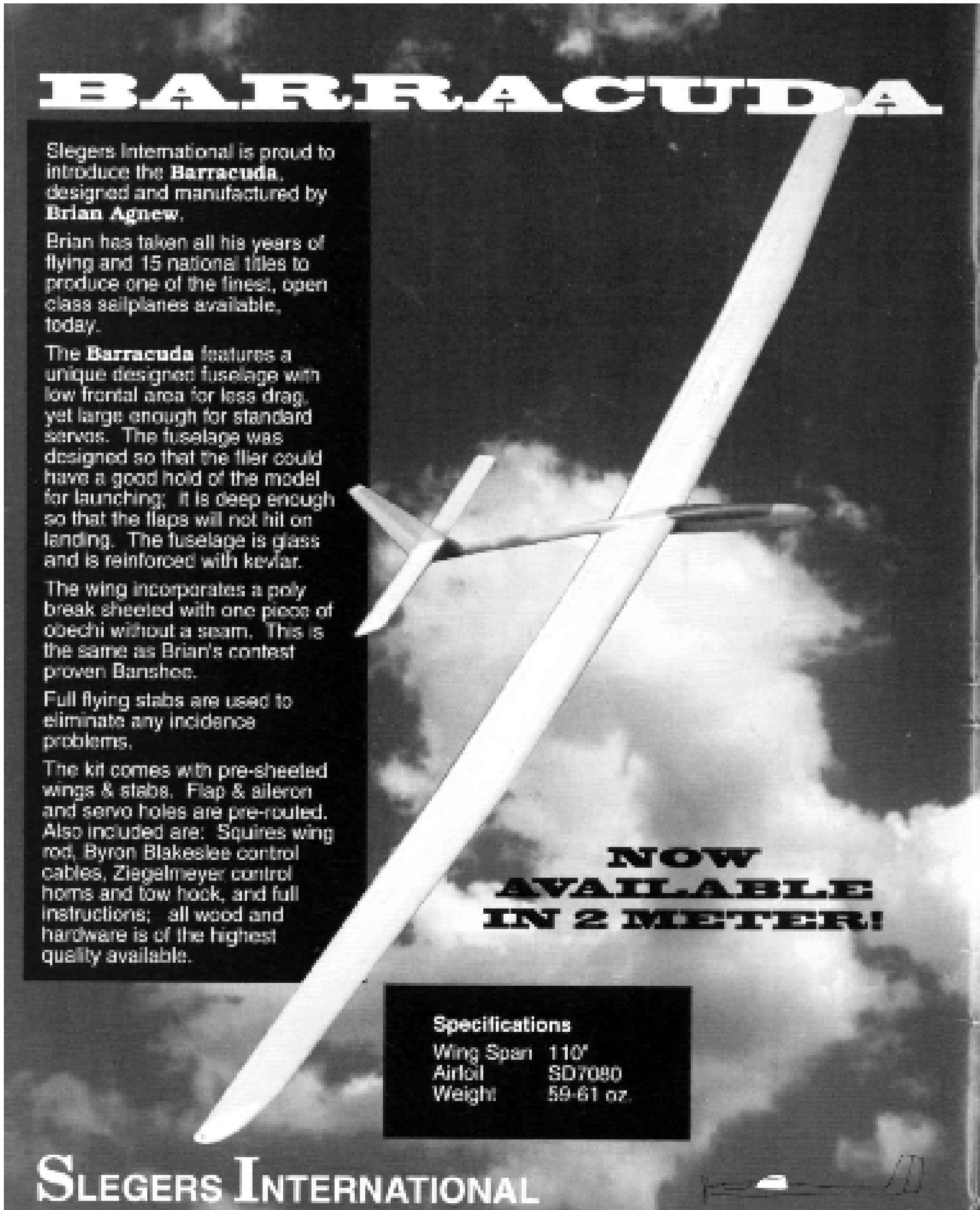

January, 1996
Vol. 13, No. 1
U.S.A. $2.50

A Publication for the R/C Sailplane Enthusiast!

R/C SOARING DIGEST

TABLE OF CONTENTS

Steve Hinderks, The Birdworks, had a dream. He wanted to build a radio controlled Sea Gull, but having accomplished that, went on to build the Albatross, which won the Pilot's Choice award at the Los Banos Fun Fly & SOAR Utah 95. This unique creation has a span of 165", wing area of 11.5 oz./sq. ft., 23 oz./sq. ft. wing loading, and clear tiplets that are 50 sq. in. each, for yaw stability. The Albatross requires perfect flying conditions, and has only experienced 2 glide flights, in a 10 - 12 mph breeze, at Cape Blanco in Oregon. This is not an optimized design as Steve says, "The pitch gallops, yaw oscillates, and it's not real stable." But it looks like a "real bird" in the air...

Photo by Ron Widel, Castroville, California.

STEVE & HIS ALBATROSS

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The Soaring Site

A Note of Apology!

Yes, the November issue of *RCSD* took much longer than it should have arriving in your hands. Our apologies!!! Unfortunately, the issue was "temporarily lost" and did not arrive until Turkey eve. We stuffed envelopes on Thanksgiving Day, and were able to deliver the issue to the post office Friday morning. Whew... We would prefer not to do that, again. So, the new cut-off date for material and ad submission has been changed to the first of the month; it used to be the fifth. This should give us a few days buffer should some sort of an emergency arise, again. Our thanks to each of you for your patience.

Sometimes, folks do or say something that really make our day, and with all that was going on in the month of November, we wanted to say a special thanks to:

Tammy at JACO-Bryant, Tennessee
Ernie Barter, California
Ron Scharck, California
Steve Savoie, Maine
Members of the DownEast Soaring Club
Steve Hinderks, The Birdworks, Oregon
Paul Ikona, CSP, California
Ben Matsumoto, California
Robin Lehman, New York
Bill & Bunny Kuhlman, B², Washington
Dr. Paul Clark, Japan
Dr. Ameil Klein, Germany
Walter Gerten, Germany
Fran Le Clercq, Wisconsin
(Get well, soon, Fran!)

As of this writing, we have already begun receiving input regarding, "On-Line or Snail Mail?" While we do not expect to be able to tell you the results of this 2 part question for awhile, thanks go to those who have already responded, and special thanks to those of you that have written detailed letters or notes! One common question addressed by several is, "How can one relax in a "favorite" easy chair or read in bed, with a computer at arm's length?" Good question, indeed!

Happy New Year!
Jerry & Judy Slates

July 9th Hand Launch Event in Dallas, Texas.

Photos by Martin Simons
Stepney, South Australia

ASW 24 with winglets, built from a kit by John Copeland.

Bordertown, Australia Scale Thermal Soaring Competition November 5th 1995

...by Martin Simons
Stepney, South Australia

Spalinger 18, 1/5th scale model by Rob Goldman, winner of the Vintage Class at Bordertown.

Book Review

"RC Soaring... A Laughing Matter"

...Reviewed by Jim Gray
Payson, Arizona

Winter blahs got you down? Not doing any (enough) soaring? Up tight, feeling neglected and overworked? Well, Bunky, tell you what I'm gonna do... Introduce you to a SURE CURE for all those problems and many more: Gene Zika's, "RC Soaring... A Laughing Matter".

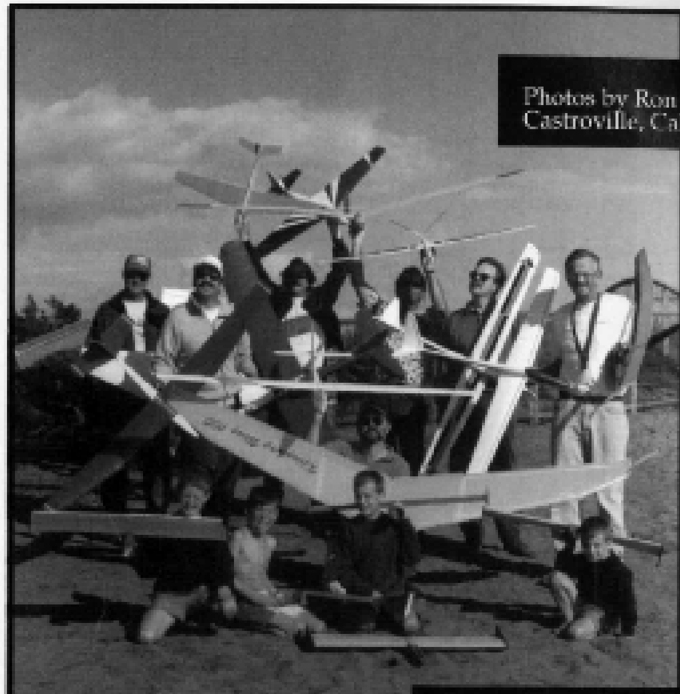
We've all seen Gene's hilarious cartoons in R/C Soaring Digest, but Bunky, you ain't seen nothin' until you get a peek at this collection of nearly 200 original "ZIKA" uproarious impressions between the pages of this new 6-3/4" by 8-1/4" soft-cover book. It's gar-on-teed to make you laugh, when you see how we look to Gene. That's YOU and ME, Bunky, and maybe a little bit of himself, too.

Gene wasn't always a cartoonist. He was a musician, attended the University of Colorado, received music scholarships to New Mexico State University, graduated with a BA in Music Education, and taught music for 17 years in the Westminster, Colorado public school. Later, he received a Master's degree in Computers in Education from Lesley College.

Gene dedicated this book to his wife Shirley and to his brother Jack, a member of the Rocky Mountain Soaring Association, who "taught me all about soaring so I could become dangerous".

"R/C Soaring... A Laughing Matter" is priced at US$15,and is available from the publisher, B²Streamlines, P.O. Box 976, Olalla, WA 98359-0976. The price included packaging and postage, delivered worldwide. The book would make a wonderful present for a glider pilot who has "everything". ■

Photos by Ron Widel
Castroville, California



Sunset Beach at Watsonville, California. Kids & big kids.

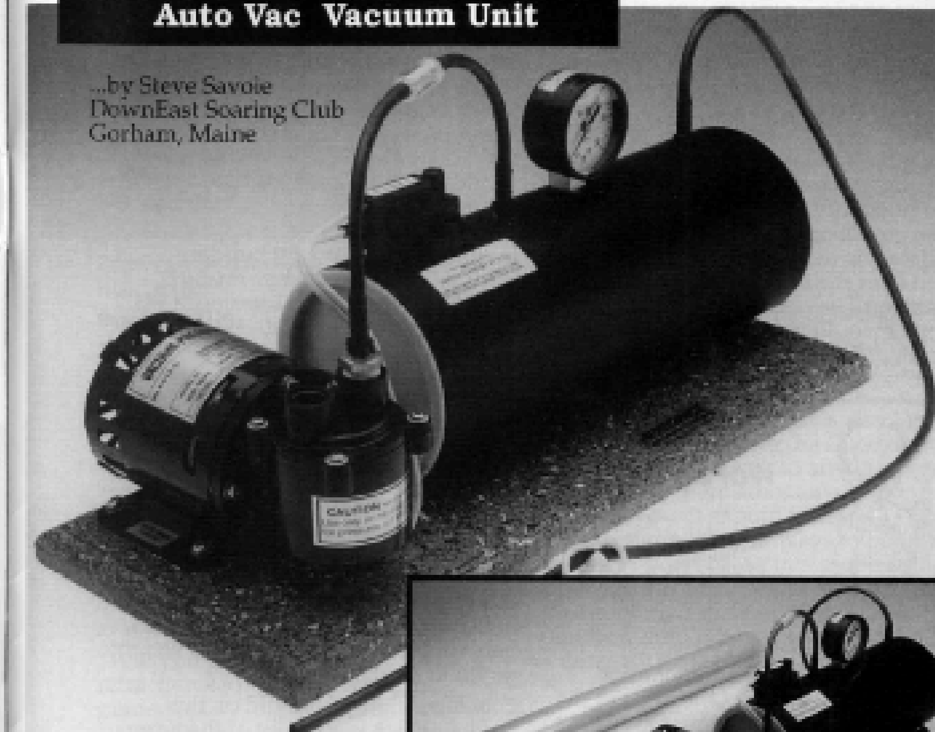
Joe Newland's SB/XC by RnR Products. Just finished 2 hour thermal for LSF Level V. Taken at the Eckhoff field in Gilroy, California.

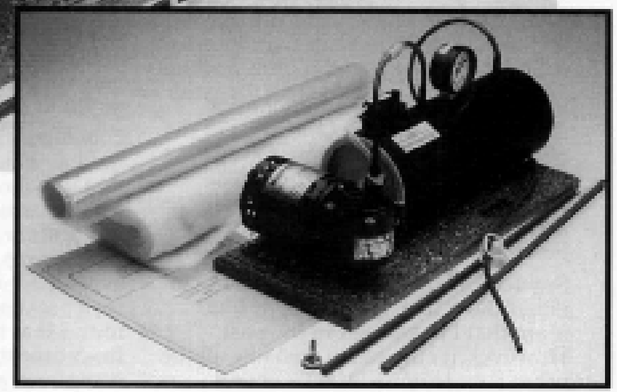
Joe Newland's F9F Panther Jet from Hangar Hobbies. Wing is 53", length 55", 6 lbs., glass fuselage, foam balsa wing.

Product Review

Aerospace Composite Products Auto Vac Vacuum Unit

...by Steve Savoie
DownEast Soaring Club
Gorham, Maine





Well, it's been over two years since I started using ACP's AUTO VAC vacuum unit and I feel qualified enough to comment on the quality and reliability of the unit. This self-contained vacuum pump and reservoir unit comes attached to a light weight base. The adjustable vacuum switch is mounted directly to the reservoir and has a workable range of 4" to 20" of vacuum which is easily read from the 0-30" vacuum gage. There is no on/off switch on the unit, so it starts up as soon as it's plugged in. When I first saw the size of the vacuum pump, I was concerned that this thing would take forever to pull down a bag; not true. In fact, I prefer a bag that pulls down at a slower rate than fast. This gives me time to work everything out if I'm bagging by myself.

