit. As I mentioned earlier, there are still some rocks and stumps to deal with. Second, bring a small high start. The longest dimension of the field is currently about 600 feet. This is really not much of a liability, however, since on most days you need only a minimal launch to reach lift. If you do visit the field and could let us know, we would appreciate it. We think we have a unique site, and would like to keep letters or postcards from fellow flyers that visit.

Additionally, there is this matter of the political future of the field. We are continuing the battle to keep this site, but could use help. If anyone has visited our site, or plans to, or is just plain interested in seeing folks keep flying sites, please drop us a postcard, note, or letter. I have included my address, and will appreciate any correspondence we receive. Letters from you folks carry considerable weight with our county government.

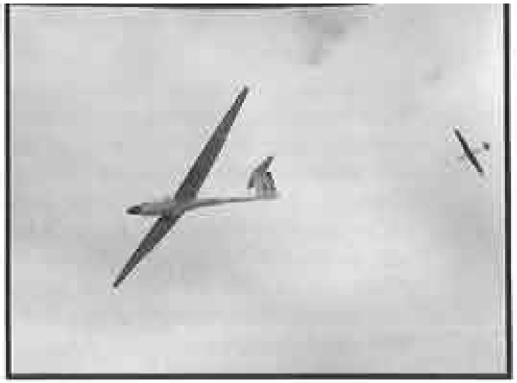
We are planning an AMA sanctioned triathlon contest at this site on September 11th. Call (505) 672-9229, or write if you want details. ■

Curt Nehring
Southern California

NORTH AMERICAN SCALE SOARING ASSOCIATION RALLY

NASSA RALLY 1993

...BY WIL BYERS & JERRY SLATES



Tony Elliot, a transplanted Englishman to the Boise, Idaho area, came to the Rally with his Ventus and Pilatus B-4. Pictured here is the Ventus in landing configuration; gear out, flaps down. WB photo

Pilot's Choice awarded to Tony Elliot with his Pilatus B-4. JS photo

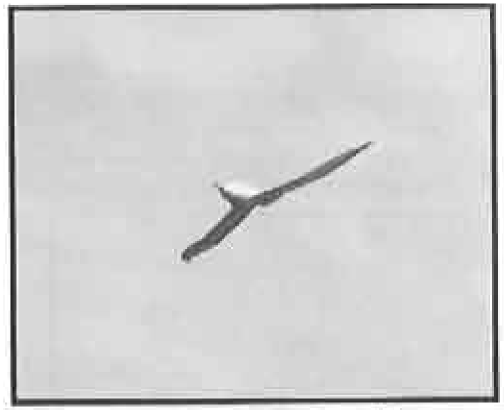
Greg Vasgerdsian and his Rhoenbussard. Looks & flys great! JS photo

MU-28 - scratch built by Jim Thurmond. JS photo

NASSA - Wil Byers

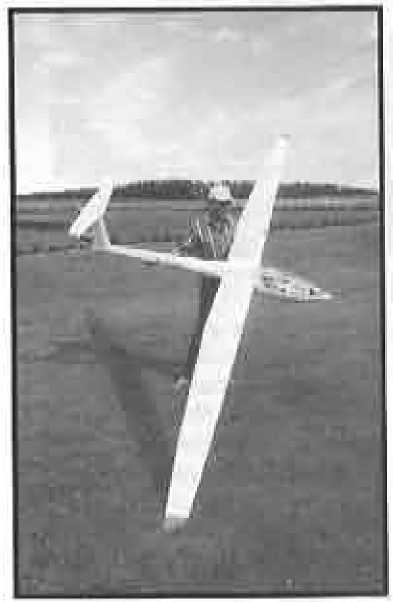
July 24 & 25th marked the date of the first ever North American Scale Soaring Association Scale Rally. The event was billed as a slope/thermal event depending mostly upon the wind. Well, the wind blew so the event was mostly a slope event.

The rally organizer's goal was to promote **FUN** and to have the event be a **NON CONTEST**. It was all of the above. It also was an event that attracted 31 entrants from as far away as Florida state. Not surprisingly all who attended were super scale soaring enthusiasts. They



This shot shows Steve Hinderk's demonstrating the inverted flight capability of his super soaring Sea Gull. I might also note that Steve was doing 16 point rolls with a Renegade before and after the event. He is absolutely a super flier. "You could count the points in the roll!" WB photo

Steve Hinderk's Sea Gull - from the "Bird Works". JS photo



Pete Bechtel shows off his 1/3 scale DG-300 fuselage from Germany. Wings were custom made in the U.S.A. Model suffered a severe crash during the event due to radio failure. WB photo

Pete Bechtel is working on his DG-300. JS photo

were Power Slope Soarers, Vintage flyers, and of course Modern glass sailplaners. This is the really great thing about scale soaring; it offers something for every interest.

Quickly, some of the highlights were a superb 1/4 scale Messerschmitt Me-109, a MU-28 aerobatic model, B-29 bomber, a 1/3 scale DG-300, a couple of Pilatus B-4s, an F-15 Eagle, Rhoenbussard, a couple of Saltos, and more and more. Scale soaring truly is for the artist, builder, flyer, and most of all fun seeker in us.

The scale rally moreover demonstrated

Another great model done by Lynsel Miller of San Jose, California. This shot really shows what scale soaring is all about. Doesn't the T-3 look like the real thing with its two pilots hunting for lift? WB photo

ME-109 & Lynsel Miller close up. JS photo

that some of the best pilots in the U.S., if not the world, fly scale. Entrants to NASSA's first ever event were able to witness a super scale ASW-17 doing 80 mph inverted passes on the deck and tight into the slope. (By the way, the pilot was Mike Bamberg the other slope columnist.) We also witnessed a Seagull glider doing four point rollers down the slopes. And, for realism many of the models carved out graceful turns in the big lift of Eagle Butte. There was so much more going on that it is hard to describe. But, it is fair to say, modelers were sharing and learning a great deal about the advancements in scale soaring and where it is heading in the near future.

The consensus among most attendees was, "Why aren't there more scale events in the U.S. and why don't more R/C soaring enthusiasts try scale soaring?"

Well, look at just a few of the pictures included in this article and hopefully your club will team up with NASSA in the future and put on a scale rally some time very, very soon. NASSA members will tell you they are waiting for a chance to come fly with you and yours.

NASSA - Jerry Slates

I took my annual pilgrimage to Richland, Washington for the NASSA, North American Scale Soaring Association

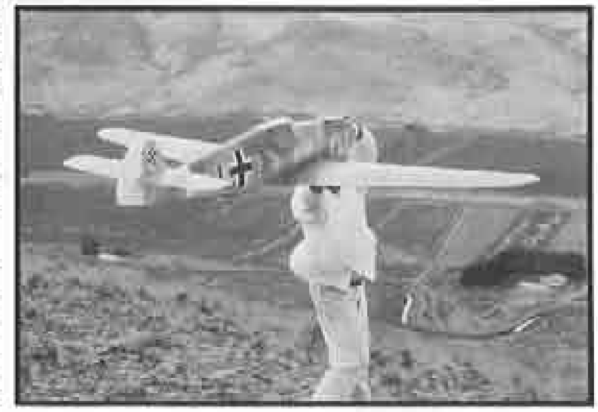
Jose Serrano of Long Beach, California, drove a good distance to Richland to show off his nicely detailed F-15. The F-15 made numerous flights during the Rally. Jose wanted stronger wind, but the F-15 seemed to handle the 15-20 mph wind very well. WB photo

A shot of the ME-109 making a pass at the hill. The model flew in surprising light winds. Lynsel said he used a SD-6060 airfoil for the wing section. WB photo

Rally. Although many modelers like looking at the pictures of the 1/4 or 1/3 scale gliders in full color in the other major magazines, you could have seen the real thing the weekend of June 24 - 25..

I arrived in Richland on Friday about noon; after checking into my motel I headed for the hill in hopes of finding someone flying. "Someone" flying? Boy did I get fooled; it looked like the weekend had already begun. There were 15 flyers there by mid-day, some of whom had been there for the last four days. What is it about this place? It's hot, dusty, windy and it's not a contest, but yet each year there is a crowd, a crowd the size that you would find at most major contests; and yet this crowd is sometimes bigger than what you would find at a major contest. There seems to be a certain bond among scale builders and flyers. It's not that mine is bigger and better than yours or that mine is one of a kind. It's just a bunch of glider flyers with scale airplanes getting together and having a good time.

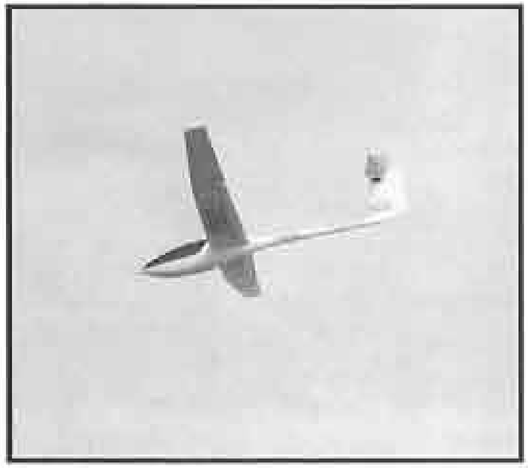
Good time, you bet! I have been talking with David Nash of Salt Lake City, Utah via telephone several times this last year and we finally got to meet this weekend. David has been telling me about his 1/2 scale project that he has been work-



Mike Bamberg readies to heave Lynsel Miller's beautiful 1/4 scale Messerschmitt ME-109. This model flew absolutely superbly. Lynsel's piloting skills guided the model through loops and rolls. You had to see it to appreciate it. WB photo

Is it the real thing? Not quite. This 1/4 scale console is for Gene Cope's Kestrel 17. JS photo

The other slope columnist, Mike Bamberg, is pictured here launching Guy Russo's Jantar I. Model is a Wanitschek kit and sports a 16 foot wing span. WB photo



Carl Bice of Lake Worth, Florida thought he died and went to heaven . He flew his Fiber Glas Flügel DG-600 through its paces for 6 days while in the Tri Cities. Carl commented to me that he had 2 1/2 hours of air time on the 600 during one day at the Rally. Carl also flew a very nice Pilatus B-4. Good pilot! Good Airplanes! WB photo

ing on. He brought the plug of his 1/2 scale ASW-20 for me to see and to show off, and all I have to say is, WOW! Another person I spent a great deal of time with on the telephone and had never meet until this weekend was Jim Thurmond of Eugene, Oregon. Jim has made his first mold in order to scratch build a scale MU-28; it is very good looking and a great flyer. Rather than ramble on, I'll let the photos speak for themselves.

As I sit here trying to tell you of the great weekend that I had, I'm doing a lot of day dreaming about what I'm going to be building for the 1994 Rally. Will it be a modern long winged soaring machine or a short stubby vintage type glider? ■

Winners of the JR Radios. JS photo

Winch Line ...by Gordon Jones

Gordon Jones, 214 Sunflower Drive, Garland, Texas 75041; (214) 840-8116 After 5:00 P.M. CST

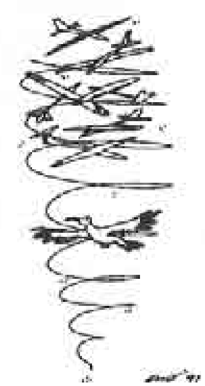
Saving Your Eyes

I was talking to a friend of mine the other night just after he had returned from the NATs; he was malenting about how bad his eyes hurt from looking into the sky for better than a week at airplanes. I reminded him that proper sunglasses; obtained from am optomoligist is the way to properly protect your eyes while gazing into a bright sky. The proper sunglasses play a vital role in our ability to see our planes at altitude. It must be noted that you must consult with a professional in this area. I wear prescription glasses (Yes, God gave me four eyes for a reason, and he is now threatening me with six.) and have a problem with light to begin with, so early on I talked at some length with an optomoligist (who was also an R/C flyer). After a very through check he came up with the best color prescription for my eyes and regular prescription. It happens that my eyes react to a very dark grey coating better than the green, yellow, or amber tints. The bottom line here is that you need to have your own specific requirements analyzed by a professional in order to obtain the best results for your eyes and sailplane vision.

Another item that people overlook is the color of the covering on the plane they are flying. While that neat color scheme looks great sitting on the ground a few feet away; you night not be able to see it worth a flip in the air. It can sometimes be a disaster to get into trouble and not recognize the attitude of your airplane. If you have noticed this happening to you at some point you might want to take some time and look at other airplanes in the air on a clear day. Write down which ones that you can see best and then compare those same colors (hopefully the same airplanes) on an overcast day. This will give you an idea of that color(s) you can see best and you can cover accordingly.

Every eye has a different reaction to color. The dark colors (black, blue, charcoal, green and red) show up very well for some people, while other prefer the lighter colors (yellow, tan, white and orange). Some people scoff at the choice of a particular color, but visibility is in the eye of the flyer! And visibility is the key to keeping things right side up and going where you want them to go.

Another point to pay attention to is the pattern of the colors you chose. Many people put a couple of bands on the top or bottom of a wing to indicate which side is up (or down). Once again look at other airplanes until you find a scheme that works for you. In an article I read some time back one flyer was changing colors and adding patterns on one of his planes until he found the right combination. Personally, I think looking at other airplanes will do the trick for most of us, unless you have a thing about covering. ■



LIFT OFF!

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1993 NATS

This month I'm going to skip the regular format of my column and give a brief report on the NATS with pictures and more details in a future article.

The electric and soaring events were held this year at the Vincennes high school, a field which, as it turns out, was a really good site.

Not going to many contests, let alone a national, I practiced as much as I could before the NATS and tried to get all my planes ready and prepared as much as possible. I thought I had everything under control, but I never thought about what the weather would be like. As it turned out, Vincennes, on the first two days of electric, was over 100° and humidity in the nineties. The air was really dead. What this made for was some very hot and uncomfortable flying conditions. Because I practice in a cooler and drier climate, it made for a lot of last minute changes in props, batteries, and charging techniques. Changing batteries had to be done by placing them in a plastic bag and then placing in a cooler of ice. Oh well, so much for being prepared. Another miscalculation on my part was the travel time. What I thought was going to be a ten hour drive, turned out to be sixteen hours and almost a thousand miles. The only hotel that was not full was also about a 45 minute drive to the flying field. I've also discovered something interesting about hotels for you electric fliers; they only have one electric outlet. So, here I am, about a thousand miles from home, over sixteen hours on the road alone, in a van with eleven airplanes (I entered three electric and three soaring events plus some back up planes were required.), what seemed like a zillion batteries, and only one outlet in the room to charge all of this. Solution? I unplugged all the lights, radio and TV. (But NOT the air conditioner!!) This gave me enough outlets for my chargers. Of course, without lights, radio, and TV, it was like living in a cave with little LED's staring at you...

The first day of the NATS was for seven cell thermal duration with an in/out rather large landing zone. With extremely hot and humid weather, it was quickly evident that the polyhedral, gear driven motor planes had a great advantage over the aileron direct drive motor planes that some of us were flying.

The second day was for the unlimited cell thermal duration with the same landing zone. This was the exact copy of the first day (hot and humid with very little lift), again giving the polyhedral gear driven motors the advantage.

I want to say a few words on the rules for 7 cells. The 7 cell class has a 45 second motor run, with an 8 minute thermal of which the 45 seconds is a part. The landing zone is for bonus points. In the unlimited class, it's a 30 second motor run with an 8 minute thermal and the same landing bonus points.

The third day was for F3E in the morning and F3B in the afternoon. This is done because they both use the same course. F3E is a combination of speed, duration, and landing, all in one flight. Due to some good luck for me and some unfortunately bad luck for my competitors, I was able to win F3E which was quite a thrill. That afternoon, I flew F3B for the first time. As a matter of fact, my first try at F3B was an official AMA flight! When it was over I felt pretty good about the results. But, I have to give credit where credit is due. Two colleagues, Joe Wurts who is the World Champion and Skip Miller (ex-World Champion), took the time to help me set up my F3B Eagle and then talked me through the course. Without this help, I would have been lost. THANKS, Joe and Skip! As hot and humid as it was and having their own equipment to take care of and also flying in the contest, it was a pleasure to see Joe, Skip and National Champion, Brian Agnew, always available to help anyone who needed it.

The next day was hand launch. It is almost bizarre to watch seven or eight pilots with seven or eight timers running all over the field in 100° heat throwing airplanes in the air, catching them and then, in a big mass, all running to the other end of the field and doing it all over again.

The next day, and the last day for me, was for 2 meter. (Time, heat, and major sunburn was starting to do me in.) This was the largest soaring event at the NATS and all went well with us flying a total of eight rounds. The weather was better with some lift and clouds. The temperature dropped all the way down to 95°. The next day, I was on my way home.

The NATS was hot, humid, tiring and the sun burn still hurts, but I'd do it all over again. Being in the NATS, meeting all the nice people that I did, seeing some really neat airplanes, learning a lot for the future, taking home first place in F3E, and sponsoring Brian Agnew in his multi-wins made it an unforgettable experience.

Good Flying! ■

NATS Results

7 Cell		
	1	John McCullough
	2	Gary Warner
	3	Ben Mathews
Unlimited Cell		
	1	William Jenkins
	2	John McCullough
	3	Ben Mathews
Old Timer		
	1	Ben Mathews
	2	Jerry Smartt
	3	Glen Poole
F3E		
	1	Ed Slegers
	2	Michael Lachowski
	3	Joseph Wurts
Hand Launch		
	1	Joseph Wurts
	2	Brian Wurts
	3	Skip Miller
Unlimited Open		
	1	Brian Agnew
	2	Skip Miller
	3	Joseph Wurts
2 Meter Open		
	1	Brian Agnew
	2	Joseph Wurts
	3	William Jenkins
Standard Open		
	1	Brian Agnew
	2	Joseph Wurts
	3	Allan Scidmore
Unlimited SR		
	1	Cody Robertson
Hand launch SR		
	1	Cody Robertson
2 Meter SR		
	1	Cody Robertson
Standard SR		
	1	Cody Robertson

"On The 'Wing...the book"

Written by Bill & Bunny Kuhlman
...Book Review by Jim Gray
Payson, Arizona

Several years ago, while reading one of the *RCSD* series "On the Wing" by the B^2s, it occurred to me that the series should be made into a book so that the information contained therein could be saved for posterity and for those non-subscribers to *RCSD* (Are there any?) interested in tailless sailplanes (flying wings). Also, it was clear having all of the articles available in a single compendium would provide an easy reference medium.

Yesterday, to my surprise, I received a large "soft" envelope from B^2 Streamlines. Yep, you guessed it: "On the Wing...*the book*" by Bill & Bunny Kuhlman. "Perfect" bound in 8 1/2" by 11" size with a light gray soft cover and simple but attractive graphics, I couldn't wait to dig into the contents, but steeled myself to a brief flip-through and a delay until evening when I would have more time to devote to a concentrated read-through.

The book is dedicated to the memory of the late Dr. Ing. Walter Panknin (1944-1992), who was famous for his "Flying Rainbow" colorful tailless sailplanes, and for his lecture at a MARCS Symposium in November, 1989: Basics, Building and Beauty of Tailless Sailplanes.

The preface says some nice words about *RCSD*, the reviewer, and Judy & Jerry Slates, crediting them with enthusiastic support and inspiration. Thanks, B^2, your comments are much appreciated.

How can one describe the contents of this book in other than hyperbole? Yes, it is great, and wonderful, and needed, and informative, but above all, it is fascinating and easy reading. As I promised myself, I sat down last evening and decided to read completely several "chapters" (each of which is one of the articles from the series through December, 1992). I confess that I could NOT put the book down, so read completely through every word until past midnight! The book is that good.

Beyond the articles as published over the years, there has been an effort by Bill & Bunny to improve the readability of the text and to update the source listings, PLUS provide additional and supplemental information toward the goal of comprehensiveness and completeness. They have succeeded admirably.

Naturally, you will want to know exactly what you can find in "On the Wing...", so here goes. It is arranged in chronological order of events, designs, philosophies, and engineering information as they occurred and became available. You will read about the Kuhlmans themselves, their own designs, and the mistakes that eventually led them through the thicket of development to success. There are pictures, data graphs and just the sort of things you'll want to know - yes, need to know - for your own work with these unique machines. Among the airfoil coordinates, you will find the Selig 5010 and 5020; the DELTA sections EMX 07, Elina, and Phoenix. There are AR173-S75 and CJ 25^2-09; the NACA symmetrical series, the HQ-0/10 and RG-15A. You'll discover the RG-12A, the RG-14A, and a Saftig and Martin 'foils, and an EH series of foils particularly favored by some designers. Yes, and Dr. Eppler's 'foils are discussed.

There are three views aplenty, and entire computer programs in BASIC that you can use to determine wing twist and sweep for stability, and a program to help you adapt the Werner series of reflexed sections, and a program to use the Panknin twist formulae, and Al Halleck's RAZER 1 design, and the Irv Culver formula.

You'll find articles, notes and comments by flying wing designers like Dieter Paff, Ken Bates, Martin Simons, Marc Vepraskas, Willie Bosco, and many others, including four German wings.

There is an article on canard design by Bill Kubiak which may seem out of place in a "flying wing" book, but nevertheless it presents another side of the unconventional soaring machine.

There are given really practical methods for building twist into a foam wing, and a good but simple discussion of a building jig to build right and left halves of wings with sweep and twist. There's even a section dedicated to information non-related to tailless sailplanes, such as gapless control surfaces and how to build them.

It would be possible to go on and on listing the various and multiple other subjects concerned with 'wings... but I'll leave it to you to think about what's already been covered with just a taste of the scope and comprehensive coverage of this book.

I think it is a must for your library that will fit alongside such other landmarks as "Nurflügel" & Ferdi Gale's "Tailless Tail" aircraft design book and historical summary, plus others you'll recognize. I recommend it highly and warn you that you won't be able to put it down either, once you've begun reading.

The price is US$28.00 direct from B^2 Streamlines, P.O. Box 976, Olalla, WA 98359-0976. Should you wish to buy a copy of "Tailless Tail", it is $38.00 from the same publisher. Also, I might mention that Ferdi Gale's new book on structures and design for model aircraft: "Structural Dimensioning of Radioglided Aeromodels" is available for $18.00. ■

The RENEGADE 60" Slope Racer

New from CR Aircraft Models
...by Steve Condon
San Diego, California

Sometime in April of 1992, the Torrey Pines Gulls held the first club slope race in several years. Of the three classes, the 60" class was the most popular and the most competitive. I was racing a 54" span modified Ridge Runt (aka: Hyperunt) and managed to negotiate the course just a little faster than the other guys. Everything else was faster than my runt on the straights, but I was leaving 'em behind in the turns - and that's where slope races are won.

The advantage I had was a slightly thinner airfoil and flaperons for camber to elevator coupling in the turns. It made a big difference. I'm pretty sure that was the day the design for the *RENEGADE* popped into the back of Charlie's mind like a bright light bulb switching on. Shortly thereafter the prototype Renegade made its debut. The little Hyperunt is now long since obsolete and collecting dust.

I was fortunate enough to build one of the prototype kits and have it ready for our October two day race. I have never flown a small plane that was so fast and agile. On a short course, this thing could leave most unlimited racers behind. It does everything you want it to: climbs fast for good starts, tracks beautifully for smooth straight away performance, and pulls through the turns so quickly that if you blink it will be half way back when you spot it again!

Designed specifically for the evolving 60" class of slope racing, the *RENEGADE* has proven to be a very competitive ship. In fact, the *RENEGADE* has dominated every 60" race since its debut. At the 1993 International Slope Race, Paul Naton managed to do extremely well against the unlimited racers on a very long course with the Renegade.

The great thing about the *RENEGADE* is that, although it is designed for racing, its performance characteristics make it an ideal ship for all types of slope flying. It will do any type of aerobatic maneuver, and yet, it will stay up in air so light, most people would be reluctant to launch a Wanderer. As a racer, however, it thrives in the big wind.

RENEGADE prefab kits are now available. Look for the CR Aircraft Models ad in this issue. The prefab kit features a super sleek (and strong) fiberglass fuselage with a slip-on nose cone and plenty of ballast room. It is designed to have the servos mounted in the wings for maximum efficiency. The airplane comes pre-bagged with a very stout carbon/glass lay-up. The prefabrication of this model is remarkable, all you do is finishing and radio installation.

As far as durability, this plane is one of the toughest. The aforementioned Mr. Naton is "king midair" with most of what he flies, and he has proven the Renegade's durability time and time again. The wing is *very* strong, with a leading edge treatment that in virtually impenetrable. In my opinion, this wing will *never* flutter or break in the air. We've taken the Renegade straight down from as high as 800' and it has been rock solid - although very touchy on the controls at that speed!

The bottom line is that with the combination of wing area, tail moment, airfoil (RG-15, naturally) and proper trim and set-up, I feel that the Renegade is the most competitive 60" slope racer available on the market today. If you want to know more about it, call Charlie Richardson at (619) 630-8775. ■

on the Wing

B^2

P.O. Box 975
Olalla, Washington
98359-0975

MH Sections

The following sections for tailless sailplanes were created a few years ago by Martin Hepperle. All require swept wing configurations, with the exception of the MH 61 which has a substantially positive pitching moment and could be used with a plank layout. In general, all are capable of creating greater lift with less drag than equivalent Eppler sections. All were designed for Reynolds numbers of 100,000 - 150,000 and higher; polars show excellent performance at a Rn = 400,000.

The accompanying chart, along with Dr. Panknin's twist formula described in previous columns, can be used to determine suitable sections for a particular tailless planform.

MH 45

Along with the MH 44 and MH 46, not described here, the MH 45 was created for the Swiss LOGO-Team. The MH 45 is capable of very high lift while being slightly positively stable. It also has the advantage of being designed to benefit from the use of flaps (25% chord). With five degrees of deflection the maximum C_l is over 1.2, while with 10 degrees of deflection it can achieve a maximum C_l of nearly 1.6, according to published polars. The MH 45 is just over 9.8% thick, and should receive serious consideration when looking for a root section.

MH 60

The MH 60 was designed to be an improvement over the Eppler 182, a very good section in its own right. The MH 60 is easily capable of producing a C_l of .65, while its maximum C_l is about 1.0; these values are about 0.2 higher than those of the Eppler 182. When used as a tip section, the MH 60 appears to be a bit better than the Eppler 228. The minimum Reynolds number for the MH 60 is 150,000.

MH 61

This section's performance is also comparable to that of the Eppler 228. The MH 61 should be used with tailless swept wings having a minimum of twist; it may also be used with plank configurations. Minimum Reynolds number for the MH 61 is 150,000. ■

MH 62 and MH 64

These two sections have no Eppler equivalents. They can tolerate lower Reynolds numbers than the MH 60 and MH 61 - down to Rn = 100,000.

Section	Zero Lift Angle	Pitching Moment	Thickness at %		Camber at %	
MH 45	0.370	0.0058	9.85			
MH 60	0.420	0.0051	10.08	27.20	1.76	38.10
MH 61	-0.107	0.0175	10.28	29.90	1.48	38.10
MH 62	-0.520	-0.0004	9.30	26.90	1.60	37.00
MH 64	-0.600	-0.0050	8.61	26.90	1.60	38.80

MH 45 X	MH 45 Y	MH 60 X	MH 60 Y
100.000	0.000	100.000	0.000
99.669	-0.010	99.666	-0.011
98.669	-0.021	98.657	-0.023
97.013	0.016	96.984	0.014
94.746	0.130	94.692	0.134
91.917	0.332	91.828	0.354
88.574	0.629	88.452	0.691
84.775	1.028	84.641	1.148
80.590	1.536	80.469	1.708
76.107	2.140	76.008	2.350
71.405	2.803	71.329	3.043
66.547	3.488	66.497	3.752
61.587	4.154	61.566	4.434
56.569	4.768	56.577	5.056
51.532	5.306	51.568	5.594
46.516	5.755	46.575	6.037
41.564	6.108	41.641	6.378
36.723	6.358	36.813	6.615
32.039	6.498	32.138	6.741
27.558	6.523	27.662	6.751
23.318	6.425	23.426	6.640
19.353	6.203	19.465	6.405
15.691	5.862	15.800	6.048
12.363	5.410	12.486	5.578
9.395	4.858	9.521	5.000
6.813	4.218	6.937	4.331
4.634	3.500	4.750	3.581
2.867	2.722	2.965	2.769
1.520	1.906	1.589	1.929
0.588	1.088	0.620	1.098
0.079	0.326	0.080	0.335
0.000	0.000	0.000	0.000
0.068	-0.279	0.063	-0.268
0.641	-0.788	0.634	-0.782
1.781	-1.310	1.760	-1.307
3.421	-1.814	3.387	-1.809
5.531	-2.277	5.490	-2.265
8.085	-2.678	8.046	-2.657
11.065	-2.991	11.036	-2.968
14.460	-3.206	14.441	-3.191
18.252	-3.329	18.237	-3.323
22.408	-3.366	22.396	-3.370
26.891	-3.330	26.880	-3.342
31.654	-3.229	31.644	-3.249
36.646	-3.073	36.637	-3.101
41.816	-2.875	41.806	-2.908
47.104	-2.646	47.094	-2.684
52.449	-2.399	52.438	-2.441
57.786	-2.143	57.774	-2.188
63.049	-1.888	63.036	-1.933
68.174	-1.640	68.160	-1.684
73.095	-1.403	73.082	-1.444
77.754	-1.179	77.743	-1.217
82.094	-0.971	82.085	-1.006
86.602	-0.782	86.054	-0.814
89.607	-0.613	89.601	-0.642
92.686	-0.465	92.681	-0.489
95.259	-0.334	95.255	-0.353
97.293	-0.219	97.290	-0.233
98.770	-0.113	98.767	-0.121
99.683	-0.031	99.682	-0.033
100.000	0.000	100.000	0.000

MH 61

X	Y
100.000	0.000
99.662	-0.021
98.634	-0.059
96.923	-0.048
94.584	0.055
91.671	0.267
88.248	0.606
84.394	1.072
80.189	1.650
75.708	2.313
71.024	3.013
66.204	3.762
61.302	4.455
56.351	5.077
51.386	5.605
46.445	6.025
41.565	6.329
36.787	6.513
32.154	6.577
27.709	6.518
23.491	6.336
19.534	6.033
15.870	5.614
12.523	5.090
9.521	4.481
6.892	3.804
4.659	3.077
2.843	2.321
1.457	1.560
0.514	0.829
0.031	0.184
0.000	0.000
0.134	-0.348
0.856	-0.857
2.097	-1.389
3.826	-1.907
6.019	-2.391
8.653	-2.818
11.707	-3.174
15.158	-3.446
18.982	-3.631
23.147	-3.729
27.618	-3.741
32.357	-3.676
37.317	-3.545
42.447	-3.361
47.691	-3.137
52.987	-2.886
58.271	-2.619
63.480	-2.345
68.549	-2.070
73.417	-1.799
78.024	-1.537
82.314	-1.288
86.235	-1.055
89.737	-0.841
92.776	-0.646
95.315	-0.469
97.321	-0.310
98.777	-0.161
99.683	-0.044
100.000	0.000

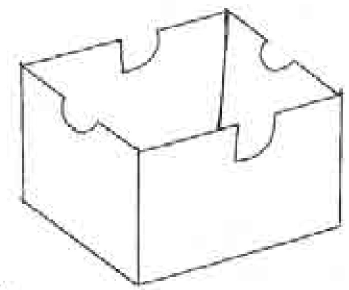
MH 62

X	Y
100.000	0.000
99.672	-0.006
98.684	-0.005
97.051	0.042
94.812	0.163
92.011	0.371
88.703	0.681
84.956	1.096
80.842	1.602
76.428	2.179
71.781	2.802
66.965	3.440
62.035	4.055
57.033	4.619
52.002	5.110
46.981	5.515
42.012	5.830
37.146	6.051
32.431	6.171
27.913	6.186
23.633	6.089
19.629	5.879
15.933	5.557
12.573	5.127
9.577	4.600
6.965	3.985
4.755	3.293
2.954	2.544
1.568	1.766
0.602	0.997
0.067	0.297
0.000	0.000
0.067	-0.261
0.66	-0.749
1.793	-1.248
3.423	-1.724
5.525	-2.157
8.08	-2.526
11.067	-2.817
14.466	-3.021
18.261	-3.137
22.416	-3.171
26.897	-3.132
31.656	-3.030
36.646	-2.876
41.813	-2.681
47.098	-2.458
52.441	-2.217
57.775	-1.971
63.036	-1.725
68.159	-1.488
73.081	-1.262
77.742	-1.052
82.084	-0.859
85.055	-0.687
89.602	-0.535
92.683	-0.404
95.258	-0.290
97.294	-0.160
98.771	-0.098
99.684	-0.026
100.000	0.000

MH 64

X	Y
100.000	0.000
99.678	-0.002
98.709	0.007
97.110	0.060
94.916	0.178
92.168	0.374
88.915	0.661
85.224	1.039
81.159	1.497
76.785	2.018
72.166	2.580
67.365	3.155
62.436	3.712
57.426	4.224
52.377	4.672
47.331	5.044
42.334	5.335
37.436	5.541
32.685	5.655
28.130	5.674
23.814	5.591
19.773	5.402
16.043	5.109
12.651	4.717
9.626	4.233
6.990	3.666
4.761	3.028
2.947	2.335
1.555	1.614
0.589	0.902
0.059	0.257
0.000	0.000
0.078	-0.260
0.690	-0.724
1.830	-1.200
3.463	-1.653
5.566	-2.064
8.120	-2.414
11.105	-2.680
14.504	-2.873
18.293	-2.974
22.445	-2.995
26.922	-2.946
31.678	-2.836
36.665	-2.677
41.829	-2.478
47.112	-2.255
52.452	-2.017
57.785	-1.776
63.044	-1.539
68.166	-1.311
73.087	-1.098
77.747	-0.902
82.089	-0.735
86.059	-0.570
89.607	-0.437
92.688	-0.325
95.263	-0.230
97.300	-0.150
98.777	-0.077
99.687	-0.021
100.000	0.000

Handy Sailplane Set-Up Stand

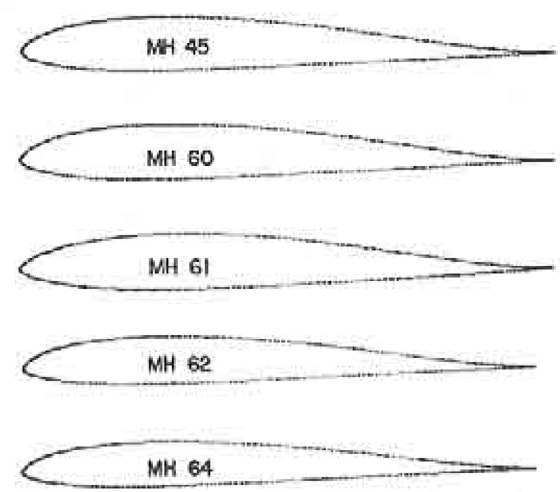


...by
Pancho
Morris
Mesquite, Texas

Here is another quickie in my Budget RC series. I like these ideas because they are good ones and things that people may not have thought of or seen, but mostly because I know that they drive my Rolex flying buddies nuts.