To use this unit, all one has to do is to attach the vacuum hose (provided) between the reservoir fitting and the bag; that's it. Just plug it in and walk away. I have used this unit for at least 40 separate baggings with no problems. The compressor motor is very quiet and, since it's not fitted with a start capacitor, it doesn't dim the lights like the 1/2 HP motor that powered the old unit I built. The unit is not affected by heat or cold; the vacuum range never drifts. My unit sits 3 feet from the basement wood stove and is exposed to 90 degree heat when I start bagging. Once vacuum is drawn down, the bag is placed in an electric blanket and the wood stove is allowed to die down. Two days later, the basement is 40 degrees and so is the vacuum unit, with no drift in the vacuum setting.

This unit and its fittings have remained tight without any leaks, even after a 3 foot fall off the work bench. I was initially concerned about the strength and reliability of the plastic vacuum hose nipple on top of the reservoir, but to date I have had no problem with it, even after the fall. The only negative comment I have is with the vacuum hose. I would have preferred a longer length of hose with a slightly larger diameter so that it can be quickly attached to the bag. I purchased 25 feet of 3/16' clear aquarium hose for my unit so that the pump is remotely located away from the work, and mess.

This unit is well designed and very reliable. It's quiet, maintenance free, doesn't take up much space, and has a usable range for both white and color foam bagging. The price is well worth the reliability of this unit; just consider the time and materials lost from an unreliable vacuum unit. It's a good investment for a model builder.

Aerospace Composite Products
14210 Doolittle Dr., San Leandro, CA 94577
1-800-811-2009/510-352-2022
■

Jer's Workbench

Jerry Slates
P.O. Box 2108
Wylie, TX 75098-2108
(214) 442-3910

Spyder Foam

I recently completed another open class, thermal glider. Using one of the Stiletto fuselages, the wing root was modified to fit a S7037 airfoil. The cores for a triple taper wing, stabilizers, and rudder were cut from Spyder Foam.

Spyder Foam is a bit more dense than either the white, gray, pink or blue foam that I have used in the past. However, it cuts easily, just like all the other flavors do. The S7037 cores were some of the best work I have done; the trailing edges at each section were clean and sharp. The inner panels of the wing were cut, to accommodate a full depth spar, using a bandsaw. The cut was clean; it was almost like cutting into soft wood.

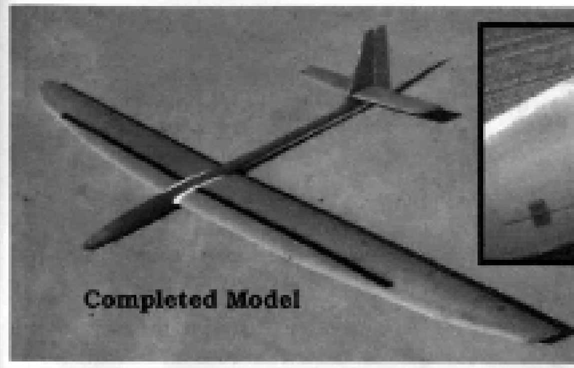
The wing was built with a 23" full-depth spar; a 1x36" strip of .007" carbon was added to the top and bottom of the spar, and for the wing skins. There are three layers of 1.4 oz. fiberglass cloth; one layer was cut on the bias. The wings were then vacuum bagged; I was pleased with the results. Using a single layer of 1.4 oz. fiberglass cloth for the stabilizer and rudder, they were then vacuum bagged, too.

The finished model, which as yet has no name, has a 110" wing span; the wing loading is 10 oz./sq. ft. The test model has not been painted, and will be test flown, first. If it flies well, trim will be added; it may require a modification or two. If I decide to build another down the road, I will paint it, but will try to hold the weight down to 11 oz./sq. ft.

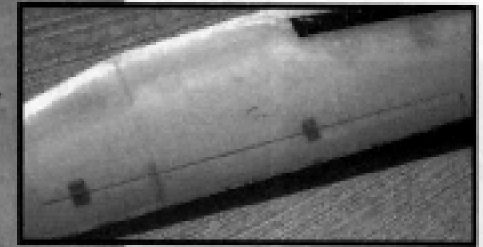
One other thing that I did on this model, which is a bit out of the norm, that may be of interest, was the hinging technique used on the flaps, ailerons, and rudder. For years, I have used tape hinges on all my gliders. But every once in awhile, a tape hinge just won't stay where it belongs. I have found that they have to be replaced from time to time. Having just completed a power model, there were a bunch of hinges laying around on the workbench. Thinking, "Why not?" I installed a set of "Radio South" hinges. These hinges are thin plastic, constructed with a special paper skin on each side.

I made the modification by making a small cut just under the glass skin of the wing. Using a #11 Xacto knife, the hinge was inserted; a drop of CA was added. (Use the kind that won't attack the foam core.) The CA will wick along the special paper skin on the plastic hinge. When completed, I still added tape in order to seal the gap along the hinge line.

I found this hinge very flexible, and the



Completed Model



Radio South hinges installed. Hinge line taped to seal the gap.

flaps can be dropped as far as they need to be.

Spar Design

The following contribution on spar design was written by Jim Skinner of California. Jim is an aerospace engineer.

"Properly made graphite/epoxy composite materials have excellent compression strength - about 80 to 90% as much as their tensile strength. I'm an aerospace engineer. I have designed several graphite antenna dishes and truss structures that are now in orbit that would have fallen apart if graphite had no compressive strength.

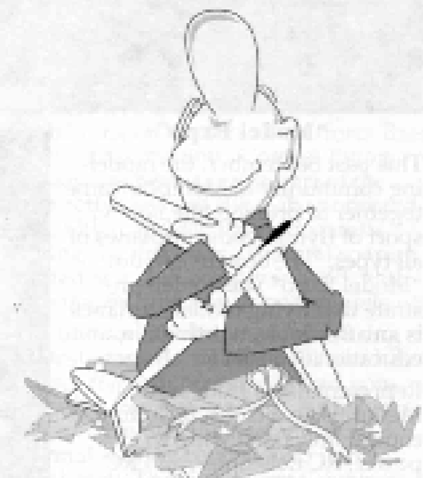
"Will you please print some sort of a retraction soon about Tony's misguided spar designs (*RCSD*, October 1995)? Balsa is weaker in compression than tension. A balsa spar will fail on the top whether it buckles or not. Where it needs carbon reinforcement is on the top, not the bottom where Tony suggests. Some new guy in our club might read that article and carefully glue some .007 carbon strips to his Wanderer spar bottoms, and then think he can stand on the pedal on his first winch launch. That carbon on the bottom will do him very little good.

"There is nothing at all wrong with your own spar design, although I would have done it a little differently.

"I recently crashed my 117" Prism, and did a structural test on the remains of the wings. At about 500 in. lb. bending moment, the top obechi skins failed, buckling inward, and at 600 in. lb., the spar failed in pure compression. The graphite/epoxy reinforcement, the glass shear webs, and the soft balsa spar were all crushed on the topside near where the joiner rod ended. Nothing came unglued or buckled. If the spar had been harder balsa, it would have done better. 60 in. lb. isn't very good, but my hardest zoom launches never broke those wings." ■

Thanks, Jim. Indeed, we agree that the spar design discussed in the 10/95 issue was never intended for zoom or pedal-to-the-metal launches. As Matt Gewain pointed out in the December issue, "When you talk to anyone about spar design, there are many different ideas on how it should be done. There are a million different ways to build a spar that won't break in a model wing, and over the years, some modeler has probably tried most of them... The question should be, "How do we build a wing with the best performance overall?"

Readers, Matt and Jim have addressed what modelers need to think about: the materials you are using and accepted design standards. If you have any questions about spar design, we'd like to hear from you. ED. ■



with
Bob Sowder
1610 Saddle Glen Cove
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(901) 751-7252
FAX (901) 758-1842

Dave Campbell, launching, and Mark Vlasak retrieving during Memphis Model Expo. Curious spectators in background. Helicopters, control line combat and static displays held at adjoining field.

Tony Fabiszak (L) and Brian Tomlinson pictured with Tony's "Paralax" HLG. Tony and Brian put on HLG demonstrations at Memphis Model Expo.

"Model Expo"

This past September, the modeling community of Memphis came together to promote the hobby/sport of flying model airplanes of all types. The objective of our "Model Expo" was to demonstrate that flying model airplanes is an affordable, worthwhile, and educational outlet for all ages.

Representatives from several Memphis area clubs, including control line, fixed wing R/C power, RC helicopter, and RC sailplanes were on hand to meet and talk with the public. A centrally located, city owned park was chosen for the site due to its normal high public use.

The event served as an opportunity for club representatives to talk about their particular aspect of the sport, provide information about flying sites, dues and other associated information geared to the entry level enthusiast.

Both participants and spectators gained something, whether it was valuable information, a good time, or a free flight hand-launch glider donated by our local hobby shop for the youngsters. To help provide some insight and information on the soaring side, past issues of *RCSD* were passed out to enthusiastic spectators.

Get 'em while they're young! Grant Sowder with HLG and flying buddy, Logan Vlasak, son of MASS President, Mark Vlasak. Lots of youngsters showed up during Memphis Model Expo.

Many interested and curious park goers came around to see the display of aircraft. Beyond the public relations aspect of the "Expo", it was truly fun to meet and fly with other local pilots, as we so often go out and do our own thing with little knowledge or understanding of other types of model flying. For participants, this was a good "cross cultural" experience witnessing the many different aspects of our sport at one consolidated site.

We feel this first time event not only strengthened the local modeling community, but more importantly, demonstrated to the general public that we modelers are a responsible group interested in attracting and educating newcomers to our great sport.

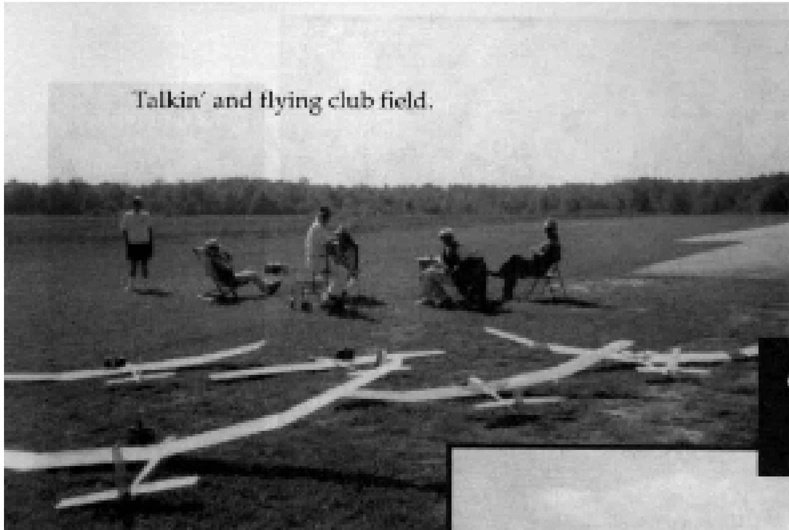
The event was the brain child of Tom Ernst, an ardent soaring enthusiast. Tom did a yeoman's job of organizing and coordinating the flying activities with participating clubs. While the Expo was designed as a local P/R event, P/R aside, it was tremendous fun. We heard comments from several contest flyers (myself included) that this type of event was probably one of the more enjoyable flying sessions we held all year.

If you have any interest in building awareness about model airplanes in your community, gather your local modeling clubs onto one site, have a fun-fly, and invite the public. You'll meet some great people, share your interests, and have a blast doing it!

Club of the Month
Coffee Airfoilers
Model Airplane Club
Tullahoma, Tennessee

The Coffee Airfoilers were formed in 1958 as a general club, flying all types of models. The club has the use of a 150 acre flying site just outside Tullahoma on the Arnold Airforce Base military reservation. Contest flying has always been a major part of the club activities, and the club sponsored Free Flight and RC Pattern contests during the first year. Thermal soaring started as a club activity in 1963, with Thermic 50 type power pod models.

The first sanctioned, thermal soaring contest was held in May 1971 and has classes for both power pod and non-powered thermal soaring. As far as is known, this was the first sanctioned thermal soaring contest held in the Southeast. This first thermal contest

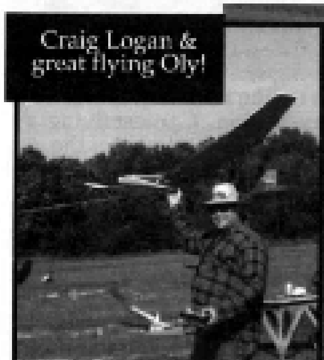


Talkin' and flying club field.

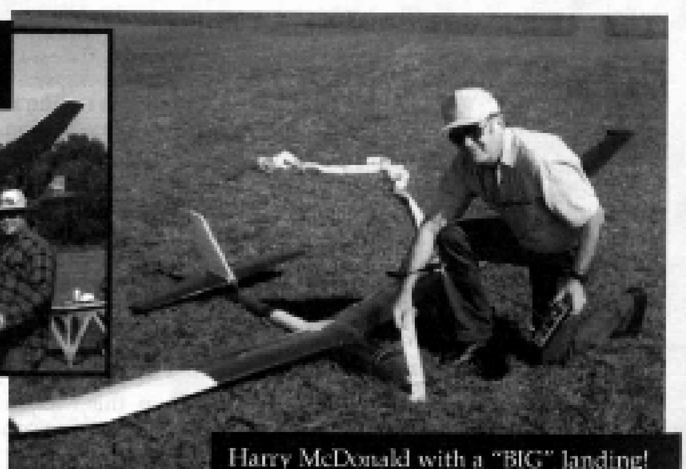
Ben Cleveland - a real soaring gentleman!

was so successful that another contest was held the following September. The Airfoilers have continued the tradition of holding spring and fall soaring contests, and held the 25th annual spring and fall contests this year.