When you're setting up a new sailplane, especially a one with a round bottom and fiberglass fuselage with flaps that come down below the fuse, it's handy to have a stand to put it in while you make adjustments. This is especially true in today's world of computer radios.

An old styrofoam cooler makes a beautiful, cheap stand. Use a knife or hot wire to cut out places in the narrow ends for the fuselage and quarter circle cut outs for the flaps and you are ready. It is not a cabinet shop built, solid oak, three axis rotational jewel built to attach to a $150 camera tripod, but it works! ■



Understanding Sailplanes

...By Martin Simons

13 Loch Street, Stepney,
South Australia 5069

Flying In Wind & Weather

Suitable models

Model gliders built specifically for slope soaring tend to be heavier and to have higher wing loading than thermal soarers, because highly loaded aircraft are capable of flying well in strong winds. Slope soaring with large, fast model gliders in mountainous country is common. F3B contest sailplanes, carrying ballast, make excellent hill soarers. But small radio controlled gliders designed for weak conditions can often stay airborne in the gentlest of zephyrs and slope soaring in such weather with these models is great fun. Everything between these extremes is possible. Large scale model sailplanes are often flown in this way. There is much interest now in 'Powered Scale Soaring' (PSS). Scale models of jet or other powered aircraft are flown as gliders on the slope. These look very realistic in flight, despite the lack of engine noise, and although they are less efficient than normal sailplanes they can soar perfectly well. Such models can be highly spectacular. Some modification of the aerofoil sections is usually thought to be desirable to achieve a better gliding performance but this is not always necessary, depending on the nature of the prototype.

On a day when there is ample lift there are few limits to the manoeuvres that may be flown in slope lift. The normal rule, that speed for sailplane aerobatics can be gained only by sacrificing height, still applies but the hill lift is always available to restore altitude. Almost any sailplane with reasonably strong structure can perform loops, chandelles, stall turns and barrel rolls. Slow rolls can be done even with a 'rudder & elevator' glider if plenty of airspeed is ensured before starting the roll and if there is sufficient elevator movement. As with any slow roll, the wing lift has to be brought to zero at the moment when the wings are banked to the vertical position. If the wings are still lifting when the bank reaches the vertical, the model will swerve as in a steep turn, so spoiling the axial roll. Preventing this normally requires a progressive forward stick movement (elevator down) as the vertical is approached. (A cambered wing profile reaches its aerodynamic zero at a negative angle of attack.) The inverted segment of the roll then requires a further definite forward stick motion. Some 'two control' model sailplanes lack sufficient down elevator movement to achieve this neatly, or to sustain inverted flight. Such gliders thus tend to fall rather ungracefully out of slow rolls, unless specially adjusted.

A glider designed purely for aerobatics should follow much the same principles as a powered 'pattern' model. A generally 'clean' design is preferred because the model will need to pick up speed quickly when diving and too much drag will produce a sluggish response. Wings will be of relatively low aspect ratio for a high rate of roll, and of thin symmetrical section to make inverted flight easier. Full span ailerons are advisable and there will probably be no dihedral. Some wing sweepback may be used to provide a little lateral stability in both upright and inverted flight.

Finding a site

As a first introduction to slope soaring it is best for the beginner to join a club and go to the regular soaring site used by the members. Failing this, suitable places can often be found by careful study of large scale survey maps which show detailed contours. The steepness of a slope and its orientation can be judged fairly well from the map, before making a preliminary

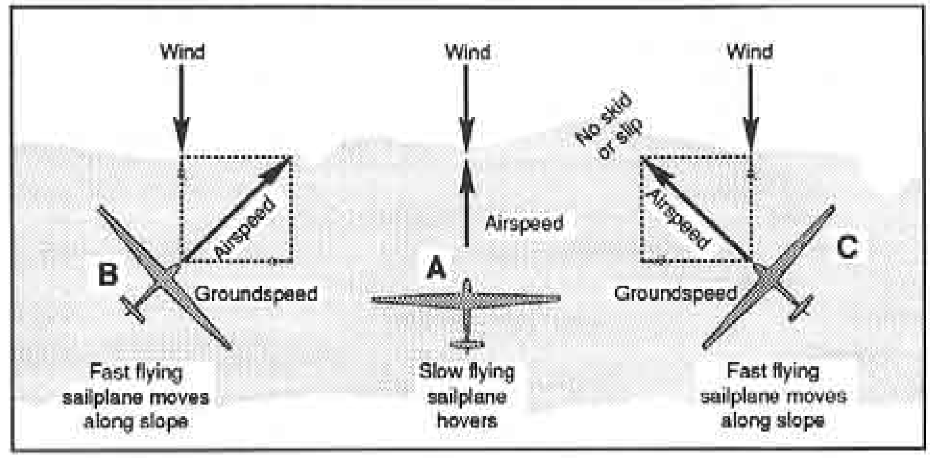


Figure 39 Slope soaring: effects of flight speed and heading

visit to the place to investigate at close quarters. Frequently a promising slope is found to be impossible. Many otherwise useful sites are not available because there is nowhere to land the model without damage to people, property, or the model itself. Some splendid hill sites are spoiled by the nature of their landing surfaces on top, where shark-tooth-like rocks are so numerous that every landing is a crash. Contour maps may indicate this with cryptic symbols or, perhaps, words like 'Scattered rocks'. In such places it is possible sometimes to find smooth patches. A alternative, not often thought of but perfectly feasible, is to launch the model by towline from the foot of the slope and land at the base too. Hill lift can be reached in this way when access to the top is not possible.

The landowner's permission to use a site must be obtained but providing the model flier explains what is required and does no damage, it is usually not difficult to gain access. A point to be noted is that sometimes permission from the landowner is not quite enough. The author, once operating from a public common, was reprimanded for flying a glider over a property some distance away at the foot of the hill, where the owner was raising partridges. The model overhead sent these birds into a panic and for the sake of good public relations the glider was brought down at once on discovering this.

It is also important to check that the slope is not used by full-scale soaring aircraft. At least one hang glider pilot has been killed by collision with a model sailplane. It is usually possible to come to some procedural agreement with the other airspace users, if any possibility of conflict arises.

Launching

It is usual to launch a hill soaring model by hand. One of the pleasures of slope soaring is that no equipment, other than the model and its radio gear, is needed. The modeller can operate single handed, put the model together and throw it off immediately into the slope lift, and soar.

There are, however, occasions when things are not so easy. The wind speed at the summit is often at its strongest. Even getting the sailplane safely to the launching point in such a strong breeze is quite difficult and, at the critical moment when the model is poised for launch, a gust may easily tip it over and blow it out of the pilot's hand. On such occasions, assistance is necessary. One person or two can carry the model forward and the pilot can carry the transmitter. At launching, to have at least one person steadying the model at a wing tip, is often necessary.

Often, struggling to launch from the crest of the ridge is unnecessary. By moving forward and down the slope a short distance, the wind is found to be gentler and usually less turbulent. Launching from here is easier and safer.

With very large models, if no help is available, it is quite feasible to launch by winch into slope lift. The author has done this on many occasions. A site with ample clear ground above and behind the slope is necessary. Some of the winch line is laid out into wind with the normal 'turn around' pulley staked out close to the crest of the slope. A winch with a foot operated switch is used. It is not necessary to lay out the full length of the line, since all that is required is to get the model safely into the air, heading upwind with plenty of airspeed, to go immediately into the slope lift. The model is launched from the ground. The wing tips are propped up level (I use a few ordinary house bricks!), the line hooked on and all control checks carried out as normal. When ready, the foot switch is pressed and the model moves forward. There is no need to climb steeply. The sailplane is merely flown forward and slightly upward at a good airspeed, the line is released as it passes over the pulley, and the flight continues. The pilot, once the model is soaring, has ample time to walk forward to the preferred position for flying. Landings are no problem in such places, since there has to be a clear place on the hill for the winch to be used at all. Obviously, the rubber 'hi start' or bungee can be used in a similar way, with smaller models.

Using the slope

In Figure 39 the lightly shaded area indicates a zone of lift above and in front of a soaring hill. The wind is blowing directly onto the slope and a model glider, shown in outline at A, has been launched. This model is trimmed for an airspeed which exactly matches the wind speed and also yields the minimum rate of sink. At this airspeed it can make no headway relative to the ground. The glider will gain height in the slope upcurrent until it reaches the level at which its sinking speed just equals the strength of the lift and it will hover there. To a watcher on the ground it will be standing still, the airspeed matching the wind and the sinking speed matching the lift. (This is exactly what a hovering sparrow hawk commonly trims itself to do when soaring, with a precision far greater than any human pilot can achieve.) On most slope soaring days it is possible to trim a model to hover in this way, but it becomes boring after a time. ■

Stabilator Basics

...by Wildey E. Johnson
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In 1989 I built my first sailplane (an Olympic 650) and, with no R/C experience, tried to learn to fly at the local power field. A few members showed some interest; however, I was soon left alone to teach myself. Repeated attempts over several months resulted in nothing better than one minute glides. I kept trying until I lost the 650 in a Georgia river. It was early 1990 when I located the Glades Soaring Group in Florida only 45 minutes from my home. After seeing what a seasoned pilot with a well-built sailplane could do, I was hooked. I wanted an R/C sailplane, and I wanted it now. Lineal Powell (the club president) mentioned that Carl Bice had a plane for sale. The next weekend I bought Carl's beautiful white and transparent blue Sagitta 600. Fortunately, Carl had taken the trouble to fiberglass the fuselage. Many crashes and hard landings have sold me on the toughness of a glass over wood fuselage.

While flying the Sagitta, I had often noticed that the stab looked tilted. This was more apparent in the air than on the ground where it appeared floppy. My Sagitta had an aluminum (I now use brass.) tube cut flush with the surface of a very thin fin. I glued the tube by applying CA between it and the supporting balsa. This held until the next landing. Other planes had more or less the same problem so I assumed that this was the nature of stabilators. This all changed when I met Mark Atzel. Mark showed me how he sets up the stabilator on his planes, and I have done the same ever since.

FIN TUBE

Mark pointed out that the tubing for the pivot wire can be longer than the width of the fin. By extending the tube out 1/8" there is room to build up a small epoxy fillet on the outside that will not let go [1]. Also the extra length reduces the leverage that the wire has over the tube. Now, when I build a stabilator, I countersink the tube in the stab to accommodate the tube protruding from the fin.

The size of the tube passing through the fin can be increased by nesting it into the next larger size. This increases the bearing surface on the walls of the fin and bellcrank which makes it much stronger. For example, the Jouster [2] has a 5/32" brass tube mounted in the fin, and a short section of 1/8" tubing is glued to the center of the 3/32" pivot wire. On sailpanes that do not use a bellcrank, you can center drill a short length of dowel and glue in the brass pivot tube [15]. I would eliminate the brass tube. Cut out small rectangle notches in the stabilators to accommodate the dowel.

PIVOT WIRE

The pivot wire is glued to the fin tube making it a part of the fin. One of the last construction steps should be to glue the pivot wire in place with the wing and stab mounted [2]. This eliminates all slack so get it plumb before the glue sets. The pivot wire should be straight and smooth to minimize friction when the stab rotates. Make sure that the wires used to align the tubes within the stab are straight. On a three meter sailplane a 3/32" pivot wire is adequate for normal flight maneuvers; however, it is possible to bend this size wire if extreme maneuvers are done at excessive speeds. I recall a beautiful sunny day that my Jupiter had attained a lofty height, and I was crusing it about the sky with the SD3021 airfoil in reflex. There was an older gentleman standing nearby who was interested in learning to fly. After I handed him the transmitter, it only took a few seconds for the plane to reach worp speed. This was followed by rapid movement of the controls in a desperate attempt to prevent the forthcoming crash. I got the plane under control with just enough altitude to fly back and land with a bent pivot wire. Some builders recommend 1/8" wire (8). So consider the purpose for which the plane is used; also note that the wire is easily replaced.

CONTROL WIRE

I will call the wire that moves in an arc about the pivot wire the control wire. The control wire pivots on the bellcrank and is fixed to the stab. It is fixed in a temporary manner to allow the stab halves to be removed from the fin. A secondary use of the control wire is to retain the stab halves on the fin while in use. You could put wax or any slightly sticky substance on the control wires [3,14]. I remember seeing sailplane plans that specified imbedding collars and set screws to secure the stab. I secure the control wire without adding any weight by just bending the tips of the wire slightly to provide the necessary friction. One end of the wire will fit tighter than the other, and the wire will stay with that half of the stab. If it gets mangled, just pull it out and make up another.

On the subject of unnecessary weight, the control wire can be thinner and somewhat shorter than the pivot wire. For example, on the Jouster the pivot wire is 3/32" and the control wire is 1/16". Also the tubing for the control wire is aluminum.

CONTROL LINKAGE

Of all the control surfaces on an R/C sailplane, the stabilator is the most critical. The control linkage must be as slop free as possible. Typically this linkage is a rigid pushrod such as an arrow shaft. Notice that the arrow shaft is the strongest part in the fuselage but contributes nothing to its strength. This is connected to the stab bellcrank. A light and strong bellcrank can be fabricated by laminating a sheet of carbon fiber between two thin sheets of plywood. Use a triangular shape for the bellcrank as shown in reference 4. It is much stronger than the L shape. A control linkage that is both light and tight is the pull-pull system described in references 5 and 6.

THE GAP

One of the obvious problems with stabilators (verses stabilizers) is the additional induced drag caused by the gap between the stabilator roots and the fin. When the stabilator is producing lift (usually downward), air moves through the gap. It takes energy to set this air in motion, and this energy consumption shows up as drag. Booo! Furthermore, this results in a reduction of lift. Booo! Two things can be done to help: 1) minimize the gap, and 2) seal the gap. It helps if the sides of the fin are flat. A triangular-shaped fin allows additional room for flat sides in the area of the stab. The root rib should be made thick enough to allow contouring the stab to the fin. For contoured fins, you could build a shallow fillet like a small wing fillet. For already completed sailpanes, consider sealing the gap as described in reference 3. It would be great if an equipment supplier would develop a product something like a spongy servo mounting tape with thin milar on one side.

CONSTRUCTION

The stabilator should be as thin as possible without becoming to flimsy [7] since thin airfoils perform better at low Re numbers [8]. A sharp leading edge will have a narrow useful range of angle of attack and will stall easily [8]. I use a 1/8" diameter curve on the LE to achieve a good maximum lift. You can reduce weight and thickness by tapering. The stabilator on the Jouster has a root thickness of 3/8" and a tip thickness of 3/16". Most designers taper the profile as well, but this is mainly for aesthetic reasons [7].

If you are interested in designing and building your own stabilator, consider the design shown in reference 9. Also reference 8 gives information on where to locate the pivot wire.

DECALAGE

Before I had read Frank Deis's article [10], I had never heard of decalage. I found it very interesting that angles of attack for stall, minimum sink, and max L/D were separated by about 3 degrees for the SD3021 airfoil. So naturally I was anxious to measure the decalage on the Jouster. Figure 1 shows how I measure that important angle. I make a temporarily aiming device by placing tape on top of the stabilator near the LE and the TE. Trim the tape so the back piece is very slightly longer than the front. In the back I use a white (or bright) color with the tape oriented at a right angle to the span. Near the LE I use a darker tape oriented parallel to the span. The tape is folded back on itself so it will stand up. The idea here is to establish a line of sight that is parallel to the cord of the stabilator. If you do a lot of this you might consider building an aiming device similar to that shown in reference 11. Establish the line of sight and measure the distance up from the LE (not the bottom) and TE of the wing. Do this with the receiver and transmitter turned on and trims set properly. Notice that the flap setting will have a large effect on this measurement. The decalage (as used in reference 10, 12) can then be computed with the approximate formula:

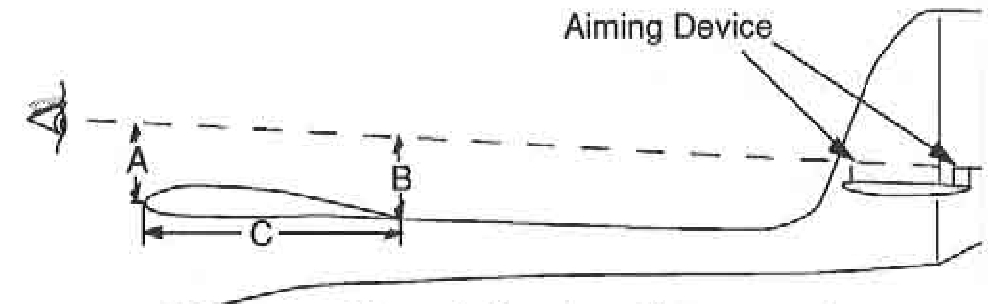

Figure 1 Decalage Measurement

decalage = 60(b-a)/c degrees

For example, if we measure b-a = 3/8", and c = 10", then;

decalage = 60(3/8)/10

decalage = 18/8

decalage = 2.25 degrees

TRIM ADJUSTMENT

Another use of the aiming technique is to reset the stabilator trim. Suppose you are setting up a new sailplane and you would like to center the trim on your transmitter. Just attach an aiming device to the stabilator and measure ONE distance up from any convent reference. A forward location will provide a more precise adjustment than one closer to the tail. I use the wing bolt on the Jouster. Now center the trim and adjust linkage until you duplicate the distance that you previously measured. This technique is an order of magnitude more precise than the usual practice of marking the fin. Note that the aiming device does not have to establish a line of sight parallel to the stabilator as required when measuring decalage. I was motivated to write this article because this information has helped me so much. The stabilator has become the standard for thermal sailplanes; let's perfect it.

(1) "Epoxy & Cotton Flox for High Stress Areas", W.D. Williams, *RCSD*, Dec. 92, page 2.

(2) "Building instructions for the Jouster Sailplane", Harley Michaelis, Model Aviation Plans.

(3) "How to Fill a Troublesome Gap from Jer's Workshop", Jerry Slates, *RCSD*, Feb. 90, page 6.

(4) "How to Make a Mold to Meet your Hardware Needs - Jer's Workshop", Jerry Slates, *RCSD*, Oct. 90, page 2.

(5) "Pull-Pull Cable Systems", Bob Champine, *RCSD*, April 91, page 24.

(6) "Dial Cord For Closed Loop Systems", Bruce Abell, *RCSD*, Sep. 92, page 45.

(7) "More Answers", Jef Raskin, *RCSD*, Jan. 93, page 4.

(8) "Understanding Sailplanes", Martin Simons, *RCSD*, Dec. 92, page 14.

(9) "Ehecatl A Medium Tech Sailplane", Pancho Morris, *RCSD*, Feb. 91, page 8.

(10) "Elevator Trim and Decalage", Frank Deis, *RCSD*, Feb. 92, page 34.

(11) "A Low Cost Incidence Meter", Pancho Morris, *RCSD*, Jan. 92, page 8.

(12) "Decalage, Again?", Ed Jentsch, *RCSD*, Jan. 93, page 22.

(13) "Decalage, Again?", Ted Off, *RCSD*, April 93, page 3.

(14) "Stabs & F3E", Curt Nehring, *RCSD*, May 92, page 2. ■

Wildey Johnson flies RC sailplanes in southern Florida with the Glades Soaring Group and the Broward Hill Flyers. He is a member of the Secquatchie R/C Flyers in Tennessee. He has 700 hours in full scale sailplanes. ■

Comparison of Model Sailplane Flight Times by Class

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On more than one occasion, I have been challenged for stating that model size is related to flight performance; therefore, Two Meter Class ships should not be grouped with Unlimited Class ships in contests. I don't know of anyone challenging my first statement with data, so perhaps this will be a benchmark to which others can respond. After looking at the statistics from about 500 of my flights during fun and practice sessions, I can provide data to support my statement.

Of course there are reasons for differences in sailplane flight performance other than the model size.

- One should recognize that thermal soaring is a mental activity and individuals are not equal in their ability to recognize and use thermals. Good flyers can win contests with two meter span models in classes for larger models...perhaps even hand launch models if significant differences in skill and opportunity exist.
- When you fly with others, you might find that they will help you spot lift.
- Flying location is another factor which accounts for differences in the frequency and strength of thermals. I recently heard from a well known West Coast flyer who remarked that East Coast flyers feel that they need 60 oz. sailplanes while West Coast flyers are comfortable with 80 oz. sailplanes. Certainly the great, full size, thermal soaring sites are in the Desert Southwest and not the green eastern states.

In order for my study be worthy of consideration these factors must be minimized. All the flights in this study were flown by one person and were flown from Anderson Sod Farm, a peat bog in the Great Medina Swamp of Northeast Wisconsin. The area is a mix of protected wildlife habitat and rich farm land. This is the home of the Valley Aero Modelers.

The statistical analysis of the information presents special problems in that the event being measured, flight time, is not naturally random. The important variability occurs as a result of the length of the positive skew in the frequency distribution as you will see in the figures. I don't know how to assign levels of confidence to the conclusions but the theory is supported by other factors and does not contradict intuition. I hope that you will consider it useful.

THEORY:

Virtually all sailplane performance evaluation computer programs indicate that, with all other things being equal, larger sailplanes outperform a smaller one of the same relative proportions. The PC-Soar[1] polar curves (Figures 1 and 2) for three sizes of Sagitta's will support this point. These theoretical differences (see Table 1) come from Reynolds number effects related to differences in wing chord and induced drag from wing aspect ratios. The increased drag shows up as differences in Sink Rate and/or Lift to Drag Ratio. Table 1 shows normalized drag coefficients for the three Sagittas. This latter L/D ratio relates to how far forward the model will move for every foot of altitude expended. When comparing model, the sailplane with a higher L/D ratio will be able to sample more air for thermal activity before it lands, given the same launch altitude. A practical difference between models comes with their abilities to find and extend flights from one thermal to another. Larger models can also be seen at greater altitude and can be flown more efficiently.

Table 1
Summary of Theoretical Projections for Performance

Parameter	Sagitta 600	Sagitta 900	Sagitta XC
Wing Length (in)	78	99	175
Wing Area (in^2)	616	890	2094
Aspect Ratio	9.59	10.77	14.2
Weight (oz)	33	44	136
Wing Loading	7.71	7.11	9.35
Min. Sink (fps)	1.34	1.16	1.05
Max. L/D	16.2	17.6	23.1
Speed at Max L/D (mph)	16.4	15.7	21.4
Airfoil Drag	0.0212	0.0201	0.0117
Induced Drag	0.0163	0.0145	0.0056

Table 2
Comparison of Models in Study

Class	Model	Average	Maximum	Flights
HLG	Chuperosa E212 Wing	3.69	6.33	6
2M	RO-8 with E205 wing	9.15	37.33	8
2M	RO-8 with original wing	4.17	8.33	10
2M	Prodigy	5.94	44.42	243
Standard	Cumic	8.88	46.05	40
Unlimited	Cumic Plus	9.13	64.70	118
X-Country	Dynasoar (custom des.)	9.71	47.75	39
X-Country	Constellation	12.66	46.83	15

Table 3
Group Statistics for Sailplanes by Class

Class	Average	Maximum	Flights	Probability of Flights > 5 Min
Hand Launch	3.68	6.33	6	0.17
Two Meter	6.36	44.42	287	0.47
Standard	8.62	46.05	40	0.63
Unlimited	9.26	64.70	130	0.58
X-Country	10.53	47.75	31	0.71

Figure 1

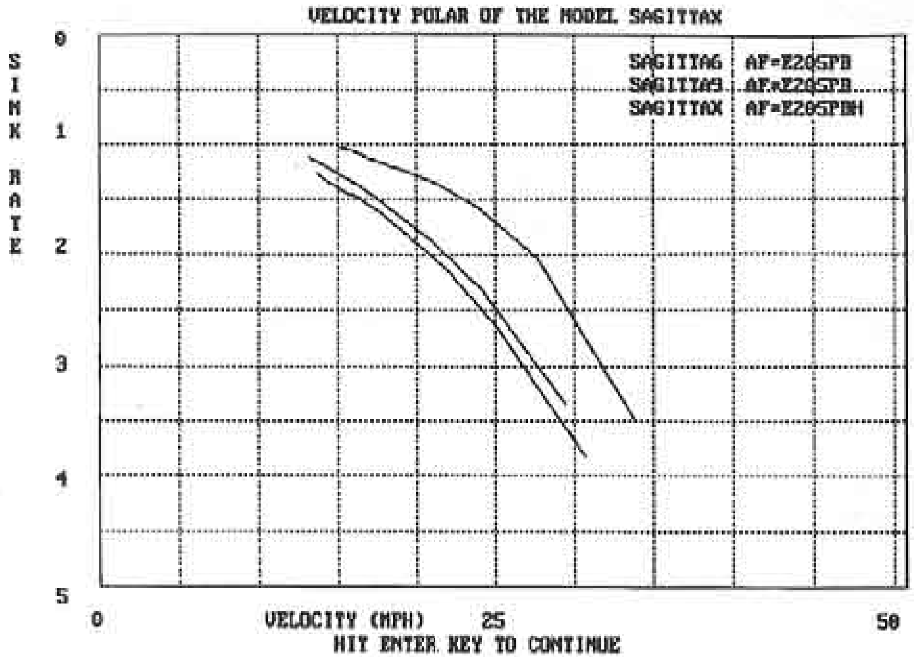
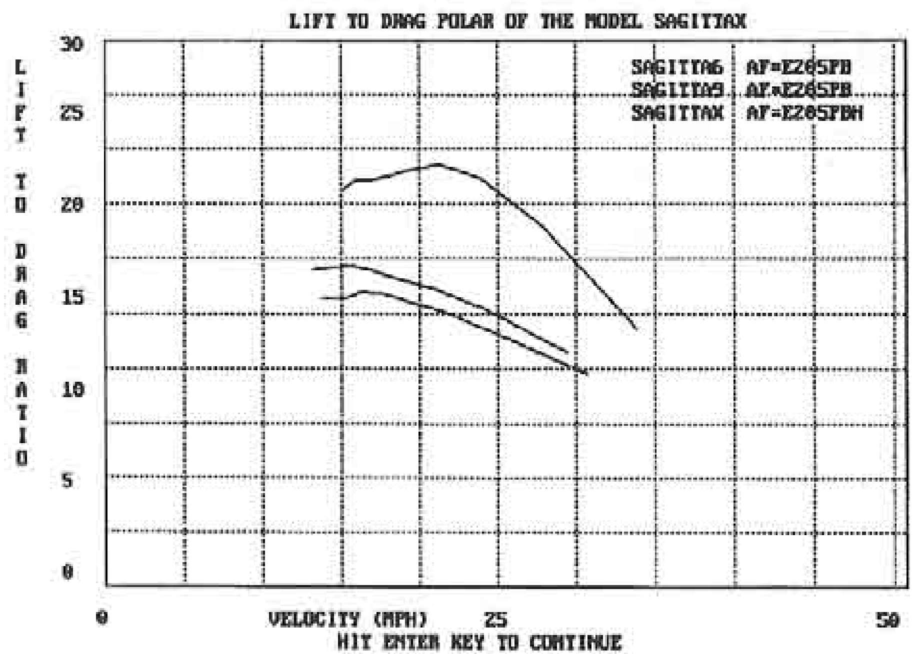


Figure 2



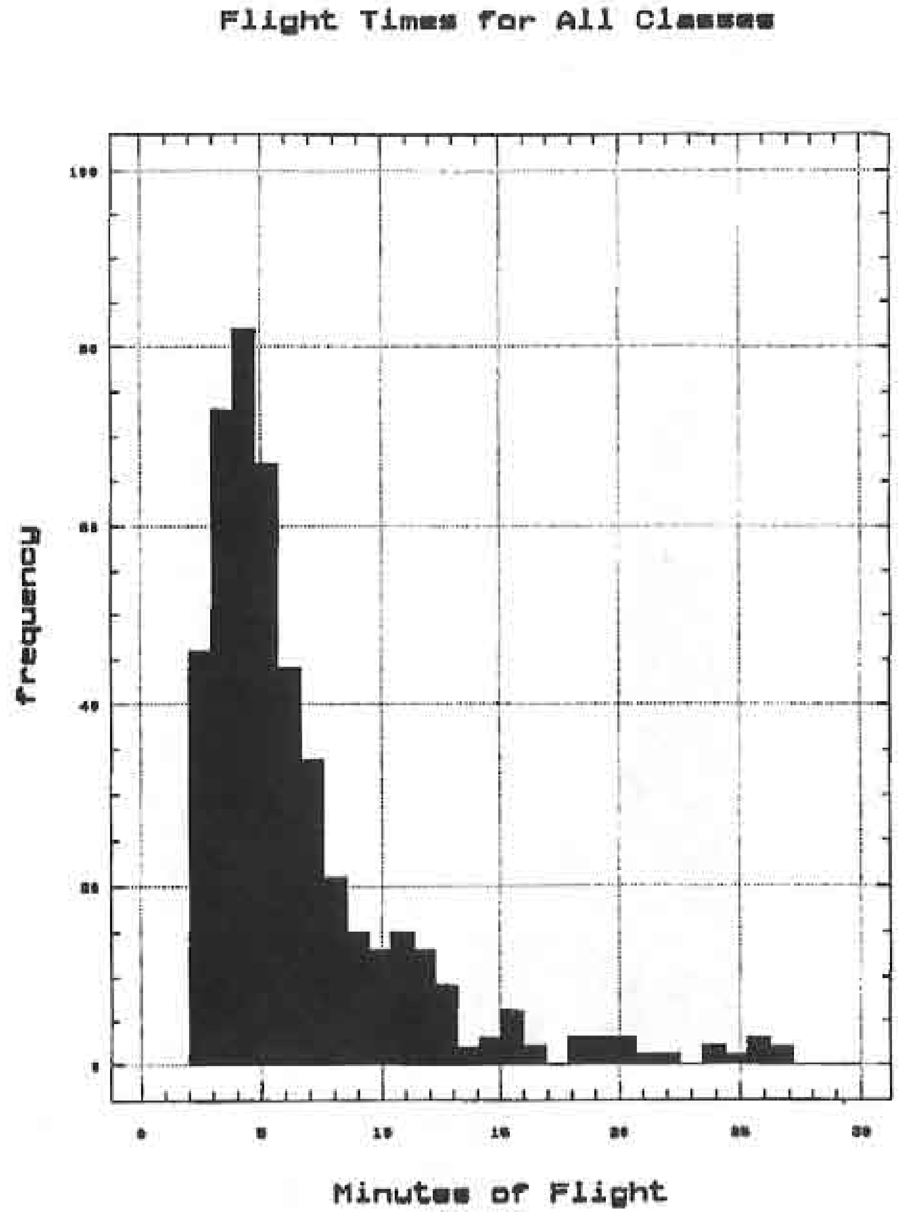


Figure 3

DISCUSSION:

The basis for my comments comes from the statistical analysis of 494 flights documented during practice and fun flying session over a six year period. The information includes: date, the model, launching method, the wind speed, time of day, and cloud condition. The flights were with various models ranging in size from hand launch to XC models. The few hand launch model class flights in this

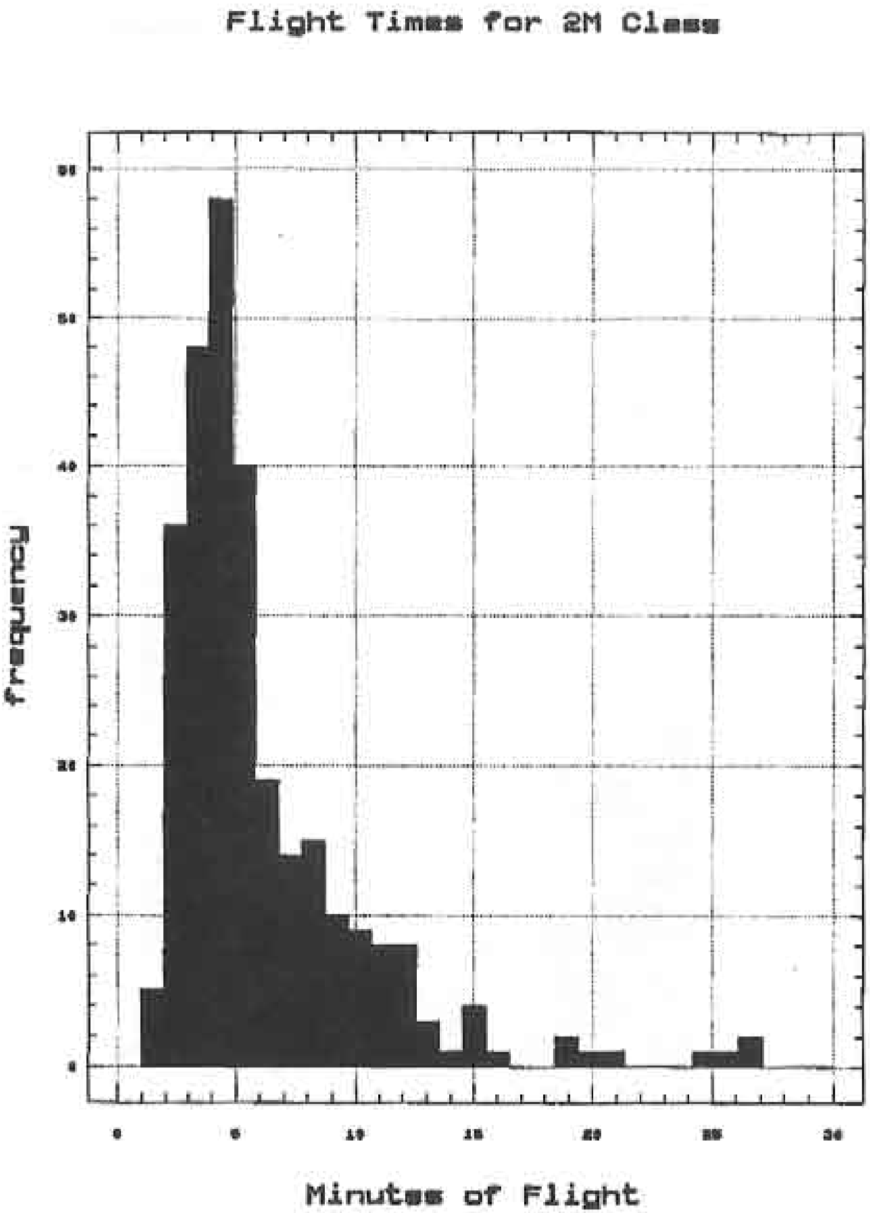


Figure 4

study were launched from high-starts or sport winches. The Two Meter, Standard, and Unlimited Class ships were launched either from a high-start, sport winch, or typical Ford long shaft starter winch. One factor which limits the analysis of the information in that, on some flights, I would intentionally come out of lift at some point to share a frequency, increase the challenge by finding the next thermal, or not risk battery failure... especially if I didn't have some goal to

achieve, e.g. an LSF goal which could be witnessed, or attempting to set a record.