The Airfoiler contest stimulated interest in thermal soaring throughout the Tennessee Valley, and contests were soon being held in Oak Ridge, Chattanooga, and Nashville, as well as in nearby Huntsville, Alabama. The Coffee Airfoilers were also quite active in contest flying on a national scale in the 70's with numerous trophies won at the well known Soar Nats, AMA Nationals, and the long running Tangerine contest in Florida.



Craig Logan & great flying Oly!



Harry McDonald with a "BIG" landing!

Thermal soaring activities in the club have increased in the last two years. Don Vickers has moved here from California, while Brian Smith has moved down from Ohio. Don and Brian have sparked renewed interest in thermal soaring. Several of the club members have also retired in the last few years. These members have formed an unofficial "Retirees" club and fly almost every day that weather permits. And speaking of flying, we fly everything from Gentle Ladies and Sailair's to Eagles, Shadows, and Super V's.

We are particularly proud to say we have in our club such notables as Chuck Anderson, Lee Webster, and Ben Cleveland. They have provided this club with real stability over the years and are still good sailplaners!

If you are in central Tennessee (just south of Nashville), we would be honored to have all of our soaring friends join us for our AMA sanctioned contests in May and September '96!

My thanks to Brian Smith for passing along the information and photos about their club. Should you ever find yourself in Central Tennessee, give Brian a call at 615-393-4876.

Having had the privilege of knowing and flying with these guys for several years, you will be well served to pay them a visit.

Happy New Year!
Thermals - Bob ■

"To use a trainer chord or not to use a trainer chord?" That is the question.

...by Robin Lehman
New York, New York

Twice this year, I let experienced pilots fly one of my sailplanes and very soon, to my horror, I found the thing pointed nose downward heading straight at the ground! When I went to get my radio back, iron fists fought me all the way. Luckily, strength prevailed, and the airplane is still in one piece! These guys refused to give me back the radio! I had to literally tear it out of their hands!

Once, years ago, my son crashed a lovely Skybolt. It spun in from way up. I gently (at first) tried to get the radio back from him, but he wouldn't give it up until the last second and BANG, I had to write off a beautiful airplane.

So, this time I was forewarned, and literally tore the radio out of these guy's hands; and no broken airplane the next time!

This brings up a discussion that I've often heard at flying sites, "To use a trainer chord or not to use a trainer chord?" That is the question!

When a student pilot is flying high up, it's easy enough to grab the radio from that person, if you grab hard. However, when you are beginning to do take-offs, landing approaches (and landings), it's impossible to grab the box in time to avert a crash.

If a trainer chord won't work because of radio incompatibility, then you are stuck teaching without the trainer chord. But it seems to me that if a trainer chord is available, then you should definitely use this marvelous tool when teaching.

So why do so many people still prefer not to use the trainer cord?

The answer seems to be that they find it difficult to set up the two radios so that they are identical while in flight. In my experience, it only takes a minute or less to set the two radios up so that they are exactly alike, when you switch from one to the other.

Let me run through the steps necessary to set up the two radios with the trainer chord:

Step 1:

Plug both radios into the trainer chord. Turn on the radio which is going to be used by the teacher and turn on the airplane. Do not turn on the student radio. The teacher's radio and the airplane must be on the same frequency. The student's radio can be on any frequency as long as it is compatible with the teacher's radio. AM and FM radios are not compatible and, at least for Futaba units, will not work.

Also, different brands of radios often will not work together. So if your airplane is on Futaba, for example, you have to find another Futaba radio in order to hook up the trainer chord.

Step 2:

With the teacher's radio and the airplane turned on (the student radio turned off), check off all controls to make sure that they are operating in a correct manner. Low throttle should be low, right ailerons should be to the right, up elevator should be up, and left rudder should be to the left.

Flip the trainer chord switch on the teaching radio to activate the student radio. Do not turn on the student radio. Now check the controls with the student radio. Make sure that the student radio gives the correct controls - right aileron is to the right, up elevator is up, etc. Correct any controls that are reversed and wrong.

Step 3:

Once you have two compatible radios hooked up, and the airplane and the teacher's radio are turned on (not the student radio), start with whichever controls you are going to use and do as follows: Ailerons - set the trims on the two radios to neutral positions and switch on the student radio. If the aileron's controls jump one way or the other, set the trim so that when switching the student on and off, the ailerons do not move. Now, do the same with the rudder, the elevator, and the throttle.

Now, both radios should be identical no matter which one is controlling the airplane. That's all there is to it. In less time than it takes to read the above, you can get a trainer chord set to go.

On the student's very first flight, it helps to have the student taxi the airplane around the field at low throttle to get a feel for the thing before flying.

If the student is on their own and taxis without the wings on, they will gain valuable experience learning how to control the airplane right and left, especially when it is coming at them!

When using a trainer chord (and the student is switched on), it is extremely valuable to keep the throttle controls where you would have them if you were flying. For instance, if you are shooting touch and go's, you should have the throttle set wherever it should be at any given point in the flight. That way, if you need to make a quick recovery just on touch down, for instance, all you need to do is flick the switch. In this manner should a mistake happen, the teacher can take over immediately without having to move any of his/her controls, because the controls are already in place with the proper input.

If you have a student who is already in the stage of landing and taking off, it is all too easy to become complacent and have the throttle control in the wrong place. For example, on take-off you want full throttle, because if the student makes a mistake you want to be able to instantaneously take over the flight. The same holds true for landing. If the student is on low throttle and making a good landing and suddenly makes a last minute error, you don't want to blast the airplane into the ground at full throttle, should you decide to take over. During take-off, landing, and touch and go's - and low passes to start with, for that matter - fly the airplane along with the student even though the student is switched on. Sooner or later, you will be very thankful that you did!

The trainer chord also has several hidden psychological advantages. It will enable your student to fly and maneuver the airplane with confidence. If the airplane crashes, it's your fault, not the student's! You should tell the student this, so they will feel free to experiment and get the feel of flying.

I have found the trainer chord to be pretty nearly, crash proof. It will save many airplanes, and will also enable a student to learn to fly an airplane on their own in a relatively short time. It's also a lot of fun!

Good Luck and Good Flying! ■

The Zoom Launch Or, Bungee Jumping with the Winch Doctor

...by Douglass Boyd
Estacada, Oregon

"Please explain to me again what bungee jumping has to do with R/C soaring, Doc," I asked nervously, chewing the Ca residue from my finger tips. The attendant fastened the harness I was wearing to a big rubber band.

"I told you, technically this is not a bungee jumping; this is the 'Rapid Riser', a catapult shot, or a backwards bungee jump... Just think of it as a really BIG hi-start."

I looked around for a telephone, hoping that the Governor would call soon. "OK, so how is this like R/C soaring?"

The Winch Doctor smiled his sneaky smile, and I remembered the last time he smiled like that, I got my fingers glued to the transmitter sticks with Ca. "Don't you remember you asked me how to do a better zoom launch with your new Led Sled?" I nodded yes. "Well then, this calls for an object lesson. You must first put yourself in your plane's place." He chuckled and told the attendant, "Make sure his towhook is secured."

"Object lesson?" I panicked, "Wait a minute. I OBJECT to this lesson!! Let me out of this turkey truss!!" The attendant winked at the Doc and said, "They all say that at the start."

"Close your eyes," said the Winch Doctor, "And imagine the winch is like a very long, stretchy arm about to throw your Led Sled into the sky." My eyes were already closed, but I wanted to think about something other than me hurtling through the sky. "You step up to the petal, hook up your Sled, and run the winch until the motor sags. Right? Why?"

I told him, "Because you need to build up line tension to shoot the glider up the first little bit, before the winch motor can take over."

"Line stretch..." the Doc said, "Line stretch is very important. WHEN you stretch it is even more important. In the launch, you can run the winch until it sags, and heave the Led Sled. You stand on the petal most of the way up, unless there is some wind, and then you pulse it off and on a bit. You get to the top, and you have three choices: 1) Float the glider off the top, 1970's style, and meander about aimlessly in search of lift, OR 2) You can simultaneously apply full down elevator, full petal, and do what I like to call a wing ripping dip-zoom. This is usually followed immediately by full up elevator, a brief vertical climb, and a BIG STALL... with a net loss of 20 to 120 feet compared to the float off launch, OR 3) You can do a real zoom launch."

I knew time was short, so I asked quickly, "What exactly does a real zoom launch look like anyway?"

"Patience. You'll find out," the old Winch Doctor said. "But first, I'll tell you about it."

"Let's assume you are on the line, near

the top, and you're about ready for that awesome zoomie. You are still in launch mode (flaps down, extra camber, high lift stuff). First, you floor the petal for a few split seconds to stretch the line between the drum and the draggy, hi lift, launch mode sailplane. This stores energy in the line just like a hi-start, or bungee cord. The winch drum also stores some flywheel energy as well. How many split seconds this stretch sequence should last depends on how strong your wings are, how strong and stretchy your line is, and how much wind/tailwind there is. These split seconds are CRITICAL. The stronger your wings, and the stretchier your line, the more forgiving the situation is. So, there you are, petal to the metal, your wings bowing under the strain, holding the nose up; you quickly, smoothly, flip your mode switch to speed mode and apply some nose down (speed mode removes the high lift flaps and camber)."

"Now, the Led Sled is fast and cleaning up, using the stored stretch, gravity, and flywheel action for a few more split seconds to accelerate to warp speed. Use just enough nose down to point slightly down; we're not looking for a deep-dip here!! Then, a split second later, release the petal and pull some up elevator. You will want to climb at about 35 - 45 degrees, not any more if you want maximum altitude. Flip the mode switch to normal thermal mode, and push some down elevator to transition into your glide. Some guys even use that speed to go left or right, especially if they know where a thermal is happening."

I asked about the folks that aren't using 'puter radios with all those presets.

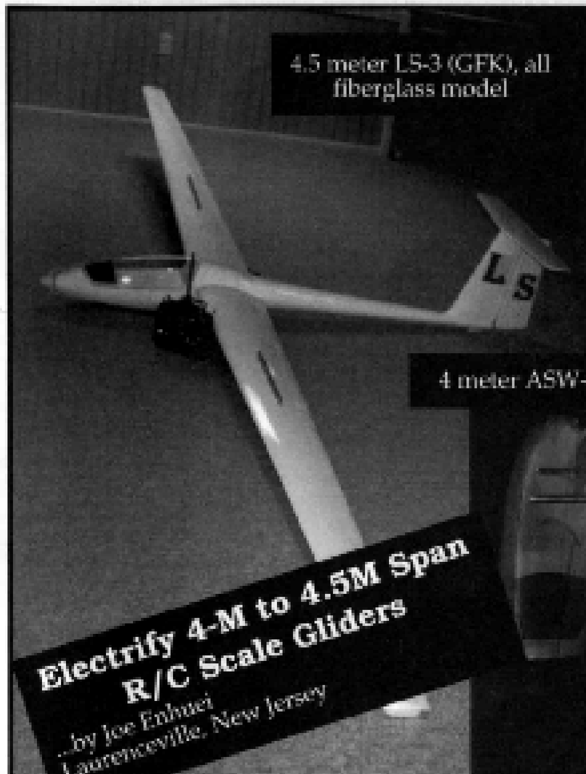
"Then you have one less thing to worry about sequencing correctly, but the technique is still the same; build tension, throw the plane, pulse near the top if needed, pull up and add power for an instant, then dive to accelerate, release and zoom into the WBY (wild blue yonder). And don't forget a smooth transition. Remember, line stretch."

"The line is stretched!" said the bungee attendant.

"OK, then let 'er rip!!!"

The bungee guy trips the release and I am launched skyward. "YEEEEEEEEE - HAAAAAAAA!!!"

The old W.D. just smiles and says, "Sorry to leave you hanging. Maybe next time, we'll talk about landings. Until then, Ting Tang Walla Walla Boing Boing!!!" ■



4.5 meter LS-3 (GFK), all fiberglass model

Electrify 4-M to 4.5M Span R/C Scale Gliders

...by Joe Enhuei
Laurenceville, New Jersey

4 meter ASW-24 interior close-up view

Introduction

My emotions are ignited when I see a large span R/C glider soaring high above, leaving behind a whistling sound so unique and unforgettable to my ears. It is clear to me that I have established my criteria for R/C soaring: a model should fly great, look majestic in the air, and sound wonderful! I start searching for the whistling sound that motivates me so much.

I ask myself, "How large should scale gliders be? How do I launch them in a flying field where most pilots fly 40-size gas models, and the field lacks the space for winch set-up?"

Launching Methods

There are several ways to launch large, wing span R/C scale gliders.

1) Throw off a slope.
2) Winch launch.
3) Airtow.
4) Electrify and hand launch.

Each launching methods has its pros and cons, and would depend on the limitations of the launching equipment, flying site layout, weather conditions, and each individual's preference. Since electric conversion of scale gliders is not yet popular, I would like to concentrate on this method, and share my findings with other R/C glider hobbyists.

Let's compare the various advantages and disadvantages of electrifying scale gliders as follows:

Disadvantages

1) Additional weight due to electric conversion would increase wing loading, increase flying speed, and thus may affect the thermal performance. Also, increased flying speed would make landing trickier and more sensitive to control.
2) Electric conversion requires glider nose modification for motor and prop installation, and

a scale glider is, of course, less scale.

3) Electric conversion would cost about $600 for a high performance electric system.

4) Electric motor could start instantly without warning, and the spinning prop could easily chop off unaware fingers. Electric motor should be handled with extreme caution.

Advantages

1) Electric power is clean, quiet, and very powerful; it could easily generate over 10 pounds of static thrust. Large size scale gliders (up to 20 lbs.) could be electrified. Electric power would not over-stress wings upon launching.

2) Launching over a flat field could be achieved by hand launch, without winch set-up for airtow.

3) Using a high output motor system, gliders could easily climb to a very high thermal altitude, which could not be achieved by the winch launch method. Gliders would not stall if hand launched.

4) The additional weight would increase penetration performance and flight stability in a windy environment. Large gliders are very efficient; the additional weight would pose little problem.