The models flown with any frequency are listed in Table 2 along with simple statistics about their average flight time, the maximum flight time for that model, and number of flights in the data pool for that model.

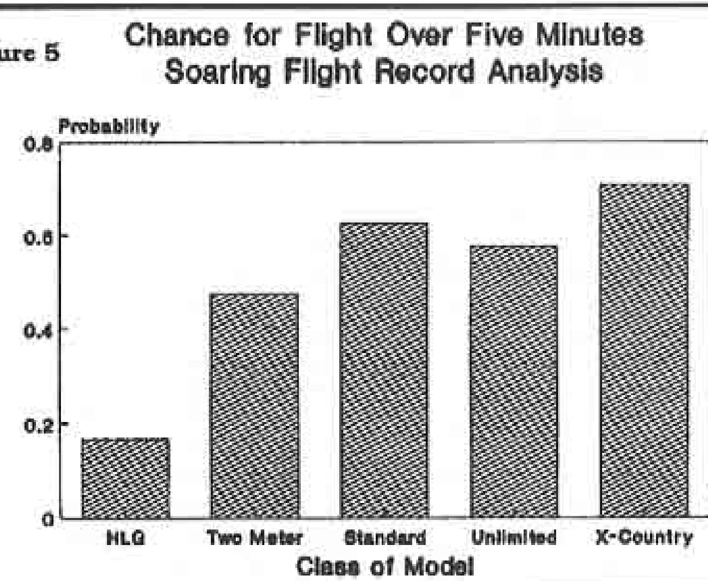
A factor not broken out separately is the difference between airfoils. These difference have been documented in a Princeton University wind tunnel and the report Airfoils at Low Speeds by Michael Selig, John Donovan, and David Fraser. Their report is available as Soartech 8 from H.A. Stokely[2].

The statistical significance of model flight time averages is really low when the number of flights is small. A better way to look at my data is to group the flights by class. This is shown in Table 3. These averages don't help us appreciate the variability in flight times. A good way to examine variability is to use the statistician's graphic tool, the histogram. The height of each "frequency" bar in this chart tell us how many flights of given time window, e.g. 4.50 to 5.00 minutes, occurred for one class of model. Figure 3 shows the "Total Flight Time Histogram" for all the models flown. Figure 4 shows the histogram for the largest single class of flights, that of the Two Meter Class models. All classes have a peak in their histogram (group mode) at about 5 minutes. It is probably obvious that a flyer won't have flights longer than 5 minutes on a nearly treeless sod farm without lift regardless of class. This would indicate that **the important differences occur with flights above 5 minutes**. Therefore, one might conclude that differences in performance might be related to the chances of finding and using lift. Figure 5 illustrates that the chances (probability) of having a flight greater than 5 minutes are also related to model size. A probability of 1.00 would be a certainty and a probability of .3 would indicate only a 3 of 10 chance of achieving flights longer than 5 minutes.

SUMMARY

Larger sailplanes allow one to fly higher, in better control and further down wind so the performance capability is en-

Figure 5



	2M Class	Unlimited
1992 NSS Soar-In, Madison, Wisconsin	2278	2286
1992 Milwaukee Thermal Soarers Contest	1345	1643
1992 Appleton Sailplane Contest	1550	1600
1991 Fond du Lac Sailplane Contest	1354	1612
1991 Appleton Sailplane Contest	1580	1614
1990 Appleton Sailplane Contest	1529	1600
1990 Fond du Lac Sailplane Contest	3754	3773

hanced. Theory will also say that larger models generally cover more ground and sink slower increasing your probability of finding thermal lift. The difference in class performance that I have demonstrated in my flight data are evident in the absolute winning scores of contests where the Two Meter Class competition is held concurrently but scored separately from the other class or classes. I have records of several Wisconsin sailplane contests where there has been a tradition of keeping them separate.

One is not precluded from flying a Two Meter Class sailplane to the winners circle in Unlimited Class or from getting your LSF Level V flights with a Two Meter sailplane. It would seem to be a matter of probability. The consensus is that one doesn't build a new Two Meter sailplane for the purpose of achieving higher LSF level flights of one and two hours.

I have restricted my analysis to model size in this article. A future article will deal with launch modes, wind speeds, and time of year and their interactions. I also have some information on electrically launched models which was surprising to me.

[1] PC-Soar is available from LJM Associates, 1300 Bay Ridge Rd., Appleton, WI 54915 at a cost of $39.95 + $3 P&H.

[2] Soartech 8 is available from H.A. Stokely, 1504 Horseshoe Circle, Virginia Beach, VA 23451 at a cost of $20 including shipping. ■

Direct Aileron Drivers DADs

...by Harley Michaelis
Walla Walla, Washington

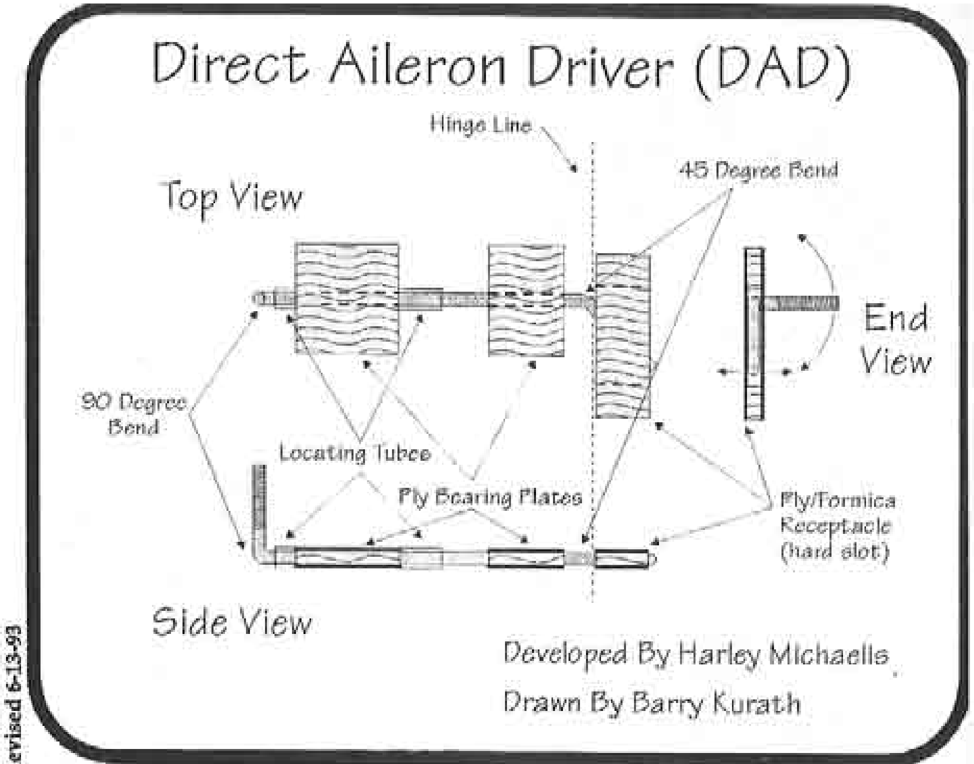
The July 1993 issue of *Model Aviation* (page 16) presents my Jouster sailplane that includes several innovations of interest to sailplane enthusiasts. However, with the plans compressed for the magazine page, the details may not be understood or slip by unnoticed. ...I should mention that *MA* felt the DAD concept of sufficient merit to do a separate article for all R/Cers and will do so in the September 1993 issue (page 120). ...The Jouster has plug-in tips, but in a 2-panel ship a straight wire pushrod can go directly from the servo to the DAD.

This set-up allows for a clean wing, with no external horns, backplates, screws, threaded rods, set nuts, clevises or exit guides or slots. If the parts are carefully made, slop and bind are eliminated. This helps control flutter and assures consistent centering of the control surface. Positive action can be assured with servos placed inboard, eliminating long servo leads and the associated glitching problems.

Concept, fabrication and installation are simple.

Concept

As the upright end of the wire arcs laterally, the rear end goes up and down thus driving the control surface.



Revised 6-13-93

Fabrication

A Dubro 4-40 rod is bent 90 degrees about 3/16" below the threads, forming the upright (forward) end. Before making the second bend, slip on two short pieces of 1/8" nylon tubing. These will be glued on either side of the front bearing to prevent foreaft play. The 45 degree horizontal bend is just ahead of the hingeline. The overall length of the DAD is determined by the space between the spar and the hingeline. Typically, the unit is around 3" long. The bearing plates are assembled over the wire. The receptacle for the rear end has a 1/32" ply base and a Formica tip. Spacers between them are sized to prevent any play.

Installation

The two ply bearing plates are mounted on a 1/64" ply base on the bottom skin of the wing. The receptacle for the 45 degree end is mounted on a 1/64" ply base on the bottom skin of the aileron. A Rocket City Swivel Link will provide neutral differential, and can be found in their #29 or #69 package. The Goldberg 332 Adjustable Horn Bracket can be used if the wire is bent so that the hole is upright, otherwise it will create differential action. The wire in the aileron points outward 45 degrees toward the wing tip. This gives up aileron with an inward pull. A working radius of about 1/2" gives ample throw outward to provide mechanical differential.

An Update from Harley

The 6/13/93 drawing does not make it clear that the ply bearing plates are a 3 layer proposition, involving 1/32" ply, top and bottom, plus 3/32" ply between. ...This makes them easy to make and assemble over the wire after the bends are made. The 45 degree rear bend should be slightly ahead of the hingeline as shown in the photos (*Model Aviation*). The part behind the hingeline is also a 3 layer item, consisting of a 1/32" ply bottom, a formica (not Masonite) top, and 3/32" ply spacers, sanded down for snug fit. Although the CA glue bonds formica and ply well, small flat-headed machine screws should be countersunk in the Formica to securely join parts. ■

FREE FLIGHT

QUESTIONS ANSWERS & THINGS

A Question About Free Flight

In the April issue of *RCSD*, page 4, Ed Jentsch of Rockville, Maryland asked the following question:

> "Ted (Off) did raise the interesting point of free-flight. Can he, or someone else out there, explain why free-flighters invariably choose to design, build and fly inherently unstable planes? That the force arrangement (i.e., CG behind the NP and positive stabilizer lift) results in a low speed, high-angle-of-attack glide begs the question. The same result can be achieved with a more traditional arrangement. Does it have to do with balancing power-on/power-off flight characteristics, or do free-flighters just like playing on the edge?"

Ted's Response

...from Ted Off
Oxnard, California

Here I go....about to climb out on a limb and saw it off. In answer to some comments I made in the April issue relative to stability, Ed Jentsch asked in essence why free flight modelers fly with a center of gravity further back than we R/C fliers do (inherently unstable planes). I've skimmed through Zaic's yearbooks, 25 years of the NFFS Sympo's, exchanged letters with Martin Simon and reread the "Old Buzzard's Soaring Book". I can't find the answer so I'll try some of my own.

First, free flight builders do not build planes with the center of gravity behind the neutral point. That was the significance of the formula in my letter. As the size of the stabilizer is increased or moved further aft, the neutral point moves with it. Thus, a free flight model with a large stabilizer can have the center of gravity at the trailing edge of the wing, still have it ahead of the neutral point and be more stable than any of our R/C gliders. Intuitively, I would suspect that they are designed more stable than our R/C planes. They are designed for minimum sink and need a strong stabilizing action to hold the wing at that high angle of attack.

However, the real question is why do they have their c.g. further back on the wing chord? First, as Ed suggested, it has to do with handling power. If the stabilizer can not be adjusted, a normal plane will want to loop when the power is increased because increased power equals increased speed equals increased lift on the wing. This can be counteracted in part by having a lifting stabilizer (c.g. further aft) which, with increased speed, tends to lift the tail up and thus reduce lift on the wing. Frank Zaic goes into much more detail on this in his book "Circular Airfoil".

But, many free flight models have a mechanical device which changes the angle of incidence of the stabilizer at the end of the power portion of the fight. And then there's free flight glider competition where no adjustments for speed are required. These too though have the c.g. further aft than we R/C fliers (50-60% of the average chord for F1A-Nordic gliders and 60-70% for F1C-Piston Engined with adjustable stabilizer). Why?

This is where I start climbing out the limb. I think this aft c.g. has something to do with the ability of a circling free flight model's ability to find and stay in lift. In a full size glider with a 25-30% c.g. one feels a thermal by (1) a kick in the pants, (2) a lifting of the tail, and (3) <u>a tendency of the glider to turn away from the thermal</u>. We've seen this lifting of the tail and turning away tendency in many R/C gliders too. But, <u>the free flight model lifts its tail, tightens its turn into a thermal</u> and tends to straighten its path in sink.

Part of this is because the inner wing is flying slower than the outer wing and tends to stall when lift is encountered.

The other reason can be visualized by suspending a glider on a string at its c.g. and moving a fan under it. The tail lifts up. In a thermal, this happens. The model speeds up and with free flight trimming, tightens the turn. The larger the tail volume (formula in last letter), the stronger this tendency is.

The further aft the c.g. is, the stronger this tendency is.

I'd welcome a better or more mathematical discussion. ■

Frank's Response

...from Frank Zaic
Northridge, California

The purpose or reason for using a large stab and C.G. at 100% on free flight models was to reduce the lift of the wing under power and so enable the full use of power for vertical climbing.

This is accomplished by having the curve path of the model develop a negative angle of attack on the wing and a positive angle on the stab. Under such a condition, the wing's lift is reduced.

Since most of the model's flight is in a circular mode, a curved or circular relationship exists between the moving wing and still air. Also, the 100% makes the arrangement very sensitive to a curved or circular path.

Hope this will help. The concept has been accepted as I have not received any contrary opinion. ■

Frank Zaic's book "Circular Airflow and Model Aircraft" is available from Frank Zaic, Box 135, Northridge, CA 91328-0135. He also has a series of year books, as well. Just send him a stamped return envelope in order to obtain his price list. ■

Russ' Response

...from Russ Whitford
Milwaukee, Wisconsin

I am writing to give my input about the CG question for FF models per April, 1993 issue.

Yes, ff models have the CG rearward to make trimming possible at high and low speed flight. Can anyone dispute that the models with the widest speed range are FF models? Consider even an indoor HL glider or catapult glider. Outdoor gas models climb at about 80 MPH and glide slower than any R/C sailplane.

FF planes can fly with a rearward CG due to the pre-programmed flight. Climb is in a right spiral typically and glide in a left turn. Cross trim prevents a spiral dive in glide and thrust trim controls climb. Cross trim is using wash-in in the left wing panel to counteract left stab tilt or left rudder. At the higher speeds generated by spiral dive to the left, the left wing wash-in rights the plane. The plane does not zoom up when the wings are leveled because of the rearward CG.