5) Upon landing, gliders could be instantly powered up should over or under-shooting occur; a second landing approach could be set up. Therefore, large span gliders could be launched and landed in relatively small fields. I think this is the most useful factor for electric conversion.

6) Large span electric gliders could be slowed down (just like pure gliders), and climb in thermals.

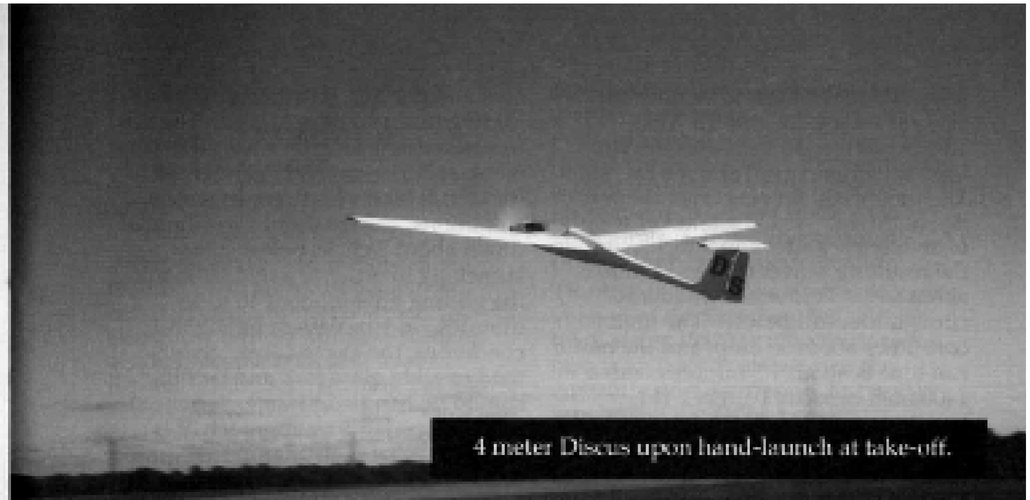
7) Due to high energy retention, electric scale gliders would be more aerobatic without losing excessive altitude.

8) Scale gliders, in general, have an undercambered airfoil, which is efficient and capable of wide speed range. Therefore, they are suitable for electric conversion in anticipation of higher speeds.

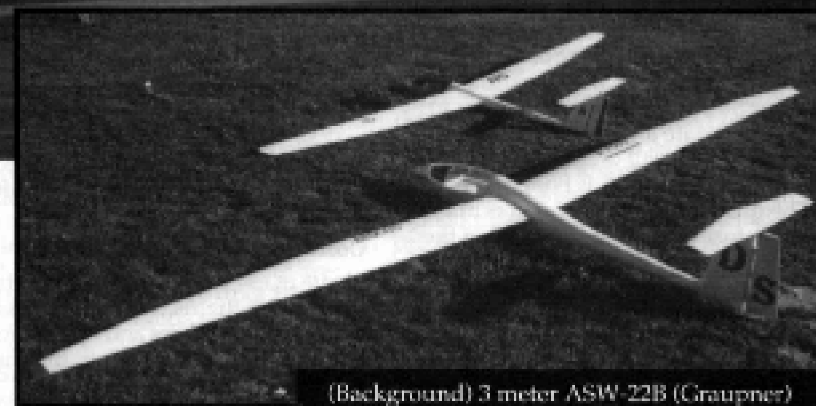
9) Once the motor is shut off, the prop will fold, thereby generating very little drag during glide.

After assessing the aforementioned disadvantages and advantages of electric conversion, scale gliders

4 meter ASW-24 (Roebers)
West Windsor Flying Club in central New Jersey
The gentleman in red jacket is Phil Thayer (Mr. Flightec).



4 meter Discus upon hand-launch at take-off.



(Background) 3 meter ASW-22B (Graupner)
(Foreground) 4 meter Discus (Roebers)

appear to be feasible for electric conversion, without significantly affecting performance.

Models Used for Electric Conversion

I start with 4m to 4.5m scale gliders, and have successfully converted to electric the 4m span Discus and ASW-24 (both are by Roebers of Germany),, and 4.5m span LS-3 (by GFK of Germany). They fly absolutely great. The scale Discus and ASW-24 are of standard class, and do not have flaps. The LS-3 has full house controls, including flaps that could be deployed in thermals, which would further extend gliding time. The take-off weight of these gliders (non-electric version) is about 10 lbs., which includes about 1.5 lbs. of ballast needed to balance the C.G. The corresponding wing load is about 18 ounces per square foot. After electric conversion, the final weight increases to about 12.5 lbs., and the wing load goes up to about 23 ounces per square foot.

Components Used for Electric Conversion

Components for electric conversion are as follows:

Component	Weight
Graupner Ultra-2000 Motor	1.5 lbs.
Battery 20-Cell (1400 mah capacity)	2.5 lbs.
Speed Control - Flightec Sec-M	3 oz.
Aeronaut 14-7 Prop	3 oz.

Based on the tabulated data, the total weight added for electric conversion is about 4 lbs., and the resulting net weight increase is about 2.5 lbs. (4 lbs.

less 1.5 lbs. of ballast to balance the C.G., as for a pure glider). This additional weight increases the wing load at increments of about 5 oz./sq. ft. The motor system generates about 8 lbs. of thrust. With the take-off weight of an electric glider equal to 12.5 lbs., the resulting power to weight ratio is about 60%. This would yield a 50° climb under full power. The motor consumes about 35 amp, and the motor run time is about 1.5 minutes with a 1400 mah capacity battery. This translates into two high altitude climbs with one battery charge. The charging time is about 15 to 20 minutes under a 4.5 amp charging rate.

Installation of Electric Components

I use a dremel tool with a cutting disc to cut off the glider nose, in order to accommodate an electric motor. A plywood firewall is epoxied into the nose, and the motor is bolted in place. The unsupported motor end is braced to the fuselage. Since the nose of the glider is not perfectly rounded in section (approximately oval in shape, depending on the model), the firewall must be shaped to conform to the cut-off opening. I discovered that the glider nose could be cut off so that the short chord of the oval shaped opening is equal to the diameter of the spinner. Down thrust of about 7° is built in order to minimize possible ballooning on take-off. The battery pack is velcroed down to the fuselage. There is plenty of room in the fuselage to adjust the location of the battery pack in order to balance the C.G.

Hand Launch and Flying

Upon launching, scale gliders are known to tip stall due to the large wing span and tapered wing tip design. Therefore, instant take off is essential using the hand launch method. Since the power weight ratio is about 60%, all that is needed is a flat-firm toss from a launching helper, and the glider will climb very quickly. Under full power, a very high altitude can be reached (estimated at 1200 feet) in about 40 seconds. At this altitude, lift appears to be abundant, especially in cool and dry air; 40 minutes or more of gliding time can be achieved. The key to sustaining a long thermal glide is to climb as high as possible under the initial full blast of power. In windy conditions, gliders should be trimmed down about 2-clicks before hand launching in order to avoid ballooning; the gliding time is about 10 to 15 minutes. In windless or light wind conditions, the electric scale gliders tend to glide quite fast, and landing should be handled by an experienced pilot. Upon landing approach, it is suggested that both ailerons be deflected up to decrease stall speed for a slower, and safer landing. A computer radio is recommended for electric, scale glider flying, especially utilizing differential to minimize tip stalling, mixing of ailerons/rudder to make each turn in a coordinated fashion; the flaps could be coupled with elevator to compensate for lift conditions.

Conclusion

I have made a few successful electric scale glider flights, which impresses many club members and spectators. Under a full blast of power, the climb rate even amazes gas pilots. The graceful thermal glide across the blue sky, or high speed passes through the field, is bliss to watch. I am extremely pleased with the results, and hope that this article will encourage more people to try electric, scale gliding. ■

In Search of the Optimum R/C Sailplane Wing

...by Oliver Wilson
Port Charlotte, Florida

Better materials and construction methods will allow higher aspect ratios. These improved structures will also allow thinner airfoils. Thinner airfoils become critical at lower Reynolds numbers, inviting yet higher aspect ratios. Higher aspect ratios and higher wing loadings will lead to significant improvement in the performance of unlimited class R/C sailplane models.

As contest formats shift to man-on-man, I expect performance to become relatively more important.

A wing, of fixed area, benefits from increased span, up to the point where induced drag reduction is overcome by profile drag increase. This point varies from airfoil to airfoil, and with wing area loading. The variations of this point from one airfoil to another are determined by how well drag is controlled as Reynolds numbers decrease.

The SAILPLANE DESIGN program of the late David Fraser is a powerful tool for analyzing this aspect of R/C sailplane design. I explored a range of spans and area loadings, while holding the wing area constant at 6.25 square feet (900 square inches). I retained the same fuselage and stability criterion throughout. I did not evoke structural considerations to limit aspect ratio.

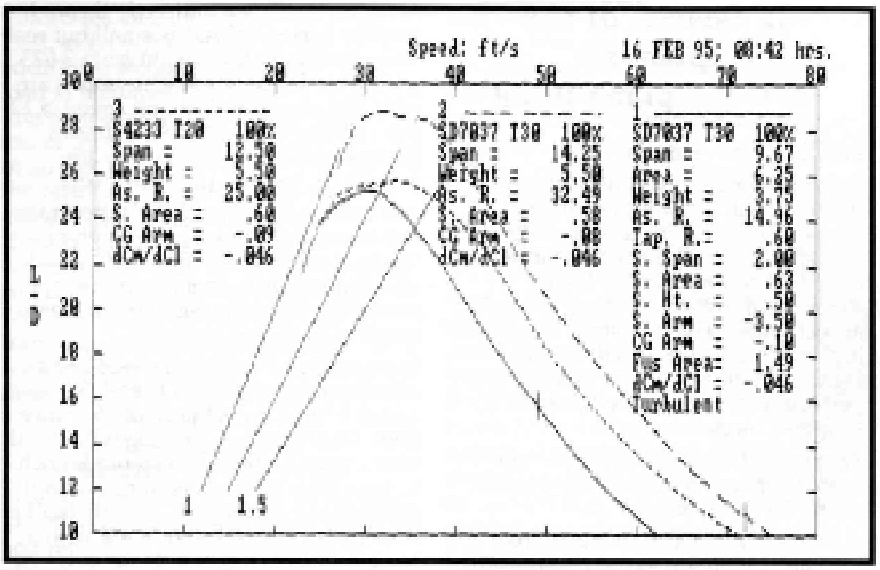
The graph summarizes the results. The straight diagonal lines are for sinking speeds of 1, 1.25, and 1.5 feet per second. The lower, solid curve is the performance polar representative of either of two currently popular, unlimited class contest ships. The upper dashed curve is the equivalent sailplane with the span increased to 14.25 feet. Because of the resultant chord reduction, I moved the center of gravity forward to the same relative percent of chord as the first case, and I reduced the horizontal tail area to maintain the same pitch stability. The reduction is parasitic drag, which high aspect ratio allows indirectly through a smaller horizontal tail, is small but real. I also increased the weight from 3.625 pounds to 5.5 pounds. The results are a similar minimum sinking speed, a 12 percent improvement in maximum glide angle (L/D), and greatly improved high speed performance.

The middle curve is a high aspect ratio version of the first case, but with a thick airfoil (S4233). The thick airfoil case is an improvement over the currently popular design, but not as much as in the second case.

In a *SoarTech 10* article, I described a cross country ship with the S4233 airfoil and an aspect ratio of 25. Since then, I have built it and flown it. It will take a petal-to-the-metal zoom launch. It has a very wide speed range, and it handles like a Paragon. Its only fault is that the polyhedral, combined with a wing mount pylon, places the tow hook so low that it is difficult to recover from a severe bank during the launch. The wing consists of closed cell foam cores with unidirectional S-glass on the top skin, and unidirectional carbon fiber on the bottom skin. The 9 square foot wing weighed 3.5 pounds. Three layers each of carbon and S-glass were used at the center. This is not the most sophisticated structure, but it did the job. The failure mode for this type of structure is buckling in the skin under compression. By going to an I-beam or box spar, the reinforcing material is used about three times more efficiently, and the change in failure mode from buckling to something else, gains another factor of three or so. If all the reinforcing material had been concentrated near the thickest part of the wing, it would have been about nine times stronger. This leads me to the conclusion that an aspect ratio 32 wing of 6.25 square feet can be built with a 9 percent thick airfoil for under 54 ounces. This leaves at least 34 ounces for the fuselage, tail, radio, and balance weight.

Such a wing would be capable of breaking a 180 pound test winch line without folding.

The best selection of airfoil from the popular airfoils, confers at least a ten



percent advantage in performance. Another 10% or so is available by going to very high aspect ratios, and higher than normal wing area loading. There is a good chance that Frank Weston is right when he asserts that advances in materials and structures may be even more important than advances in airfoils. Selection of aspect ratio and loading is at least as important as airfoil selection within this study.

These results in no way diminish my desire for better airfoils or my support for the work that Professor Selig and his students are doing at the University of Illinois.

I expect the next generation of airfoils to be at least 10% better than the current generation. Airfoil choice, wing area loading choice, and span (aspect ratio) choice is significant. These choices have the potential for improving performance by 20% over current practice. After the choices have been made, the airfoil must be accurately built and the structure must be strong enough to zoom launch if the performance potential is to be realized in competition. ■

Understanding Sailplanes

...by Martin Simons

13 Loch Street, Stepney,
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Flight Without Figuring Part 6

More about wing sections

Camber

In the previous article, it was shown how the camber line of a wing section affects the lift curve on a chart of lift against angle of attack. The more cambered the camber line, the more the lift curve moves up and leftwards, without altering the general shape of the curve.

Since the cambered wing has a higher maximum lift, other things being equal a model with such a wing will stall at a lower airspeed than one with a symmetrical section. The amount of lift produced by any wing, depends on the airspeed. If the wing has camber, and a higher maximum lift coefficient it will be able to support itself in the air at a low airspeed. This can be important for an inexperienced pilot, since the model will land and take off more easily, without a long ground run.

The cambered wing also will help if the model has to carry much weight.