Extremely low wing loadings allow this correction to occur with little loss of altitude. Long tail moments and light weights cause a lot of damping effect that also aids in stability.

Thickness of the wing airfoil is always greater than stab airfoil. I know this is very important, but will leave the theory to others. Some older gas designs require thinner stabs to remain stable using modern high performance engines.

So, why is a FFer like me reading *R/C*

Soaring Digest? FF and R/C soaring are very complimentary forms of model aviation. The technology, construction and skills are similar. Shortage of flying fields makes R/C soaring much more practical. The aesthetics are also similar. I also enjoy sailing. These three passions conjure images of peaceful, calm and serene activities. Not so. I enjoy a screaming FF climb, fly mostly slope soarers and race on an ultralight, Kevlar offshore boat that will plane at 16 knots. Oh well, there goes the poetry. ■

A Free Flight Enthusiast

Recently, we received a letter from Ralph Prey. He is the editor for his club's newsletter, *Satellite*, which has a national distribution to major free flight modelers. Ralph says, "I'm pioneering the use of R/C glider airfoil/construction in AMA powered free flight models in the club I belong to." If you are interested in obtaining more information on this subject, Ralph's address is 4859 W. 97th St., Inglewood, CA 90301. ■

Free Flight Locator?!

We received a note from Ed Toner, Howell, New Jersey. He says, "Here's an item that may be of interest for you. Although designed for locating wayward rockets, it is small and light enough for FF. Price is right, too. Order the TRANSROC II™, EST 2237, $29.99 + $2.25 from Estes Industries, P.O. Box 277, 1295 H St., Penrose, CO 81240-0227."

The TRANSROC II™ literature says, "Recovery is easy with this compact, lightweight sonic tracking and locating system for model rockets. The on-board unit fits in any BT-20 size rocket or larger and emits a strong locator tone. The direction and frequency sensitive hand-held receiver will pinpoint the sending unit at up to 183 meters (600 feet) range. Includes headset and magnetic compass. Requires one 9 volt and one 6 volt (type 2CR1/3N) battery - not included." ■

Evaluating Model Designs

...by Jef Raskin
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Phone: 415-359-8588 Fax: 415-359-9767

An Error In A Previous Article of Mine, Using Sweep for Roll Stability, and, Evaluating Flying Quality in General

Sometimes I hear from a modeler who modifies a model and reports improved performance beyond anything that physics thinks is possible. Occasionally these reports counter known aerodynamic principles. More often I will hear that changing this or that detail makes a plane "less draggy", "handle better", or improves some other parameter. Most of these judgements are questionable. A recent exchange of correspondence with a modeler on the topic of the utility of small amounts of sweep to improve the stability of aerobatic gliders is a good example.

Nat Penton, of DeQuincy, Louisiana, clearly knows his stuff. He wrote to point out some erroneous advice in my article, On The Design of Aerobatic Sailplanes, published here a while ago. I had suggested that larger thickness ratio airfoils at the tip of a strongly tapered wing might be a cure for excessive tip stalling. Penton observed correctly that at model sizes this strategy would probably not work. Recently, he sent me another delightful letter with some quotes on both sides of the issue. From Lennon, *RC Model Airplane Design*: "Some methods of improving the lift distribution of tapered wings are: (among others)... thicker sections at the wingtips, than at the root." From Simons, "Model Aircraft Aerodynamics": "With all tapered wings on models, the tip chord should err on the generous side to avoid tip stalling caused by scale effects and laminar separation. The aerofoil section at the tip should be thinner than at the root, for the same reason." And from Anderson, NACA Report 572: "Improvement [in tip stall characteristics] could be obtained by using thicker sections near the tips."

Thicker? Thinner? Thicker? OK, time to do my homework. Thicker sections generally stall at higher angles of attack than do thinner sections, and their stall tends to be more gradual. But blunt-nose sections also tend to stall at higher angles of attack than pointy ones. Also, at higher Re the stall usually comes at higher angles of attack (but not always: see the SD8020 in Soartech 8). For non-flapped sections at model sailplane speeds, measured stall angles vary between 9 and 12 degrees. Thinner sections are more efficient at lower Re. We have trends in all directions.

If the taper ratio is .5 (tip half the chord of the root) the tip is flying at an Re half of that at the root. For many sailplanes, it turns out that the decrease in efficiency due to the lower Re at the tip can more than wipe out the advantage of taper in decreasing induced drag. A rectangular wing might be more efficient than a tapered one! After looking at the numbers I have come to the conclusion that there is no general answer to this question. The results are so narrow that it depends on the speed and size of the aircraft and the particular airfoils used. The answers may be different for the same plane if it is flying slowly or quickly; this is an issue which must be decided for each case individually.

Penton reported that in his powered aerobatic models, a bit of sweep made them fly more stably. And this brings me to my main subject: it is usually impossible to know if a small change makes a difference. But first, consider the friendly dispute in which Penton and I were engaged. We know that too much sweep will cause yaw-roll coupling, that is the plane will roll with application of rudder. In fact, some of my sharply swept deltas will do a very nice axial-looking roll with rudder only. On the other extreme, the no-sweep Anabats just fly somewhat sideways without rolling (or pitching, for that matter) when you apply rudder. The effect, at extremes, is clear.

But how about a small amount of sweep, say 8 to 10 degrees? Penton reports no observable yaw-roll coupling, which accords with my own experience. But he claims increased stability with such an arrangement whereas I argue that if there isn't enough sweep to cause noticeable roll with yaw, there isn't enough sweep to give noticeable roll stability. Sweep can provide roll stability due to yaw-roll coupling: picture a plane that is slightly rolled to the right. The lateral center of pressure (of the fuselage) is behind the center of gravity. The vertical fin is there to guarantee this condition. Thus the plane's nose is yawed by gravity to the right and the plane sideslips down and right. But the right wing, due to sweep, is effectively longer than the left wing, and generates more lift, causing the plane to roll to the left. As the wings return to level, the longitudinal stability of the aircraft brings the nose up. Thus you can achieve roll stability without dihedral, useful in a plane designed for inverted flight where dihedral becomes destabilizing anhedral.

My straight-winged Anabats seem quite stable and will fly, hands-off, for 5 seconds or more (sometimes much more) depending on wind conditions. Surprisingly, a measure of roll stability comes free, without either dihedral or sweep, to any plane that is stable in pitch. Just as explained above, a slipping plane will turn into the slip due to the action of the fin, turning the roll angle into a pitch angle. The longitudinal stability of the craft will then bring up the nose, thus eliminating some of the roll. If the plane turns through 90 degrees, all the roll will have been eliminated. This is why an all-out aerobatic sailplane with no sweep or dihedral can still be easy to fly: it is absolutely stable in yaw, reasonably stable in pitch, and has something going for it in roll, too. If you don't believe this, make a little balsa glider with no dihedral or sweep, six degrees or so of wing incidence, and an adequate fin. It will fly stably once you find the right amount of nose weight.

Now that we have the theory down, how does this stuff work out in practice? Is Penton right that 8 degrees of sweep improves stability without introducing yaw-roll coupling? One part is easy to test: you observe if planes roll when you apply rudder. Neither of us have detected any roll (with the plane going horizontally or vertically) with sweeps up to 10 degrees on our particular aircraft. So we are satisfied on that score. This is an all-or-nothing test. Either you—or, more importantly, the judges at the aerobatics contest—can see the plane roll or not. Stability is a different matter. As we have seen, almost every well-designed sailplane is more or less stable in all three axes. Stability is a matter of degree. Penton claims he sees an effect, I do not. This may be due to something as simple as the fact we are flying different planes and we are both right for our own planes. It is not worth discussing this matter further, but let us ask instead if we have any way of detecting slight performance differences at all. Do those fancy wing tips help performance? Does this fin shape or that work better? Can we tell?

The answer for most of these questions is "probably not." Human beings are notoriously subjective, even when they are honest and well-intentioned. The history of science is littered with unintentional subjective tilts. One famous example was a noted professor who was studying brain sizes in different human races many decades ago. To be objective he filled the cranial cavities of skulls with lead shot and then measured the increase in weight. Sure enough, he found that his race had slightly larger brains. A repetition of the experiment years later, done with proper controls, showed no such difference. Why? The scientist knew which skull was which. When you fill an irregular shape with lead shot the point at which you stop is not precisely defined. If he was, subconsciously, just a bit more generous with the filling of some skulls, if he shook them a bit harder while getting the shot to settle so he could add the last pieces, if he judged the scale to read closer to the "9" than the "8" when the pointer was about halfway between, and made other close calls in the direction of his expected results, he could easily have reached the results he did. And his notes indicate this kind of unconscious bias.

Many important experiments are done "double blind" to eliminate this kind of problem. A double blind experiment is one where the people doing the experiment don't know which case they are dealing with. In comparative testing of two drugs, the experimenters themselves don't know which drug is being given to each patient, so they are working "blind." On the other end, the people evaluating the effects of the drugs don't know which patient got which drug. That's the other blindness. Only after all the evaluations are completed is the code broken and the experimenters find out who got which drug.

In testing stereo equipment I ran into the same phenomenon. I'd set up an "A-B" switch so that listeners could learn which of two amplifiers they preferred. I quickly learned that you had to make the loudness exactly equal or people would tend to choose the slightly louder one. That taken care of with a sound-level meter, I found that people preferred the one they previously had decided was better (based on advertising, price, recommendations, or whatever.) But I couldn't hear the differences they said they could.

I didn't think my listening was defective so I set up an A-B-X system with a three-way switch and chose a number of amplifiers that I thought sounded the same. For each experiment, and without telling me which was which (so that I couldn't bias the experiment), a friend hooked one amplifier to two of the positions and the other to the third. If the listener insisted on knowing which was which, I randomly assigned three brand or model names to the three positions. Most listeners could hear differences between what they thought were three different amplifiers, and it became clear that their preferences were random. Audiophiles who swore by tube vs. transistor amplifiers couldn't pick one from the other, and if misinformed about which was which would choose the wrong kind. It was quite amazing and I proved that for the most part there is no difference in the sound of various power amps, cables, and many other components, in spite of intense advertising that claims otherwise.

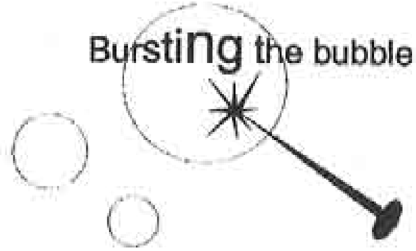
So what happens when we take our latest modification to the flying field and try it out? We have worked hard and we think that the mod is an improvement (otherwise we wouldn't have done it). So up goes the plane and, sure enough, it usually flies a bit better. But most of the time we are just fooling ourselves. This is the worst possible test. We are the pilot and the evaluator—this isn't even a single-blind experiment. Then, too, we usually don't have the unmodified plane to compare it with for A-B testing (no chance for A-B-X testing here) so we are comparing the present flying qualities to a memory. Memories are notoriously unreliable for this kind of thing, even if you've been taking notes, as many experiments have shown (there are whole books on the subject of how wrong even apparently clear memories can be).

So-called objective measures can be misleading. For example, does your new plane thermal better than the old one? Take them both out to the field and measure times aloft. Use an accurate, objective, and incorruptible stopwatch. But were the thermals identical for the tests? Did you make the extra effort to ride that little bubble at 20 feet altitude for a few circles (and an extra 25 seconds) with the new one while you just unconsciously gave up and landed the old one "knowing" it couldn't use such a small thermal? Letting some other pilot do the testing is better, so long as he or she doesn't know what you've done or why, though usually the differences are visible and the other pilot will have some preference. Using two pilots in the same air also doesn't work. A less experienced flier and I fly identical ARF electric sailplanes. We do simultaneous launches in informal duration contests. I always win (up to now, but he's getting better...). If we switch planes I still put up longer flights. If we didn't switch planes many people would conclude that my plane was better.

This is why I discount by 95% almost everything I read about novel ways to sightly improve performance. Into this category goes most information about choices between similar airfoils, small changes in wing planform, wing tip shapes, stabilator vs. stabilizer and elevator, round or square fuselage cross-sections, and much else. I guarantee you this: many modifications to model planes make such small differences in flying qualities that I can't tell, you can't tell, and most of those who claim they can tell can't tell either.

The bottom line is that I don't know who (if either of us) is right about the stabilizing effects of small amounts of sweep, and there is no easy way to find out. And don't write with your experiences on the subject unless you have some non-subjective way to prove your point! ■

Bursting the bubble



...by Graham Woods
Hertfordshire, England

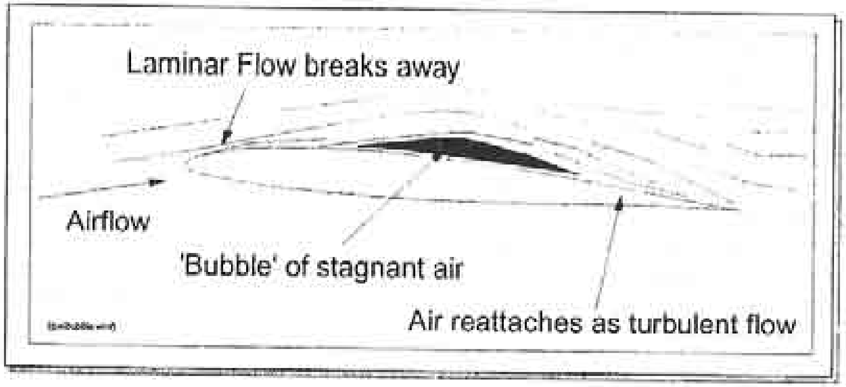
Jupiter had risen in the east starting its 195 day journey across ***our*** night sky so it must have been a Sunday in November. Winter was surely on its way. 'Twas one of those days when an almost lifeless Sun strobes hypnotically through the avenues of trees on the way to the slope and the scent of woodsmoke from distant autumn bonfires fills the air.

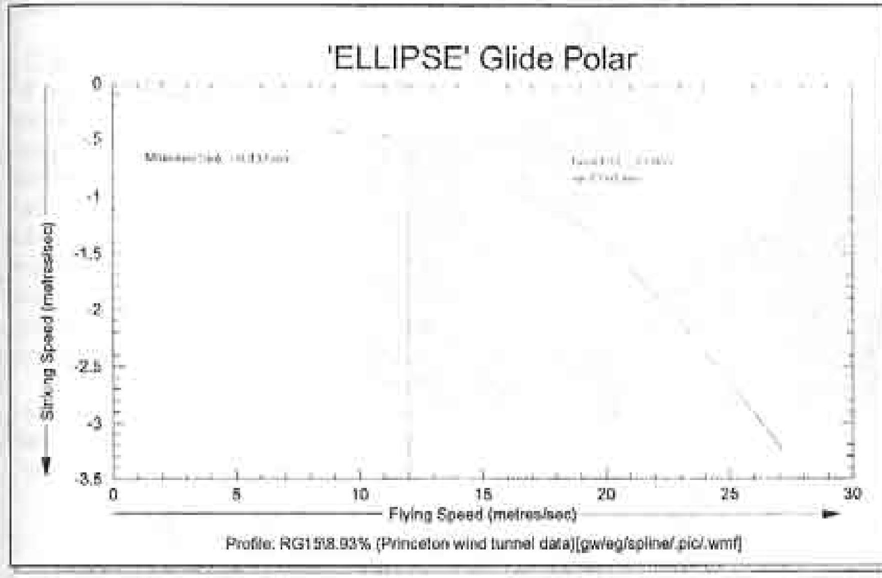
On the hill, heavy air arrived from the west. It was quite flyable but as the Sun began to set, the damp cold penetrated to the very bone. The air temperature reached dew point - moisture condensed on us and our models. One last flight and Greg Lewis flew his *Ellipse* spiritedly *(let's say)*, we didn't take much notice as we stood *chewing the fat* but when he landed something odd had happened to his model. Some of the condensation had disappeared from the surface of the wings of his model. I've noticed this before but this time I had a camera with me and took this photograph (next page) and that's why I am writing this piece - I hope you can see the effect on this fascinating photograph. So why did it happen? Have **you** seen this effect before?

I'm not really into aerodynamics at all but theory has it that a 'bubble' of stagnant air can form on the top surface of the wing under certain conditions. Laminar flow breaks near the leading edge and reattaches itself as turbulent flow towards the trailing edge. These conditions are factors to do with the wing section itself, its angle of attack and the Reynolds' numbers at which the wing is operating. A bubble is more likely to form when the model is flying slowly (a low wing Re number) than when flying fast. The ***effect*** is to make the wing ***appear*** thicker to oncoming air than it really is and therefore increase its drag.

The *Ellipse* is no slouch and likes to be flown fast; on this particular day it **was** being flown fast by Greg at low lift coefficients, not just cruising around at best glide or high C_L values. Using data from the PS-Soar[1] program I prepared the table and glide polar for the *Ellipse* and you can see that this model **always** operates at Reynolds' numbers above 125,000, probably closer to 200,000.

Still using the same soaring program I had a look at the C_l/C_d curves for the RG15 (from the Princeton Wind Tunnel Test Data), see screen shot. Looking at these measured (not theoretical) curves





'Ellipse' Glide Polar RG15 (8.93%)			
Coefficient of Lift C_L (no units)	Sink Speed (m/sec)	Flying Speed (m/sec)	Reynolds' number (full chord) (no units)
0.1	3.255	27.178	379,849
0.2	1.241	18.998	268,594
0.3	0.762	15.506	219,306
0.4	0.582	13.428	189,924
0.5	0.503	12.011	169,873
0.6	0.46	10.965	155,072
0.7	0.436	10.151	143,569
0.8	0.433	9.494	134,297
0.9	0.442	8.953	126,616

of lift and drag, at Re 200,000 and above there appears to be no evidence of the increase in drag associated with a bubble on the upper surface. On the other hand, the curve for an Re of 99,600 does show the characteristic kink associated with bubbles on the upper and lower surfaces of the wing. So why could this be when a bubble appears to be there? Any suggestions? Maybe I'm not understanding the graphs properly. (As I said aerodynamics is not my best subject.) Perhaps the change in the appearance of moisture on the wings' upper surface was nothing to do with a *bubble* at all.

It was suggested that since the wing is hollow, and the ailerons filled with Rohacell, this had something to do with the condensation effect. But then this doesn't explain the actual pattern of the condensation shown in my drawing for clarity. The way the condensation seems to vary with the chord - as does the wing Re number. Another alternative is that the section is not an accurate RG15 section. Maybe there is a smaller bubble that

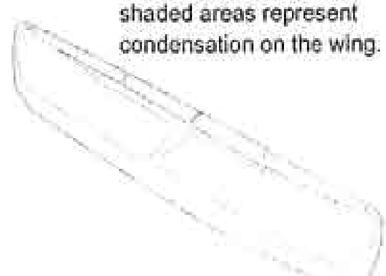
moves back and forth depending on the small changes in angle of attack? Closer scrutiny of the photograph also shows other areas of the wings' surface that are free from condensation. These are: around the tape join of the main and tip panels, the wing surface above the fuselage and the surface of the wing immediately in front of the exposed flap clevises.

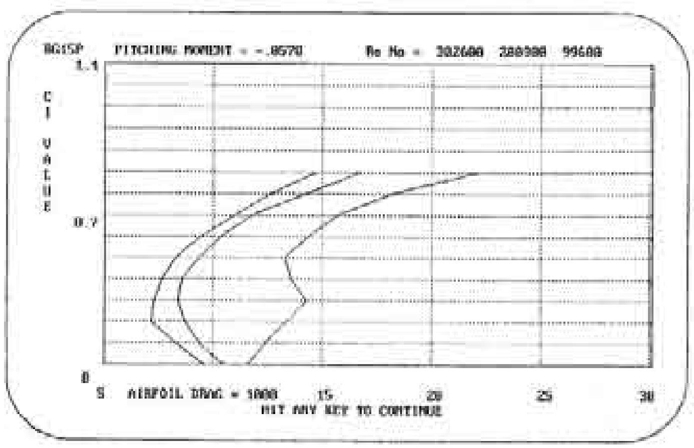
What could this mean? If, indeed, the observed phenomena *was* one of these upper surface drag bubbles, perhaps we ought to rethink our ideas about upper surface turbulators only being advisable for improvement low speed performance. To operate at an Re of 200,000 the *Ellipse* has to fly at just over 30 mph, something it must have been doing for most of the time. (A recent visit to one slope by a military policeman with a radar gun revealed that speeds of 50 mph are commonplace on the slope with dive speeds from altitude easily exceeding 100 mph, sometimes touching 120 mph).

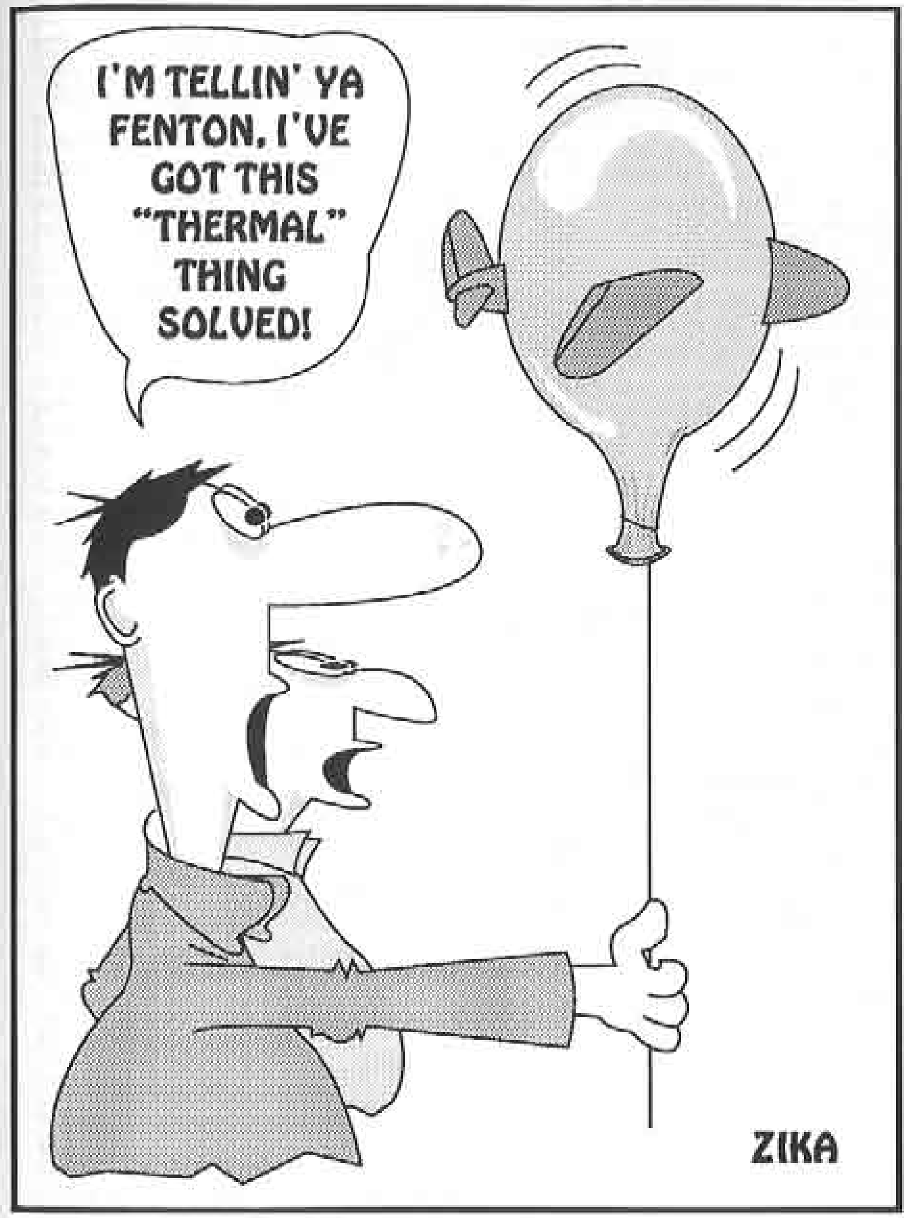
I don't know the answer; perhaps there is another explanation of the phenomenon that hasn't occurred to me. Any answers?

1 PC-Soar Program by LJM Associates ■

Just in case the photograph does not reproduce well - the shaded areas represent condensation on the wing.







R/C Soaring Resources

Do you hold seminars and workshops? Would you like to be included as a contact to answer questions on soaring sites or contests in your area? If so, please contact *RCSD*. Our address and telephone numbers are on page 1.

Seminars & Workshops

Free instruction for beginners on construction and flight techniques. Friday & week-ends (Excluding contest days) Bob Pairman, 3274 Kathleen St., San Jose, California, 95124; (408) 377-2115.

California Composite Seminars - We want to help you build better! Bring your project and let us help you with it. Thirty five dollars for a six hour plus Composite Technician lesson includes lunch! Two people minimum, please. Great mountain flying all year round! Clubs? We travel, too! Please call (805) 822-7994 and ask for Scott Metze.

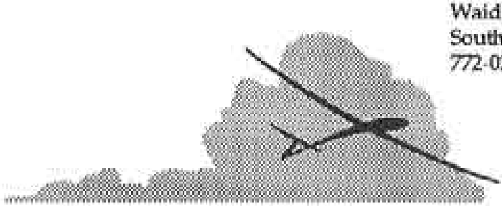
Reference Material

Madison Area Radio ontrol Society (M.A.R.C.S.) *National Sailplane Symposium Proceedings*, 2 day conference, on the subject and direction of soaring. 1983 for $7.00, 1984 for $7.00, 1985 for $8.00, 1986 for $8.00, 1987 for $9.00, 1988 for $9.00, 1989 for $10.00, 1992 for $12.00. Delivery in U.S.A. is $3.00 per copy. Outside U.S.A. is $6.00 per copy. Set of 8 sent UPS in U.S.A. for $75.00, outside U.S.A. for $80.00. Last 4 (1987-1992) in U.S.A. is $45.00, outside is $50.00. Allan Scidmore, 5013 Dorsett Dr., Madison, WI 53711.

BBS

BBS: Slope Tech, Southern California; (310) 866-0924, 8-N-1

BBS: South Bay Soaring Society, Northern California; (408) 281-4895, 8-N-1



Contacts & Soaring Groups

Arizona - Southern Arizona Glider Enthusiasts, Burt Kline (contact), 2642 W. Ca Puebla, Tucson, Arizona 85745 U.S.A., (602) 882-4083. SAGE welcomes all level of flyers!

California - California Slope Racers, John Dvorak, 1638 Farringdon Court, San Jose, California 95127 U.S.A., (408) 259-4205.

California - Northern California Soaring League, Mike Clancy (President), 2018 El Dorado Ct., Novato, California 94947 U.S.A., (415) 897-2917.

Canada - Southern Ontario Glider Group, "Wings" Program, dedicated instructors, Fred Freeman (416) 627-9090 or David Woodhouse (519) 821-4346.

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

Kansas - Wichita Area Soaring Association, Pat McCleave (Contact), 11621 Nantucket, Wichita, Kansas 67212 U.S.A., (316) 721-5647.

Maryland - Baltimore Area Soaring Society, Al DeRenzis (President), 5003 Wetheredsville Road, Baltimore, Maryland 21207 U.S.A., (410) 448-0808.

Nevada - Las Vegas Soaring Club, Steven Smith (President), 6978 Starwood Dr., Las Vegas, Nevada 89117 U.S.A., (702) 873-9591.

Northwest Soaring Society (Oregon, Washington, Idaho, Montana, Alaska, British Columbia, Alberta), Roger Breedlove (Editor), 6680 S.W. Wisteria Pl, Beaverton, OR 97005 U.S.A., (503) 646-1695 (H) (503) 297-7691 (O).

Texas - Texas Soaring Conference (Texas, Oklahoma, New Mexico, Louisiana, Arkansas), Gordon Jones (Contact), 214 Sunflower Drive, Garland, Texas 75041 U.S.A., (214) 840-8116.

Utah (U.S.A.) - Intermountain Silent Flyers (IMSF), Bob Harman (contact), (801) 571-6406... "Come Fly With Us!"

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

F3B/USA • F3F/USA

RC Sailplane Technical Journal

F3B/USA is a bi-monthly publication dedicated to the sports of F3B and F3F. The journal is intended for the beginning as well as experienced multi-task soaring enthusiast. Articles cover a wide variety of areas including: technical data issues, description of techniques, and articles written by and about the top people in the sports.

Subscription Rates: $12 per year (6 issues)
For More Info Write: F3B/USA,
87 1/2 N. Catalina, Pasadena, CA 91106

LSF

The League of Silent Flight (LSF) is an international fraternity of RC Soaring pilots who have earned the right to become members by achieving specific goals in soaring flight. There are no dues. Once you qualify for membership you are in for life.

The LSF program consists of five "Achievement Levels". These levels contain specific soaring tasks to be completed prior to advancement to the next level.

League of Silent Flight
10173 St. Joe Rd.
Ft. Wayne, IN 46835

You are invited to join the
NATIONAL SOARING SOCIETY

- OFFICIAL AMA SOARING "SPECIAL INTEREST GROUP"
- YEARLY NSS "SOAR-IN" TOURNAMENTS
- NATIONWIDE "EXCELLENCE AWARDS PROGRAM"
- EXCELLENT BI-MONTHLY NEWSLETTER
- NSS FULLY SUPPORTS THE F3B SOARING TEAM & LSF SOARING PROGRAM
- NSS IS INVOLVED IN THE ORGANIZATION AND OVERSEEING OF THE SOARING PORTION OF AMA NATS (INCLUDING AWARDS BANQUET)
- YEARLY DUES ARE $15 U.S.A. AND $20 OVERSEAS (SPECIAL FAMILY RATES)
- NSS OFFICERS ARE FROM ALL 11 DISTRICTS

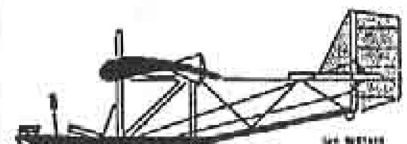
For Information, Contact:
NSS Secretary/Treasurer
Robert Massmann
282 Jodie Lane
Wilmington, OH 45177
(513) 382-4612

T.W.I.T.T.

(The Wing Is The Thing)

T.W.I.T.T. is an organization of engineers, scientists, pilots, sailplane enthusiasts, model builders and many other persons having an interest in flying wing/tailless aircraft technology. Write to T.W.I.T.T., P.O. Box 20430, El Cajon, CA 92021 to find out how you can participate.

Send SASE for membership application and flyer: "What is T.W.I.T.T." or, send $2.00 for full information package including one back issue of our newsletter, postpaid. Full membership is $15.00 per year and includes twelve issues of the newsletter. Back issues of newsletter are $.75 each, postpaid.



The Vintage Sailplane Association

VSA is a very dedicated group of soaring enthusiasts who are keeping our gliding history and heritage alive by building, restoring and flying military and civilian gliders from the past, some more than fifty years old. Several vintage glider meets are held each year. Members include modellers, pilot veterans, aviation historians and other aviation enthusiasts from all continents of the world. VSA publishes the quarterly magazine BUNGEE CORD. Sample issue $1.-. Membership $10.- per year. For more information write:

Vintage Sailplane Association
Route 1, Box 239
Lovettsville, VA 22080

Curt Nehring
Southern California

1993 Northwest Championship Soaring Tournament

Northwest Soaring Society

September 18 & 19
Eugene, Oregon

- 1 1/2 days qualifying rounds
- 1/2 day final flyoffs
- team competition

CD - Tom Culmsee, (503) 667-4532

"Gonzoklahoma"

...by D.O. Darnell
Tulsa, Oklahoma

The following took place in Yukon, Oklahoma at the Sherry Sod Farm, and it is with utter dispatch, fellow sportsmen, that I feel compelled to write you out there is Soarville with the latest flash from Prarieland.

D.O.: "Wow, that 2M Duck launches higher than about anything I've seen! Little bugger's ballistic... Troy designed 'em that way... Full-throttle winching and just sling that puppy harder and higher than anyone else! Maybe a hundred feet higher!"

Texas Tom: "Yer full of it, D.O. I can out-launch that *quacker* any day with my Mariah! Why, that ain't nuttin! Hell, I can do better than that in my sleep!"

D.O.: "You're just gettin' old and senile and anyway, you can't even see that high anymore... what's more, and (sputter)... I'll back that up with money. That Duck'l waste the Mariah!"

Tom: "I haven't got any money anymore so I won't bet (ha, ha, chuckle, chuckle), but I'm still right, anyway. Anyway, how'd ya prove it?"

D.O.: "Ahem! (scratching back of head) Well, neither have I, but you've got to admit that it's an interesting argument, anyway. Nes, Paw?"

The argument then becomes a bit less subjective suddenly wandering into the realm of genuinely interesting. How could you measure the apogee of a typical launch? I know that there are range finding devices and I know that there are pocket calculators with built-in trig functions so that a sight-and-dangle-the-angle approach could work... Maybe a Cassio watch? But how, with say accuracy within a meter, can you do it with generally available, inexpensive hardware?

Additionally, there is a potential for a new event: LAUNCHING! Well, most contests you go to nowadays are LANDING contests aren't they? Makes sense to me! Have launching contests.

O.K, some of you whiz kids out there! Submit some ideas on how to do the measuring. At least, let's start some dialogue (in *RCSD*, of course), and chew on it a bit. It would be more fun than golf and cheaper than F3B.

More Later? ■

12TH Annual
LAST FLING OF SUMMER
October 16 & 17
Blue Springs Sod Farm
(160 Beautiful Acres!)
SE of Broken Arrow, Oklahoma
Expert & Sportsman
2 Meter & Unlimited
AMA License/Gold Stickers Req.
Rahm 12 Volt Winches & E-Z Mechanical Retrievers
Awards, Raffle, & Prizes
BBQ Sat. Nite Included in Entry Fee
Restrooms on Site
Entry Fee: $25.00
For both classes both days
Contact: Sandy Hay (C.D.)
(918) 665-8069 Home
(918) 838-9961 Work
Please try to pre-register by October 11 to avoid any contest delay!