On the other hand, if the model is intended for aerobatics, it is important that it should fly equally well upside down and right way up. A cambered wing section works against this. Hence aerobatic models generally should have symmetrical wing sections.

We may now look at the effect of camber on trim.

Balance

When a model is in flight at a steady airspeed and in a steady attitude (e.g., diving steeply, climbing, or perhaps even flying straight and level) it is in a state of equilibrium. This means nothing more than a balance of forces. The total of all the upward forces is equal and opposite to the total downward forces, all the forward acting forces are equal and opposite to the backward forces, pitching forces tending to raise the nose of the model, are exactly opposed by forces tending to lower the nose. The sum total of all the forces adds up to zero so nothing acts to alter the model's flight in speed or direction. The model is in *trim*.

For instance, imagine a model, under control, diving vertically at some high but steady airspeed. The controls have been positioned deliberately by the pilot, for diving vertically. The forces are all in balance, in equilibrium.

When the pilot decides to end the dive, something has to be done to change the balance of forces. The equilibrium has to be upset. A movement of the elevator will do this. Assuming it is properly designed and built, the model will respond.

When a new trim is set up by the pilot, a new balance will result. The new equilibrium attitude might be a steady climb, or flying upside down, or even upright straight and level. The point is that controlling an aircraft and changing its flight behaviour from one attitude to another, requires, each time, a change in the balance of forces, disturbing the equilibrium, altering the trim. After each such a change a new equilibrium, that is, a new trim, is established.

Even an aerobatic flight pattern may be thought of as a very rapid change from one state of equilibrium to another, though the changes may be so rapid that there is hardly time for one balanced state to be established before another is commanded.

Of course, a vertical dive in equilibrium with the pilot doing nothing, could continue until the model hit the ground, which would very suddenly bring about another sort of equilibrium: the state of lying in pieces motionless all over, and partly under, the paddock.

In Figure 1 the main forces acting on a vertically diving model with a symmetrical wing section, are shown. The weight, together with the thrust of the engine and propeller, directly down, is balanced by the total drag which is directly up and equal to the total of thrust and weight. There is no increase or decrease of airspeed. (This model is at its so-called terminal velocity.)

There is no lift coming from the wing. The wing is at its aerodynamic zero angle of attack. If there were any wing lift, this would not be balanced by any other force and the diving trim would therefore be upset. The model would begin to pull out of the dive.

Since the wing section of the diving model is fully symmetrical, the airflow over both surfaces (nominally, upper and lower) is the same. No force tending to upset the dive comes from the wing.

The tail control surfaces also will be at aerodynamic zero because if they are not the model will not continue in the vertical dive. The model is therefore in equilibrium or trim for vertical diving, with its tail and wing both at zero lift.

It will continue diving until the pilot decides to upset the equilibrium and establish a new trim in a different attitude.

Pitching moment

In Figure 2, only one thing about the model is changed. It now has a cambered wing section.

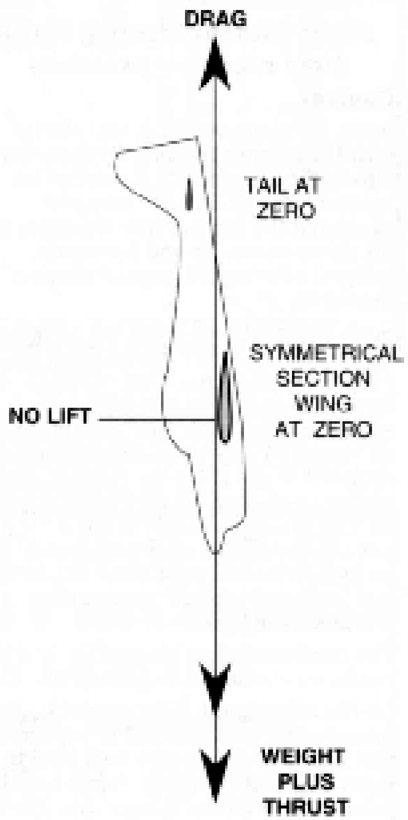
To maintain the diving equilibrium, it is necessary again for the wing section to be at the aerodynamic zero angle, because if any wing lift appears, the model will not continue in the dive. As noted previously, the zero lift angle for a cambered wing section is geometrically negative. The pilot does not measure this angle with a protractor. The only angle of attack at which the dive remains vertical, is the angle at which the wing is producing no lift, i.e., aerodynamic zero. The pilot knows this angle has been found when the dive is truly vertical. The elevator is used to control the angle of attack of the wing until the model does dive vertically. Once this is done the required aerodynamic zero has been achieved and the trim is held.

The wing section is cambered. The air flow follows a different course over the two surfaces. Although no lift is produced a force arises which is entirely due to the camber. It tends to force the wing to a more negative angle of attack and is called the pitching moment of the wing section. In

Figure 1

Equilibrium in a vertical dive with a symmetrical wing section. Drag equals thrust plus weight. Velocity constant. A balance of forces.

The model is in vertical diving trim.



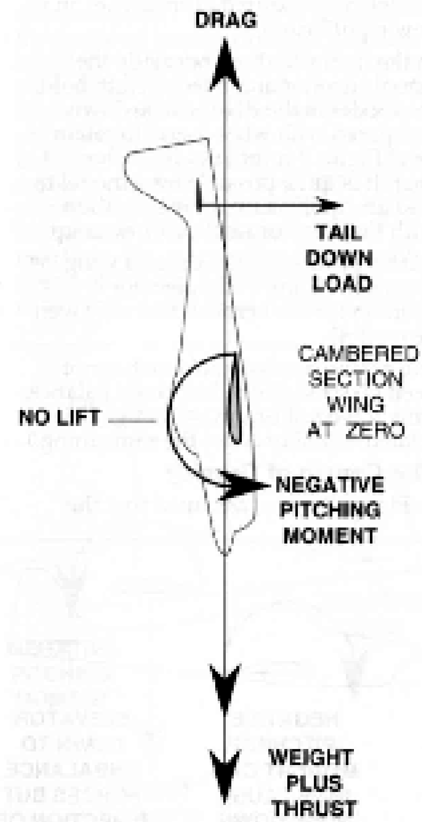
general, the more cambered the section, the larger the pitching moment is. With all normally cambered sections, the pitching moment is negative. That is, it tends to force the wing to a more nose down or negative angle.

In vertical diving trim, the pitching moment tends to rotate the whole model beyond the vertical. If it is allowed to do so the wing will come to an angle of attack below aerodynamic zero and will then produce **negative**

Figure 2

Equilibrium in a vertical dive with a cambered wing section. Drag equals thrust plus weight. Negative pitching moment caused by camber is balanced by tail down load. Velocity constant. A balance of forces.

The model is in vertical diving trim.



lift. The aircraft will pull out of the dive **inverted**. This is called a 'tuck under'.

In order to maintain the diving equilibrium, a force has to be found which will prevent the negative rotation. With normal model layouts, this can come only from the tail, a **nose up force**. That is, the tail has to be at a **negative aerodynamic angle of attack** to the airflow

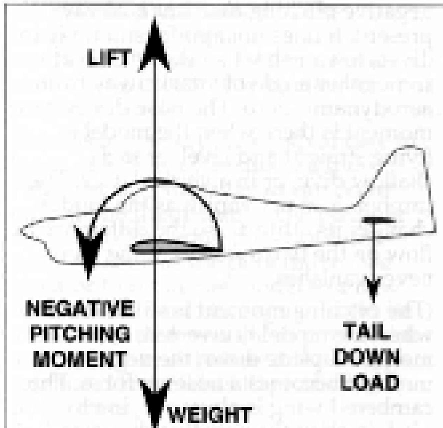


Figure 3

Equilibrium in level flight with a cambered wing section. The negative pitching moment is always present. This must be balanced by a down load on the tail.

(Note. Thrust and drag are not shown in this diagram for the sake of simplicity. The wing lift is slightly more than the weight to compensate for the tail load.

passing over it. The tail will experience a down load. If, for any reason, this tail download does not appear, or is not great enough, the model will not hold the vertical dive but will tuck under.

No paradox

Most model fliers, on first coming across the facts illustrated in Figure 2, find them paradoxical. To maintain a model (with a cambered wing) in a vertical dive trim the **tail has to produce a down force**. Yet the normal position for the elevator controls to hold a model in diving equilibrium, is downwards. It is natural to think that holding the elevators down, causes the tail to develop some upward load, to keep the nose of the aircraft down.

To understand this requires some careful thinking.

When any aeroplane or glider with a cambered wing section is flying, the negative pitching moment is always present. It does not appear suddenly in dives, to vanish when the wing is at some other angle of attack away from aerodynamic zero. The nose down moment is there when the model is flying straight and level, or in a shallow dive, or in a vertical dive. The camber does not vanish as the model changes its attitude, so the difference in flow on the two surfaces of the wing never vanishes.

(The pitching moment is still there when the model is inverted, but if the model is upside down the negative moment becomes a nose up force. The cambered wing is always trying to pitch itself in the negative direction.)

Thus, in level flight, as shown in Figure 3, the camber is trying to force the nose down. Assuming that the centre of gravity of the model coincides with the aerodynamic centre of the wing, where the wing lift originates, it is necessary to balance out the nose down pitching moment of the camber, with an equal and opposite nose up moment from the tail.

Although, in this situation, the elevator control may be neutral or even slightly up, the tail unit of a model with a cambered wing is normally required to lift **downwards** as shown in Figure 3.

We cannot assume that the elevator position at any given moment, tells us what force the tail as a whole is producing. The elevator allows us to control the aeroplane by first upsetting the balance of forces and then trimming for a new balance, diving, climbing, upside down or whatever it may be.

The way in which the elevator may be moved to cause the initial imbalance is one thing. The position of the elevator when the new balance is established, is another. The direction of the force from the tail, after re-trimming, is not instantly obvious from the position of the control stick or trimmer.

To **change** the straight and level equilibrium, to make the model rotate nose down into a dive, requires the tail force, nose up, to be reduced. The elevator is moved down (Figure 4). This upsets the balance and allows the wing camber to push the nose down. The dive begins. When the required diving angle has been reached, it is necessary to set up a new balance. To do this the elevator has to be moved to another position to hold the new equilibrium.

There are three distinct actions. First, elevator down to start nose down rotation. Second, stop the rotation, by an up elevator movement. Third, find the elevator angle that will keep the model in the desired attitude, i.e., in its new equilibrium.

In the final situation, normally the actual elevator angle required to hold the model in the dive will be down compared with what it was to retain level flight. It might not be so, however. It is quite possible for a model to find an equilibrium diving position with the elevator neutral, or even up.

With a symmetrical sectioned wing, as shown in Figure 1, the elevator position for the vertical dive may well be neutral.

(Note, the discussion above has not been about stability, but about balance, trim and equilibrium. Although related, stability is not the same thing.)

The Centre of Gravity

In Figure 3 it was assumed that the centre of gravity of the model coincides with the aerodynamic centre of the wing. The aerodynamic centre of any lifting surface is normally very close, in plan view, to the 25% mean chord location. Any wing sweep or unusual changes of outline should be allowed for in working out where the A.C. is. For most accurate results, the vertical location, allowing for any wing dihedral, should be found too.

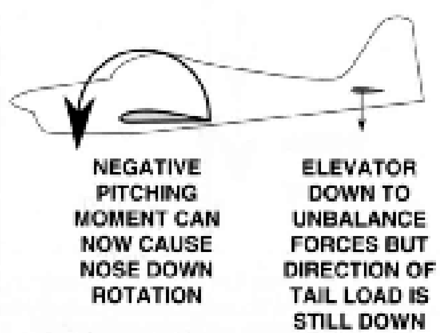


Figure 4

To make the model dive the elevator is moved down. This reduces the tail down load but may not reverse its direction. In any case the equilibrium is disturbed and the pitching moment turns the nose down to start the dive.

(Note, thrust, drag, lift and weight not shown)

In most models, for various reasons, the centre of gravity does not coincide exactly with the wing A.C., often being placed slightly behind it in the horizontal sense. In level flight this obviously changes the balance of forces, as shown in Figure 5. It is possible, by placing the c.g. somewhere about 30 to 35% of the mean wing chord, to bring the tail load for balance in level flight to nil, or nearly so. The moment of the wing lift, ahead of the c.g., tends to raise the nose. This more or less balances out the pitching moment caused by the camber. The tail then has nothing to contribute. It may be set at its aerodynamic zero, probably with elevator control neutral.

There is some very small advantage in terms of efficiency in this situation. However, this nil tail load can occur only at one flight speed. The pitching moment of the wing does not disappear. As soon as the pilot moves the elevator to rotate the model to a new trim, the tail load once again has to be adjusted to maintain the required trim and, in a dive, as before, if the wing is cambered the tail has to produce a down force.

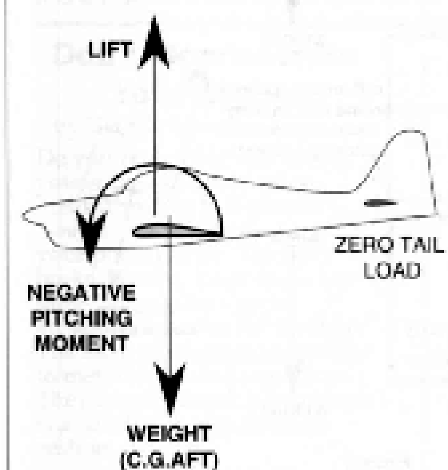


Figure 5

Equilibrium in level flight with a cambered wing section and centre of gravity aft. The negative pitching moment is always present. This may be balanced, at one flight speed, by the wing lift acting ahead of the c.g. The tail down load may be reduced to zero. At other speeds, some tail load will be required.

Centre of pressure

Much confusion has arisen among modellers about the pitching moment of cambered wings, the aerodynamic centre, and the so-called centre of pressure.

In the early days of aeronautics, when people like Horatio Phillips were setting up wind tunnels, they found that wing sections always tried to change their angles of attack in the airflow. Every test piece had to be held firmly before any meaningful measurements could be made.