Schedule of Special Events

Date	Event	Location	Contact
Sept. 9-12	World Cup	Czechoslovakia	
Sept. 11	TPG 60" CL Slope Race	Southern California	Charlie Richardson (619) 630-8775
Sept. 11-12	Masters of Soaring (Sponsored by Weak Signals)	Temperence, MI	Art Slagle (313) 477-2228 Eve.
Sept. 11-12	CASA Thermal - 11th Annual	Gaithersburg, MD	George Frechette (301) 299-5268
Sept. 18	H/L	San Antonio, TX	Jerry Caldwell (210) 438-4077
Sept. 18-19	TNT Texas National Tournament	Dallas, TX	Henry Bostick (214) 279-8337
Sept. 18-19	SIG/EISS Glider Contest - Third Annual	Blakesburg, IA (Antique Airfield)	Jim Porter (800) 524-7805
Sept. 18-19	Cross Country C.S.R.	California Valley, CA	Scott Tooher (310) 323-4304
Sept. 18-19	Northwest Championship Soaring Tournament	Eugene, OR	Tom Culmsee (503) 667-4532
Sept. 19	F3B DARTS	Dayton, OH	Bob Massman (513) 382-4612
Sept. 25	Hand Launch Contest	Poway Flight Center, CA	Scott Condon (619) 471-2453
Sept. 25-26	2M & Unlimited Buzzards	Orlando, FL	Cy Baylor (407) 699-8750
Sept. 26	Unlimited Thermal AMA Regional	Kirkville, NY (Syracuse, NY)	Dave Zinteck (315) 656-7103
Sept. 26	TULSOAR Fun Fly	Tulsa, OK	Terry Bryant (918) 482-5817
Sept. 26/Oct. 3	2M Postal Denmark - Details in *RCSD*, "Soaring Site", June 1993	Everywhere	Steen Hoej Rasmussen
Oct. 2-3	20th Annual CVRC Fall Soaring Festival	Visalia, CA	Jerry Fox (209) 733-8091
Oct. 2-3	Annual DEAF Fun Fly - Electric	Dallas, TX	Frank Korman (214) 821-0393
Oct. 2-3	CSS Pumpkin Fly	Cincinnati, OH	Bob Lester (513) 232-3117
Oct. 9	Team Thermal Duration Contest - T.O.S.S. - First Annual	Paramount Ranch, CA	Mike Reagan (805) 529-5513
Oct. 9-10	5th Annual MASS Fall Soaring Tournament	Memphis, TN	Bob Sowder (901) 757-5536
Oct. 10	Annual Dual Elimination	Dallas, TX	Jim Truitt (214) 348-2929
Oct. 16	Open	San Antonio, TX	Jerry Caldwell (210) 438-4077
Oct. 16	TULSOAR 12th Last Fling of Summer	Tulsa, OK	Sandy Hay (918) 665-8069
Oct. 16-17	2M & Unlimited Pelicans	Morriston, FL	Bob Wargo (813) 938-6582
Oct. 16-17	Fall Speed Festival Hosted by Torrey Pines Park - C.S.R. Unlimited/TPG 60" class	Southern CA	Steve Condon (619) 565-4361
Oct. 17	TULSOAR 2M & Unlimited	Tulsa, OK	Perry Gilstrap (918) 455-5490
Oct. 24	TULSOAR Fun Fly	Tulsa, OK	Mike Stephenson (918) 445-3002
Oct. 31	G/Lady Special Buzzards	Orlando, FL	Ed White (407) 321-1863
Nov. 7	610, 612 DEAF Dallas Electric Aircraft Flyers	Dallas, TX	Jack Hamilton (214) 348-4669
Nov. 13	TPG 60" CL Slope Race	Southern CA	Charlie Richardson (619) 630-8775
Nov. 14	Task T6 Triathalon	Dallas, TX	Chuck Fisher (214) 270-2634
Nov. 28	TULSOAR Fun Fly	Tulsa, OK	Doug Drullinger (918) 838-0282
Nov. 20	2M, Open	San Antonio, TX	Gene Warner (210) 732-3101
Nov. 20/24	Slope & Thermal Scale Fun Fly	Southern CA	Scott Condon (619) 471-2453
Nov. 21	5th Annual MASS Turkey Shoot	Memphis, TN	Mike Kelly (901) 756-9410
Nov. 26-28	Variety Buzzards	Orlando, FL	Cy Baylor (407) 699-8750
Dec. 26	TULSOAR Fun Fly	Tulsa, OK	Corey Gilstrap (918) 455-5490

** For more information about the Inland Empire Soaring Society, contact Al Lies, 1321 S. Rotchford Rd., Veradale, WA 99037.

***Additional information on the contests listed in Europe is available from *SOARER*, a British publication. Jack Sile, Editor, telephone 0449-675190 Suffolk, England.

Types of Advertising

Business

Business advertising is subject to the full rates.

Classified

Classified ads are free of charge to subscribers and are printed on a space permitting basis 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.

Clubs & Non-Profit Organizations

Clubs & Non-Profit organizations are not charged for ads where it is deemed that all readers benefit from the information. Where only a small geographical area benefit, these ads are charged at 1/2 price and are subject to space permitting basis. (Ads, on a space permitting basis, are run on a first come basis.)

Deadlines

The deadline for receiving advertising material is the 5th day of the prior month. (Example: If you wish to place an ad in the March issue, it must be received by February 5th.) There are always exceptions to the rule and, if the ad cannot meet the deadline, please contact *RCSD* to negotiate an extension.

Advertising Guidelines

- The publisher retains the right to refuse any advertisement for any reason.
- All rates are subject to change.
- All advertisements are the responsibility of the advertiser. The advertiser assumes the responsibility for any claims that might arise against the publisher.
- An advertiser's copy will be provided via 1st class mail to each advertiser of *RCSD* where the full advertising rates are paid and current. (Excludes classified.)

Ad Rates Effective December 1, 1990

(Cost/month based on # of ads in a year)

Ad Size	1 X	3 X	6 X	12 X
1/8 pg	$15	$14	$13	$12
1/4 pg	$30	$28	$26	$23
1/3 pg	$40	$38	$35	$30
1/2 pg	$60	$56	$52	$45
1 pg	$120	$112	$104	$90

Notes

RCSD has neither the staff or the facilities to investigate advertising claims. However, we would hope that any subscriber would feel free to contact us immediately if they are unable to resolve any issues they may have with any advertiser.

Advertiser Index

Do You Need Help With Ad Copy?

For help with ad design & typesetting, contact:

Barry Kurath
105 N.E. 61st #12
Portland, OR 97213
(503) 236-4067

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 5th day of the month. (Example: If you wish to place an ad in the March issue, it must be received by February 5th.) *RCSD* has neither the facilities or the staff to investigate advertising claims. However, please notify *RCSD* if any misrepresentation occurs.

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

DON'T YOU HAVE ENOUGH TROPHIES?? * ATTN: CONTEST DIRECTORS!!!** Award your winners w/shirts, caps, jackets, bags, individualized w/screen art (incl. place & class). Designed by fine artist and past Natl. Champion, Tom Jones. Golf shirts from $20.00, T's from $10.00. For more info. send S.A.S.E. to: **Zoomit Creations**, 16 S. Woodstock Cir., The Woodlands, TX 77381; (713) 363-3384.

SAILPLANE PERFORMANCE ESTIMATION easily done on your computer. Software contains wide selection of airfoil data, calculates polar curves and performance summary. Requires IBM PC, XT, or AT. Specify floppy disk size and density. Price: $30, or info. $1 + SASE to: Pete Steinmeyer, P.O. Box 67, Arvada, CO 80001-0067.

SCOUT G-72: 72" span, R/C sailplane kit designed for the traveling flier. Components pack into 8" x 8" x 22" kit box. Limited availability. Price: $26.00. Shipping: $3.00. Frank Zaic, Box 135, Northridge, CA 91328-0135.

CARBON FIBER, 100 ft. 12k tow ... $9.95 plus $2.00 shipping and handling. (For information, send S.A.S.E.) DISCOUNT COMPOSITES, P.O. Box 96, Bountiful, UT 84011-0096.

Wanted

WINDSONG or PIXY kits, cheap! George Voss 405-692-1122 E. or 405-736-4492 D. Okla.

Krick scale sailplane kit, for DFS REIHER, or MINIMOA, or a source for Krick kits, or pre-40's sailplane kits from other suppliers. Bill Scott, 12567 SE River Rd. #231, Milwaukie, Oregon 97222; (503) 786-7114.

For Sale - Personal

NSP SPARROW sloper, SD8000 airfoil, presheeted wings & stabs from mfg., NIB... $150.00. Call Darrell at (602) 641-1243 AZ.

PROTECH Smart Charger, Mod 709 auto peak/auto discharge, NIB, never used... $35.00; NSP heavy duty high start, 100' tubing, 400' nylon line w/parachute, on reel, excellent condition... $50.00. PPD. Roy Smith at (707) 279-9241; P.O. Box 219, Kelseyville, CA 95451.

12 volt winch, uses Model Builder frame, Rahm style brake, includes all electronics & line, RTF... $275.00 + S&H; IPD E-Z Retriever, works like a spinning reel, all electronics & line, RTF... $300.00 +S&H; GRAND ESPIRIT, RTF... $150.00 + S&H; Marks Models SENSOAR, 117" straight wing with flaps/ailerons, RTF... $100.00 + S&H; Dodgson CAMANO, needs work... $60.00 + S&H; Cliff Hanger F-20... $45.00 ARF + S&H; BOUNTY HUNTER fuse & cores with spar wood... $75.00 + S&H. George Voss (405) 692-1122 Eve. or (405) 736-4492 Days Oklahoma.

Multiplex DG-600, NIB... $325.00 or trade for HOBIE HAWK NIB. Contact Jim Reading at (619) 271-1791 or (619) 292-5454 S. Calif.

1/4 Scale Jantar-1 all composite construction, foam glass balsa sandwiched wings and stab, includes JR servos, retractable gear, and wing bag... $600; 1/4 scale Salto, all composite construction, show quality 100% scale including spoilers, aileron linkages, cockpit, and landing gear, never flown! Wing Bag included... $1000; 1/4 scale DG-500 kit, Multiplex in the original box, first class kit with presheeted obechi wings and stab... $600; A Slope Scale kit, PSS Focke-Wulf 190, great condition and ready to fly... $150. Call Wil Byers 509-627-5224 after 5 PM. Need $ for new projects!!!

Quality fiberglass kit by Bob Sealy, LASER 123" span, Selig 3021 airfoil, fiberglass fuse with nose cone, foam core - balsa sheeted wings, NIB... $125.00. Contact Ray Hayes, 69598 Brookhill Dr., Romeo, MI 48065.

LEGEND, NIB... $150.00. Call Carl Schoenberger at (214) 733-2704 work # w/ voice mail.

2 Fantastic giant floaters (I have too many.) w/ servos & wheels perfectly balanced & flown many times - mint condition. Grob Twin, 24' span... $2500.00. LS4, 26' span... $2600.00. Robin Lehman at (212) 744-0405 NY.

THERMAL MODI by Greco, 118" span, SD7037 foil, glass/kevlar fuse, composite stabs, carbon/brass sheath wing rod, aluminum shaft hinges, wings are blue foam with glass/carbon reinforcement sheeted w/obechi. Obechi is stained & clear coated and quite stunning with the matching grains. Capable of repetitive F3B zoom launches. Number 2 from the factory, and in excellent shape... $575.00 obo without servos, all 6 141s included. Make offer. Manny at (714) 492-9553 S. Calif.

PHOENIX unlimited sailplane, two Air. 401 servos for ailerons, excellent condition, pictures available... $350.00; FALCON 880E electric sailplane, includes Air. 401 servos for ailerons, 141 Air. servos for flaps, Air. 501 servos for elevator/rudder in fin, Ultra 1600 motor, Graupner Micro Moss speed control, 14 cell 1100 SR battery pack, 6 Ace filters on all servo lines, Freudenthaler CF prop 11-7 and spinner, pictures available. All components total over $1500.00. Will sell for $1200.00. All components and sailplane built and kept in excellent condition. Since the sailplanes are in impeccable condition, prices will not change. Includes shipping. Contact Hans Wiederkehr at (516) 696-3361 New York.

R/C Soaring Digest
P.O. Box 2108
Wylie, Texas 75098-2108
(214) 442-3910
FAX (214) 442-5258

R/C Soaring Digest
A Publication for the R/C Sailplane Enthusiast

Subscription Costs

USA: $19 Bulk/Third Class
OR $26 First Class
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Canada & Mexico: $26 Air
Europe/U.K.: $36 Air
Asia/Pacific/Middle East: $42 Air

Please allow 4-6 weeks for U.S.A. delivery by Bulk. Surface delivery outside the U.S.A. is no longer available effective August 1, 1993.

Subscription Renewals

RCSD mails out one post card size renewal notice in the U.S.A. Outside of the U.S.A., the renewal notice is placed in an envelope.

How To Read Your Label for Expiration

214 1ST 94/01

214 - The first entry is the subscription number.

1ST - This is a first class subscription in the U.S.A.

3 - 3rd Class U.S.A.
A - Airmail Outside U.S.A.
S - Surface (No longer offered.)
Other - Tracking codes. (V, for example means advertiser.)

94/01 - The subscription is good through the December, 1993 issue. It must be renewed prior to January 1, 1994, or it will be logged in as a new subscription.

Back Issues

We receive many inquiries every month about the availability of back issues for *R/C Soaring Digest (RCSD)*. So, we try to print sufficient quantities each month for those of you who wish to obtain back issues or want additional copies. We hope you enjoy *RCSD* but, if you are NOT satisfied, please return them for a full refund, no questions asked!

(Quanties are limited for some months.)

1992	1993
☐ January	☐ January
☐ February	☐ February
☐ March	☐ March
☐ April	☐ April
☐ May	☐ May
☐ June	☐ June
☐ July	☐ July
☐ August	☐ August
☐ September	
☐ October	
☐ November	
☐ December	

Please send via:
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Total Cost @ $3.50 Per Issue ________

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☐ Please send the back issues I have selected.

Name________________________________

Address______________________________

____

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(Check or Money Order, only, please. U.S. funds.)

WING COVERS

OKAY, GANG! This is your **ONLY** chance to order high quality wing covers from us! Double faced (our previous ones were single), quilted wing covers with stab pockets come in 2 styles: tapered 12" x 8" or straight 10" x 10" length to fit your sailplane 2m - Unlimited.

$39.95 + Actual S&H

DON'T WAIT! ORDER NOW!

We'll manufacture these covers in November and ship them the first week in December. Covers are serged by a professional seamstress. All orders must be in by 15 November 1993.

This is the **ONLY** ad you'll see!

Soaring Specialties
1403 Lincolnshire Rd.
OKC, OK 73159
(405) 692-1122

VACUUM BAGGING TOO EXPENSIVE?

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CALL OR WRITE TO REQUEST OUR COMPLETE CATALOG

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Like you've never known, unless you own a ROTOR, that is!
- *Huge loops/ ballistic exits*
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- *3 rolls/ sec if you can handle it, or*
- *Continuous axial rolls/ no nose drop*
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- *Precise and powerful control response at any speed*
- *Docile handling/ no tip stall possibility*
- *Great high angle flight for high drag landing approach*
- *Not bad in light lift either (7-8 mph at Torrey Pines)*

MODULAR FEATURES

Like the other pitcheron airplanes from VS, our modular approach increases flexibility of Vmax-PLUS. The following wings can be used:
- *Standard Vmax(E374- balsa)*
- *Standard Vmax(E374 ply)*
- *Vmax thermal(S3021-balsa-84in span)*
- *All three ROTOR pylon wings(HQ 1.5/9,SD6060,E374) with slight mods*

BUILD TIME—CONSTRUCTION

SHOW!! These features cut 50% off normal build time:
-Glass/kevlar molded body/pre-drilled holes
-Blue foam cores/ pre-sheeted option(extra cost)
-Only two sheet-style tail surfaces
-Ultra simple pitcheron controls- no long pushrods,wing bellcranks,hinges)
-Estimated time to complete: 15 hours(fast builder) 20 hours (good builder)

CONTROL SYSTEM

PITCHERONS: Articulated wing panels give pitch and roll. No tail surfaces. Behaves just like ailerons/elevator but less drag. Requires elevon mix transmitter/standard size gear/2 ch 50 oz-in servos reqd

WINGERON/ELEVATOR: Builder option- no mix reqd- add elevator to stabs/use std servo to drive wings for roll only

SPAN = 59 INS	*WEIGHTS : 29 OZ (min poss.)*
AREA = 305 SQ INS	*57 OZ (FAI max)*
ASPECT RATIO = 11	*STRESSED FOR :*
WING SECTION = THIN E374	*ANY MANEUVER / SPEED*

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