What the experimenters were discovering was the pitching moment, which is a real force, not a theoretical abstraction. A cambered wing in a flow of air always tries to pitch to a different angle of attack and the force can be felt even with a crude piece of curved card in the breeze from a fan. A symmetrical wing section will do the same unless it happens to be supported in the air stream exactly at the quarter chord point, which was not usually done in Phillips' time or for some time afterward.

When the strength of the pitching moment was measured, along with the lift and drag, it was as *if* the point of action of the lift and drag forces moved about. Such motion would create the pitching force. It became customary to calculate the supposed movement of this theoretical centre of pressure and show its supposed position on the wind tunnel report charts. As the angle of attack increased, the centre of pressure was calculated as moving forward. As the angle of attack reduced, the c.p. formulae showed it moving back (Figure 6).

It is very important to note that the backward movement of the centre of pressure does not suddenly stop at some place on the wing, not even at the trailing edge. Misunderstanding of this is still very widespread. As the angle of attack is reduced, the centre of pressure, a calculated point, not a real object, not a real force, moves further and further back. At low angles of attack, such as those required for fast flying speeds, the c.p. has to be imagined as being **somewhere behind the wing** entirely. At still higher flight speeds, the c.p. works out to be behind the tail of the aeroplane.

At the aerodynamic zero, no lift, angle of attack, the calculations indicate that the c.p. is at an infinite distance behind the wing: out of this universe! This is true even if the wing section is symmetrical or has been designed specially to have no centre of pressure movement (reflex sections). With all normally cambered wing profiles, **at aerodynamic zero, the pitching force tending to twist the aerofoil nose down, is still present.** For the centre of pressure position in this situation, an infinite distance behind the wing is the only possible answer to the sum.

At negative aerodynamic angles, the centre of pressure re-enters the universe and moves forward again as the angle becomes more negative and negative lift is produced. It is only the mathematics that produces this rather strange result. In actual fact, the real pitching force does not change either in strength or direction, relative to the wing.

Certainly no wind tunnel engineer ever ran off to infinity to measure the lift and drag forces there. The forces are on the wing, not some distance away. The lift and drag measured in the wind tunnel are not to be found in the house across the street or on the other side of the moon. The centre of pressure position is only a calculated point, used in an attempt to explain, mathematically, the pitching forces produced by cambered sections.

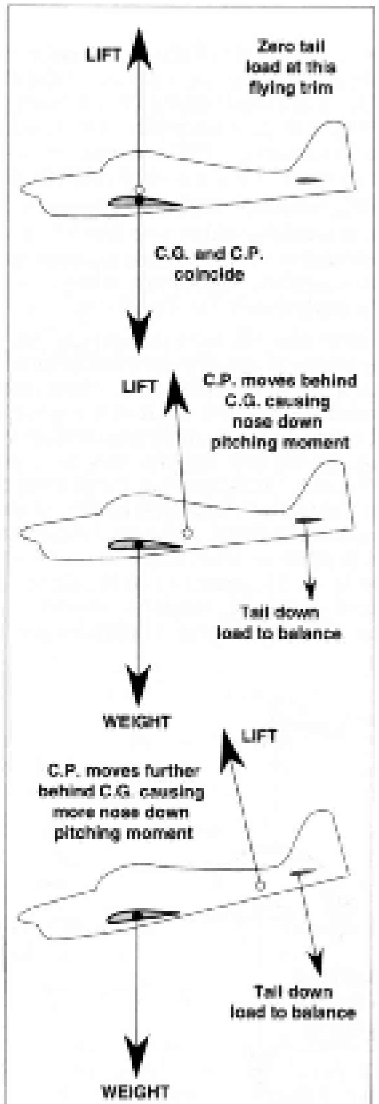


Figure 6

Another way of explaining the negative pitching moment of cambered wings.

The point of action of the lift may be imagined as a moving point, termed the centre of pressure. This point is found to move aft as the airspeed increases.

At high speeds the centre of pressure lies behind the wing and even behind the tail.

Mathematically the results are the same whichever method is used.

Because most old textbooks dealt at some length with the centre of pressure, many older modellers still prefer to use this idea. There is nothing wrong with this method of describing the forces on a wing. Many successful aeroplanes and gliders were designed, in the old days, using wind tunnel results presented in this way. The final results are exactly the same in every respect, as those coming from the more common, modern methods, although the centre of pressure calculations tend to be rather more complicated.

The important difference is that instead of imagining, and calculating, an abstract moving centre of pressure, it is recognised now that the real point of action of the lift and drag is at the aerodynamic centre of the wing, always close to the quarter chord position, and, for practical purposes, fixed there. The pitching moment, the real force, is found to depend almost entirely on the camber of the wing, and it is this force which has to be allowed for when trimming and balancing the aeroplane.

Providing the differences between the two methods of describing the forces is remembered, there is no harm in using the old style. It is important, of course, is to avoid confusing them. The aerodynamic centre of a wing is virtually a fixed point at which the aerodynamic forces are effectively acting. It lies about a quarter of the distance from the leading edge on the mean chord of the wing. The centre of pressure is an imaginary, moving point which can be anywhere, even behind the wing, or behind the tailplane, or at infinity, depending on the angle of attack of the wing.

Only when the airflow begins to separate from the wing, stalling, does the aerodynamic centre shift, and then it moves quickly aft to about 50% of the chord. This is why aircraft normally tend, automatically, to pitch nose down sharply at the stall. ■

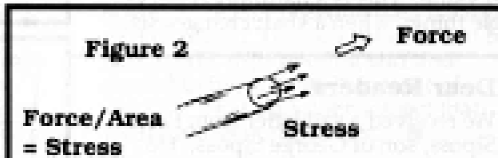
Don't Concentrate Your Stress

...by George Siposs

Do you remember when, as a young boy, you wanted to break a stick in two pieces? You cut a notch around it with your pocket knife. The stick broke cleanly. Beavers do the same thing as they gnaw around a tree, and fell it easily. The same phenomenon applies to metal and wood structures... They usually break where there is a sudden change in cross-section. Figure 1.

Figure 1

Figure 2



First, a couple of definitions.

Stress is force per unit area. Strain is the elongation or change in shape as a result of stress. Stress refers to the intensity (tension, compression or shear or torsion) inside a solid piece of material. Figure 2.

For instance, if you apply a pulling force of 10,000 pounds on a rod whose cross section is one square inch, the stress is 10,000 psi.

Engineering scientists take samples of materials, subject them to measured amounts of force, and determine the total force needed to destroy that piece. (The force could be: pull or tension, push or compression, shear, torsion or twist.) For instance, when they take a piece of square aluminum with one inch sides (= 1 square inch cross section), it takes 13,000 pounds to tear it apart. Thus, the stress at failure is 13,000 psi.

Now, the next piece they test may have a cross section of 0.5 square inches, and the force will be found to be 6,500 pounds. But the stress is still 13,000 per square inch!

When engineers design a piece of

structure to take a stress without breaking, they calculate the force which is applied to the structure (e.g., on a winch, the line pull may be 20 pounds, so the wings have to withstand that). They then use a material whose size or composition is sufficient to withstand that force without permanent deflection or failure. For instance, if the structure is chosen to have a working stress of 3375 psi, and they use aluminum with an ultimate limit of 13,000 psi, then that part has a safety factor of 13,500/3375 = 4.

It is important to realize that, while the force may not be high, the stress may be very high, because the cross section is so small. The tip of the phonograph needle is so small that even a fraction of an ounce push on it creates more compression stress than what exists under an elephant's feet!

Engineering books list tables of stress values for each material in tension, compression, shear, and torsion. But these values cannot be applied blindly based on cross sectional area, because of a phenomenon known as "stress concentration".

Wherever the cross section of a part changes abruptly, it will have a stress concentration that will reduce its strength below the calculated theoretical value. This is a naturally observable thing: when a shaft changes size

Figure 3

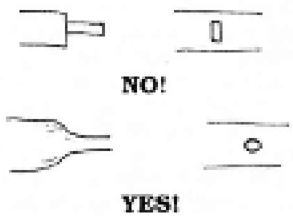
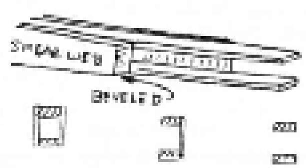


Figure 4

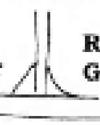
Figure 5



Gradual change!

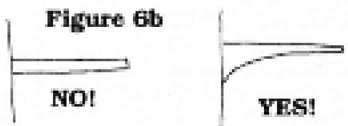
Figure 6a

Triangular



Radiused Gusset

Figure 6b



Dear Readers,

We received a sad letter from Peter Siposs, son of George Siposs. He said, 'I'm sorry to write that my father passed away on November 21 after a long battle with Leukemia and Lymphoma cancer. Dad loved flying nearly his whole life and developed several planes. He wrote articles in most R/C magazines over the years, as well. He co-developed the first R/C car back in 1967, I believe. I thought I would write you so that you are aware of the situation. ...I would appreciate it if you could ensure that no further Digest's, or readers letters, are mailed to his home.'

Sincerely,
(Signed) Peter Siposs

George Siposs cared a great deal about flying and the hobby. He experimented with different ideas, and many of you, over the years, have read about them through the pages of *RCSD* or one of the full-size R/C magazines. He was an active member of the Harbor Soaring Society in California. We shall all miss him.

This note is to acknowledge the request of his son, Peter Siposs. We would appreciate it if all of you could help ensure that no further readers letters are mailed to his home.

abruptly, it will "seem" to be weaker at that point. The amount of strength reduction depends on the type of cross sectional change. For instance, a sharp corner, a hole in the middle, or a notch all create different stress concentrations. Figure 3.

The fuselage abruptly changes cross section, figure 4, just in front of the tail feathers. When the plane stops abruptly (i.e., nose dive close to the ground), the fin wants to keep going because of its inertia. The skeg on the bottom of the fuselage has less weight than the fin, so the fin tends to break the fuselage. Make this part stronger. (Because the stabilizer is equal on both sides, its mass compresses the fuselage, but does not want to make it snap off.)

The wing spars have doublers out to a portion of the wing (box spar); then suddenly there are only spars, and no shear webs. Breaks usually occur where the box spar ends. You can make the spar stronger if you gradually reduce the size of the shear webs, or eliminate the webs on one side only for about five ribs. Figure 5.

Where two pieces of wood meet, there is a sudden change in cross-sectional area. Use triangular or radiused gussets to distribute the load on a wider area. Figure 6.

The basic idea is to make the change of cross section a gradual one. Use tapered pieces to blend one size into the other. Another way to reduce stress is to make the part resilient so that the stress is not applied suddenly. For instance, use bamboo, or steel wire, because they all bend, and thus gradually absorb the load.

Theoretically, the wing, when bent upwards, has a lot of tension on the bottom. Most of our wings fail, however, in compression (i.e., the top part crushes). You can prevent that by making the top covering stiff and curved to increase its "moment of inertia". That's another subject that we'll discuss in the future... ■

Special Events

Schedule of Special Events

Date	Event	Location	Contact
Jan. 13-14	2m, Unl.	Punta Gorda, FL	Ollie Wilson, (941) 627-2117
Feb. 3-4	SW Winter Soaring	Gilbert, AZ	Iain Glithero, (602) 839-1733
Feb. 24-25	2m, Unl.	Cape Coral, FL	John Agnew, (941) 936-7148
Mar. 23-24	2m, Unl.	Orlando, FL	Hank McDaniel, (407) 831-3688
Apr. 20-21	2m, Unl.	Orlando, FL	Hank McDaniel, (407) 831-3688
May 24-27	2m, Unl., Fun, XC	Morriston, FL	Ken Goodwin, (904) 528-3744
June 1-2	1st Annual Northeast Aerotowing Fly-In	Elmira, NY	John Derstine, (717) 596-2392
June 1-2	LSF V Task Weekend	Tri-Cities, WA	Don Pesznecker, (503) 659-9624
June 8 - 9	SWSA 2M Soarfest '96	Covina, CA	Pete Olsen, (909) 597-2095
June 20 - 23	Mid-South Championships	Memphis, TN	Bob Sowder, (901) 751-7252
June 29-30	2m, Unl.	W. Palm Beach, FL	Jim McCudden, (407) 967-8909
Aug. 3-4	2m, Unl.	W. Palm Beach, FL	Jim McCudden, (407) 967-8909
Aug. 30-Sept. 2	2m, Unl., Fun, XC	Williston, FL	Ken Goodwin, (904) 528-3744
Sept. 21-22	2m, Unl.	Orlando, FL	Hank McDaniel, (407) 831-3688
Oct. 19-20	2m, Unl.	Williston, FL	Bob Wargo, (813) 938-6582

Slider

A $150 Two Meter Design

Using Off the Shelf Components

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

I Hate 2 Meter Sailplanes!

They're hard to see with my tired, old eyes, and are harder for me to land as accurately as my 100" Duck or Airtronics Peregrine. It's also another box to carry, and as Soaring Law #49 expounds, "Two models are four times as much trouble as one!" But when you contest like I do, and I LOVE to fly contests, and you drive to Wichita, Dallas, or Kansas City, or to MUNCIE for the LSF/AMA NATS, and you're spending maybe a grand on a long trip, you need to fly as many flights as possible to amortize the cost of each flight. I mean, at $1000 for the trip, you're talking $100 per flight for ten flights. Serious money! So, if the contest is large, far away, and they have 2 meter events, it makes sense to fly as much as you can, as often as you can. OK, OK! So, I needed to get a 2 meter ship for the NATS this year!

Wing

Looking at what was available, there were certainly many 2 meter ships to choose from. Being cheap, I was reluctant to spend almost as much for a 2M kit as I would have for an open class ship, so I decided on a roll-ur-own. A couple of years ago, I wrote an article for *RCSD* in which I suggested that a competitive sailplane could be constructed from off-the-shelf components made by specialists (i.e., a wing from a wing maker, a fuse from a fuse maker, hardware from hardware makers, etc.) It would seem that such is now so, and at Pasadena this year, two things happened which brought about my latest creation. Mark Levoe, Levoe Design, was selling glass fuselages (Super-V like, but with conventional tail group), and Roger Chastain, Tekoa: The Center of Design, was showing samples of the new Feather/Craft 'buck an inch' obechi/foam wings. OK! I came home with the fuselage and called Roger a couple of days later to order a set of 2M SD7037 wings. The wings arrived a few days later via UPS, packed in heavy plastic bagging and bubble wrapped in a heavy cardboard box. The $15 shipping and handling charge was well justified. Workmanship on the wings was excellent. The panels were sanded and ready for finishing. (I used MinWax Polycrylic clear gloss.) The control surfaces were routed out with a 3/8 slot allowing the use of light-weight 1/16 balsa facing. The wing panels were quickly assembled with the additional builder supplied spruce, or preferably bass (easier to shape), leading edge stock, and a couple of blocks for the wing tips. Each panel weighed less than 5 ounces, and matched within 3 grams! So far, so good! Next came the process of joining panels. Oh... I guess I neglected to mention that this is a one-piece wing. I know, I wasn't crazy about this either, but that's what Roger sells and, what the heck, I'll try anything, once. The panels have full-depth spars capped with inch-wide carbon fiber. At the roots (which come without root rib), I removed 1/8 foam in front of and behind the spar for a depth of 4 inches, spanwise. Into these cavities (one panel at a time), I poured slow-curing epoxy, and inserted spar-height 3/32" thick carbon/glass sheet strips facing the spar front and rear. Clamps were attached so that the strips are held tightly to the spar. When the first panel was cured, the second panel was joined in the same manner with additional epoxy placed on the remainder of the root facing. The now, one-piece wing was again left to cure. The dihedral angle was about 4 degrees, and was pre-sanded as delivered, and the panels matched LE/TE and LE/spar within 1/32". Close enough!

Normally, if you follow Tekoa's instructions, the wing panels are first bevel sanded to achieve dihedral of 3 degrees, and then simply butt glued together with 5 minute epoxy and reinforced with 3 layers of 4 oz. cloth on top of the joint, and 2 layers on the bottom. A pine block 1/4" greater than the fuse width is used on center at the trailing edge — is used at the joint TE after the flap/aileron are cut away. After the joint cures, 2 3/4" holes are drilled at the panel junction into the bottom sheeting, foam removed to top sheeting, and holes are filled with epoxy/microballoon mixture to provide mounting bolt bearing points. The flap/aileron and wing panel TE are lined with 1/16 balsa, while 1/8" spruce or bass is used for the L.E. Tip blocks are glued on, and then the assembly is sanded and finished. Tekoa recommends multiple coats of water base Varthane, wiped on with a sponge, lightly sanded in between coats.

But, the reinforcement method I ended up using was a little different. The center of the panel joint was reinforced with carbon fiber mat and glass cloth. Two layers of heavy, woven carbon mat 3 3/4" wide was epoxied on the lower surface and allowed to cure. This was followed by two layers of 1 oz. glass cloth, 4 1/2 and 6" wide. These were epoxied and blotted out, one sheet at a time. The upper surface materials were one 3" wide layer of 1 oz. cloth and a final 3 1/2" wide layer of 1/2 oz. non-bias cloth. I used masking tape to form an outer rail for the epoxy, so to keep the joint neat and blendable at the edge, or the 6" cloth.

The center bottom built up to about 3/32 thick, which was necessary for the method of wing to fuse attachment that I came up with. A taped, brass, screw-in insert was located at the hardware store. The insert is taped on the inside, and accepts 3/8" nylon bolt (like the kind used to attach toilet seats), and is threaded on the outside with a heavy, pitched thread, which would normally be screwed into 11/16 hole in wood for table legs, etc. I carefully drilled a hole in the wing lower surface, slightly smaller than the insert's outer diameter, and 1/8" behind the spar. Using a soldering iron, I removed the foam down to the upper sheeting. Next, I plugged the insert loser end with masking tape, filled the cavity half full with epoxy, and screwed the insert until it came in contact with the top sheet. As the insert was screwed in, it displaced some epoxy, which was wiped away with an alcohol-soaked towel. The epoxy was allowed to cure until it was green — still just a little soft, allowing the insert to still be moved for adjustment. The 3/8" nylon bolt, cut to the proper length, was then inserted through the 13/16" hole in the bottom of the fuse. The fuse was then placed, inverted, onto the inverted wing on the bench, and the bolt (lubed with mold release or Vaseline) was screwed into the insert. The fuse and the assembly was then left to cure, overnight.

Circular servo wells were routed into the lower surface using a Dremel tool to remove the skin, and a soldering iron to remove the foam. All foam in the cavity was removed, exposing the top skin. Foam-compatible CA was used to coat the top skin at the bottom of the cavity. This helps reinforce the skin, and helps avoid splitting. Circular blocks of blue foam, about 1 1/2" in diameter were used in each of the servo wells. The blocks have cutouts for the servos, and provide a substantial reinforcement for both the top and bottom skins, while rigidly retaining the servos, which are simply pressed in. Blue foam is springy, and doesn't crumble under compression, as does white foam. I use those Airtronics vinyl, servo-retaining, sticker thingees for well covers.

The wing attachment method works well, and the wing is one strong sucker! If supported on the tips, and deflected at center, the wing springs up and down like a glass diving board, deflecting about 1 inch with three or four harmonics. Energy return is phenomenal. Out of a tight turn in a thermal, the wing flexs (loads), and then really unloads. Very snappy response; very quick. All up weight is 45 oz., 9 1/2 oz./sq. ft.. Dry, the ship thermals very well. With the addition of 5 - 6 oz. ballast, it shrugs off 15 - 20 mph gusty winds like a bad habit. Penetration is extraordinary! Landing with full flap is predictable and accurate. Needless to say, I'm happy with the ship, and I am planning to build another wing with the RG-15 airfoil for the slope.

Tekoa offers several wings. The $1.00/inch units (these are one-piece) are available with SD7037 or RG-15 airfoil, and either 78" (2 meter) or 100" span. Also available are the Shadow wings, SD7037 @ 120" and 78", for a few dollars more. Shipping and handling is $15 per set for UPS, or an additional $10 for 3-day delivery. Call Roger and order a set. You'll like 'em!

Fuselage

The fuse chosen was a 2M unit with conventional tail group. These may be purchased from Levoe Design in either 2M or Standard size at $79 and $89.

These fuselages are Kevlar reinforced and very light; they are reinforced in the corners and high stress areas, making the unit very strong. One-piece glass, removable canopies are supplied with each unit. A slip-on nose cone would be better if it were available.

The bellcrank was fashioned out of Formica, and elevator joiners were cut to length out of titanium stock. Pushrods were made from 1.5mm carbon/glass rods, with plastic inserts glued onto the ends to allow tube/clevis attachment to be press/fitted and CA'd on. Strong and light. Two 1" thick blue foam plugs with 1/8" holes for pushrods and 3/32 heat shrink antenna tube were used for bulkheads. One was positioned slightly ahead of the fin boom junction, and the other 3" aft of the TE. These support and guide the pushrods and keep them from flexing. The heat shrink tube runs to about 2" shy of the bellcrank area and forward into the canopy area over the top of the servo tray and close to the receiver. It is left unattached up front making it easy to grasp and insert the antenna. Servo tray is 3/16 ply with 3/8 balsa rails underneath epoxied in. Rudder and elevator servos, along with switch, are mounted on it.

A 4" x 1/4" contoured plywood plate was epoxied into the bottom of the fuselage to allow wing bolt attachment (from bottom) and towhook mounting. The wing attachment bolt also retains a 6 oz. ballast unit made up of 1/16" thick strips of lead cut about 4" long, stacked and taped together with masking tape. The lower strips are narrower than the upper, allowing the unit to fit within the curvature of the fuse. Insertion and removal is easy; one bolt!

Stabs & Rudder

The rudder was fashioned from a piece of pink foam, sanded to shape, and covered with obechi using 3M 77 contact cement. For stabs, I used a set from an otherwise deceased Falcon 880 (built up and Ultra Coat covered, <1 oz.).

Miscellaneous Notes

Obechi looks great when finished clear with a Polyurethane finish. The preferable type is water based, and can be wiped on with a cloth or sponge. It dries quickly and is very hard. If you use this type of finish, apply it just as soon as you receive the wings. That's right. Before you do anything else to them. Why? Well, obechi does some strange things. For instance, it turns yellow if you get oil, or old CA (not covered here), or aliphatic resin glue, or almost anything else on it. If the obechi is smooth, finish it first with polyurethane, and then do the construction. If the obechi surface is not as smooth as you want it, clean up your bench, wash your hands, put on gloves, and sand it with a hand held orbital sander with 220 grit paper. The less you touch the stuff, the better it will finish.

When routing servo wells, make sure that the top of the wing is well supported on a flat surface. Don't cut through the top skin, and don't push hard on the servos while inserting them into the wells, as it is easy to split the top sheeting or make a bubble on the top surface.

Airtronics 4141 servos were used throughout with 12" and 24" extension cables. (It would be nice if 6" and 18" extensions were available.) The 4, 24" units in the fuse were tediously shortened the appropriate amount so as to fit the fuse length. These cable can be pulled about 3" above the wing saddle; the pigtails from the aileron and flap servos stick out of the wing about the same amount. After connecting, the connectors are stuffed into the fuse just ahead of the TE.

It was necessary to enlarge the cable channel in the wing. I used a jig to slide a 3/16 heated wire into the wing panel at the root in order to "burn" a 3/8" channel. If not careful, you can de-bond, or split the obechi sheeting. So, take it very easy, and make sure that the jig is level and straight. Get down and eyeball it, spanwise.

To make it easier to install the servo extensions in the wings, you can remove the male plugs by pressing the tiny retaining tangs on the connector tubes through the slots on the surface of the plug. Use an exacto knife and press gently on the tang while gently pulling on the wire (one at a time). The wire should be easy to remove. Just be very gentle. When the connectors have been removed, use scotch tape (or other thin tape) to gather up the ends so the cable is round on the end. Slide into a piece of 1/4" heat shrink tubing, and compress the bundle. (Don't melt the cables!!) Insert the tube into the servo bay hole, and push through to the exit hole at the root end. Remove shrink tube and masking tape. When you reinsert the tube into the plug, use the point of the exacto and gently raise the tang up above the surface of the tube to that when you insert the tube into the plug; you'll hear it click in place. If you don't hear the click, either the tang is bent down and not catching, or you have the tube in the plug upside down. Make sure that you insert the each wire into the correct hole. (Red into #3...) Check twice!

So, if you want to get into the air quickly and cheaply, check out these wings from Tekoa. These are high quality and very affordable. Levoe's excellent fuselage at $79 is an excellent choice. You can build a cutting edge machine with off-the-shelf components. One other thing for those of you laughing at me because of my cabling techniques. I just want to say here (late breaking news) that I now know a much better way to do it. But, that's another story.

Thermals, D.O.

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Levoe Design
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Sierra Madre, CA 91024
(818) 355-2992

■

on the Wing

B²

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The EH 0.0/9.0

The EH 0.0/9.0 is another in a series of sections designed by John Yost; it has no camber and is 9% thick. As a symmetrical section it has a pitching moment of zero and a relatively limited maximum lift coefficient. For enthusiasts of tailless planforms, however, the EH 0.0/9.0 has at least two useful functions. The EH 0.0/9.0 can be used as the section of choice for vertical stabilizers, whether as "winglets" or as a single central fin. It can also be used in a more fundamental role as a thickness distribution in conjunction with a predetermined camber line.

As a vertical surface section, the EH 0.0/9.0 may be considered by some to be somewhat thick. However, as other of the EH sections have been thinned successfully, there should be no major concern over thinning this section, as well. Such thinning should be done in moderation; 7% should be the minimum thickness considered.

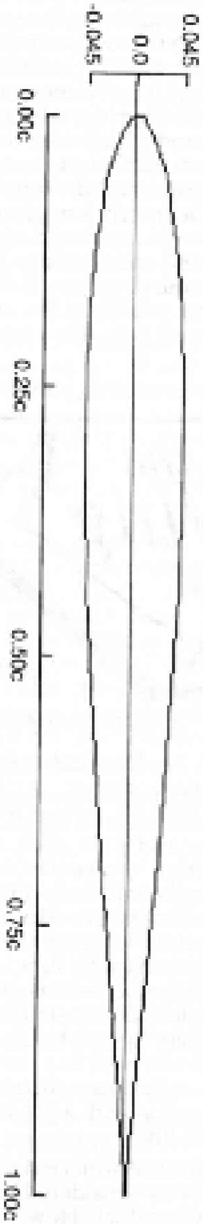
If the EH 0.0/9.0 is used to place a thickness distribution around a camber line, we would highly recommend using the algebraic rather than the trigonometric method. The trigonometric method involves adding the thickness distribution along an artificial axis which is perpendicular to the local camber line, while the algebraic method always adds the thickness distribution parallel to the Y axis. The algebraic method is far easier to accomplish and gives a leading edge shape which seems to provide better stall characteristics.

For those of you who wish to use camber lines appropriate for plank planforms, see On the 'Wing... #17, published in the June 1990 issue of *RC Soaring Digest*. That column provides the formulae for camber lines with various crossover points. If you do not have that specific back issue of *RCSD*, the column is reprinted in "On the 'Wing... the book," published by our own B²Streamlines. The reprint also includes a computer program which calculates various reflexed camber lines and then imposes a chosen thickness distribution.

Please forward suggestions for future columns to us at P.O. Box 975, Olalla, WA 98359-0975. ■

EH 0.0/9.0

X	Y	X	Y
100.000	0.000	0.099	-0.289
99.901	0.004	0.394	-0.623
99.606	0.018	0.886	-0.984
99.114	0.046	1.571	-1.350
98.429	0.092	2.447	-1.726
97.553	0.158	3.511	-2.094
96.489	0.243	4.759	-2.445
95.241	0.345	6.185	-2.778
93.815	0.463	7.784	-3.087
92.216	0.597	9.549	-3.370
90.451	0.748	11.474	-3.624
88.526	0.916	13.552	-3.847
86.448	1.100	15.733	-4.039
84.227	1.297	18.129	-4.198
81.871	1.505	20.611	-4.323
79.389	1.724	23.209	-4.415
76.791	1.950	25.912	-4.474
74.088	2.181	28.711	-4.500
71.289	2.415	31.594	-4.495
68.406	2.648	34.549	-4.460
62.435	3.104	37.565	-4.396
59.369	3.320	40.631	-4.306
56.267	3.526	43.733	-4.191
53.139	3.716	46.961	-4.054
50.000	3.895	50.000	-3.895
46.961	4.054	53.139	-3.716
43.733	4.191	56.267	-3.526
40.631	4.306	59.369	-3.320
37.565	4.396	62.435	-3.104
34.549	4.460	69.406	-2.648
31.594	4.495	71.289	-2.415
28.711	4.500	74.086	-2.181
25.912	4.474	76.791	-1.950
23.209	4.415	79.389	-1.724
20.611	4.323	81.871	-1.505
18.129	4.198	84.227	-1.297
15.733	4.039	86.448	-1.100
13.552	3.847	88.526	-0.916
11.474	3.624	90.451	-0.748
9.549	3.370	92.216	-0.597
7.784	3.087	93.815	-0.463
6.185	2.778	95.241	-0.345
4.759	2.445	96.489	-0.243
3.511	2.094	97.553	-0.158
2.447	1.726	98.429	-0.092
1.571	1.350	99.114	-0.046
0.886	0.964	99.606	-0.018
0.394	0.623	99.901	-0.004
0.099	0.289	100.000	0.000
0.000	0.000		



R/C Soaring Resources

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

Contacts & Soaring Groups - U.S.A.

Alabama - North Alabama Silent Flyers, Ron Swinehart, 8733 Edgehill Dr. SE, Huntsville, AL 35802; (205) 883-7831.

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

Arizona - Southern Arizona Glider Enthusiasts, Bill Melcher (contact), 14260 N. Silwind Way, Tucson, AZ 85737; (602) 325-2729. SAGE welcomes all level of flyers!

California - California Slope Racers, John Dvorak, 1063 Glen Echo Ave., San Jose, CA 95125; (408) 259-4205.

California - Desert Union of Sailplane Thermalists, Buzz Waltz, 3390 Paseo Barbara RD, Palm Springs, CA 92262; (619) 327-1775.

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

California - South Bay Soaring Society, Mike Gervais, P.O. Box 2012, Sunnyvale, CA 94087; (408) 683-4140 after 5:00 pm.

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

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

Eastern Soaring League (VA, MD, DE, PA, NJ, NY, CT, RI, MA), Jack Cash (President), (301) 898-3297, e-mail BadIdeas@aol.com; Bill Miller (Sec./Tres.), (609) 989-7991, e-mail JerseyBill@aol.com; Michael Lachowski (Editor), 448 County Rt 579, Milford, NJ 08848, e-mail mikel@airage.com.

Florida - Florida Soaring Society, Ray Alonzo (President), 3903 Blue Maidencane PL, Valrico, FL 33594; (813) 654-3075 H, (813) 681-1122 W.

Georgia - North Atlanta Soaring Association, Tim Foster, (404) 978-9498 or Tom Long, (404) 449-1968 (anytime).

Hawaii - Maui Island Slope Soaring Operation, MISO, Hank Vendiola, 10-C Al St., Makawao Maui, HI 96768.

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

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

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

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

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

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

Maine - DownEast Soaring Club (New England area), Steve Savoie (Contact), RR#3 Box 569, Gorham, ME 04038; (207) 929-6639. InterNet e-mail <Jim.Armstrong@acornbbs.com>.

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

Maryland & Northern Virginia - Capital Area Soaring Association (MD, DC, & Northern VA), Steven Lorentz (Coordinator), 12504 Circle Drive, Rockville, MD 20850; (301) 845-4386.

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

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

Missouri - Independence Soaring Club (Kansas City area, Western Missouri), Edwin Ley (Contact), 12904 E 36 Terrace, Independence, MO 64055; (813) 833-1553, eve.

Nebraska - B.F.P.L. Slopers, Steve Loudon (contact), RR2 Box 149E1, Lexington, NE 68850; (308) 324-3451/5139.

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

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

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

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

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

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

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

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

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

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

Tennessee - South Central Area, Brian Smith, 317 Crestwood Dr., Tullahoma, TN 37388, (615) 393-4876, anytime.

Texas - Texas Soaring Conference (Texas, Oklahoma, New Mexico, Louisiana, Arkansas), Gordon Jones, 214 Sunflower Drive, Garland, Tx 75041; (214) 271-5334.

Utah - Intermountain Silent Flyers, Bob Harman, (801) 571-6406.. 'Come Fly With Us!'

Virginia - Tidewater Model Soaring Society, Herk Stokely, (804) 428-8064, email: herkstok@aol.com.

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

Outside U.S.A.

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

Canada - Manitoba, Winnipeg MAAC Men Gliding Club, Bob Clare, 177 Tait Ave., Winnipeg, MB, R2V 0K4, Canada, (204) 334-0248.

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

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

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

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

BBS/Internet

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

Internet - Email list/resource of RC soaring related folks, including US and international club contacts, vendors, kit manufacturers/distributors, software, equipment and supplies. Also a resource for aeromodelling related WEB sites on the Internet. Contact Manny Tau at taucom@kaiwan.com, or on CompuServe: 73617,1731.

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

The Frequent Flier's Info. Hot Line, San Francisco Bay Area - Box 1 (lost & found airplanes, helpful tips, upcoming events), Box 2 (questions), Larry Levstik, (415) 924-4490.

Hobby Shops that Carry *RCSD*

Air Capital Hobbies
8989 West Central
Wichita, KS 67212
(316) 721-4164

California Soaring Products
1010 North Citrus
Covina, CA 91722
(818) 966-7215

Finney's Hobbies
3455 Peachtree
Industrial Blvd., Ste. 980
Duluth, GA 30136
(770) 495-8512
(770) 495-8513 fax

Gunnings Hobbies
550 San Anselmo Ave.
San Anselmo, CA 94960
(415) 454-3087

Gyro Hobbies
23052 Lake Forrest Dr.
Unit C2
Laguna Hills, CA 92653
(714) 583-1775

HiTecHobbys
284 - B Wellsian Way
Richland, WA 99352
(509) 943-9241

Hobbies'N Stuff
9577 L Osuna Rd. NE
Albuquerque, NM 87111
(505) 293-1217

Hobby Counter
1909 Greenville Ave.
Dallas, TX 75206
(214) 823-0208

Hobby Town USA
8090 S. 84th St.
La Vista, NE 68128
(402) 597-1888

Hobby Warehouse
4118 South Street
Lakewood, CA 90712
(310) 531-8383

PEC'S Hobby Supplies
947 Stierlin Road
Mountain View, CA 94043
(415) 968-0800

Tim's Bike & Hobby
2507 Broadway
Everett, WA 98201
(206) 259-0912

Reference Material

"Summary of Low-Speed Airfoil Data - Volume 1", Michael Selig wind tunnel testing results. $25 USA (includes postage), $29 surface outside USA, $31 air Western Hemisphere, $38 air Europe, $42 air all other countries. Computer disk, ascii text files (no narrative or illustrations), is $15 in USA; $16 outside USA. Source for all "SoarTech" publications, also. Contact Herk Stokely, 1504 N. Horseshoe Cir., Virginia Beach, VA 23451. Phone (804) 428-8064, email: herkstok@aol.com.

Still a few copies available of some issues of the printed transcripts of talks given on RC Soaring at the Previous Annual National Sailplane Symposium. Prices reduced to clear out stock. Talks were on thermal meteorology, flying techniques, hand launch, cross country, plane design, airfoil selection, vacuum bagging, plastic coverings, flying wings, etc., etc. Send SASE or call for flyer giving details. Many copies of most recent (1992) transcript left. Clubs have found them good for raffle prizes, gifts, etc. Al Scidmore, 5013 Dorsett Drive, Madison, WI 53711; (608) 271-5500.

Seminars & Workshops

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

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 1st day of the month. (Example: If you wish to place an ad in the March issue, it must be received by February 1.) *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

GLIDER RETRACTS - high quality, 1/5, 1/4, 1/3 scale made in U.S.A. 1/4 are standard or heavy duty. Contact Bill Liscomb, 7034 Fern Place, Carlsbad, CA 92009; (619) 931-1438.

PC-Soar Version 3.5 Sailplane Performance Evaluation Program Optional Sailplane Library now expanded to 54 models including: Alcyone, Anthem, Genesis, Mako, Probe, Thermal Eagle, and Synergy-91. Free Library Upgrades. PC-Soar Upgrade to Ver. 3.5 $10, PC-Soar New Purchase $40. New Libraries of Sailplanes and Airfoil Polars $30. Please include $3 P&H for all purchases & upgrades. Also available: *RCSD* Database and Laser cut airfoil templates. LJM Associates, 1300 Bay Ridge Rd., Appleton, WI 54915; ph: (414) 731-4848 after 5:30 pm weekdays or on weekends.

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

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

WANTED: Sales Reps. Just Plane Fun Models is looking for energetic people who love flying R/C sailplanes and would like to support their hobby by becoming a sales representative for my line of sailplane kits. Be your own boss and set up your own territory. Call or write Buzz Waltz, Just Plane Fun Models, 3390 Paseo Barbara, Palm Springs, CA 92262; (619) 327-1775. Commissions paid on all sales.

FORD LONG SHAFT MOTORS, $75. Classic glider kits, cool bands. HITEC, FUTABA, AIRTRONICS radios. #2 meter zip starts: $24.95. Call us for your glider needs. 1-800-359-0233. Ask for Scott. 10AM - 4PM MTN time.

For Sale - Personal

Airtronics Sagitta XC, NIB... $325.00 + shipping; Wik Modelle H-101 Salto, NIB... $125.00 + shipping; Craft-Air Inc. Golden Eagle, NIB... $90.00 + shipping; Top Flite Antares, NIB... $60.00 + shipping. Ray Zatirka, (313) 697-7570, Michigan.

JR X388S glider switches, 2 years old, 1-NER-529X receiver, 1-NER-226X receiver, 600 ma battery, rubber duck antenna, FM 53.700 mhz ham frequency, two 341 servos... $300.00 + shipping. Rick Dusek, (702) 436-0245, after 3:00 pm, Nevada.

Airtronics Infinity 1000, ch 35, no servos, 2 battery packs, 1100 mah, case, neck strap, charger... $800.00 or B.O. + shipping. James Dudley, (916) 455-1885, No. California.

NIB, Graupner 1/4 scale Discus, 4 meter, w/ Multiplex spoilers... $420.00 + shipping. Sheldon Cohen, (415) 424-1240, Palo Alto, California.

Schweizer I-34, 98" span, old Sterling kit, NIB... $70.00 incl. shipping, U.S.A. Paul, (360) 275-6237, Washington.

Twin Astir (Wik), 4 meter all glass, excellent condition, completely finished, ready to fly, slight hangar rash, has an immaculate detailed twin cockpit, competition worthy, all servos rigged for Futaba radio, nose tow release for airtowing...$795.00; Wik Speed Astir, all glass, NIB, 3.8 meters... $595.00; Twin Acro III (Roebers), NIB, 4 meters... $495.00; huge towplane, 134" span, will tow the largest sailplanes, 1/3 L5 with Saks 8.4 twin and Futaba servos, mint condition... $2500.00; German tow plane - Roebers Sky Wing, 99" span, suitable for 1/4 sized & larger gliders, NIB... $475.00. Robin Lehman, (212) 879-1634, New York.

Wanted

Fiberglass fuselage for Craft-Air Viking sailplane. Bob Parker, (408) 997-3417, California.

Classified Note

Please note that the cut-off date for classified ads has been changed to the 1st of the month.

The cut-off date for display ads is also the 1st of the month, and the ad must be camera ready.

TIDBITS & BITS

Great Lakes Soaring League 1995 Fall R/C Soaring Festival Results

...by Ray Hayes

The contest format I developed for this event may be a first. My goals for this unique concept were to create a contest for small R/C sailplanes to compete on a small field and have an unprecedented amount of flight time. Also, I wanted to promote a fierce and equal competition in a relaxed atmosphere, and finally a contest that one person could put on without help on the field. Sounds like an impossibility, but for the most part, that is how it happened. Greg Nilsen volunteered to handle the scoring, and a few non-flying visitors helped with the timing in the two meter event. A special thanks for the help goes to them.

This was a three part contest for 2 meter, hand launch, and 1.5 meter man-on-man hi-start. Winners were declared in each of the three events, and the total points were accumulated to determine the overall winner. Sound interesting?

The keys to this format are: one frequency per contestant, and hi-starts were used in place of electric winches. Using the keys eliminates the number of people required to administer the impounding of transmitters and operating the winch/retriever equipment. The greater benefit is the saving of time. One of the problems we face, in the usual contest, is lost time resulting in less flying time. I believe the lost time factor has contributed to shorter task times and fewer rounds. What is lost time? Lost time occurs when the impound area is not next to the launch area, and requires walking long distances to first pick up the transmitter, and then another hike to the winch area. Lost time also occurs due to the nature of our electric winches and retrievers. One of the attractions to flying small sailplanes is the convenience of hand launching, or using a small hi-start in small areas like school yards.

This is how the contest format worked. I used pre-entry to solve frequency duplication and to eliminate the early morning lost time required to register contestants. Entry confirmation included the pilots meeting information thereby reducing the length of the pilots meeting. The 2m event had a start time of 10:00 a.m., and finished at noon. Pizza and refreshments were furnished by the host for a relaxing lunch break, and the 2m winner was announced. The two hour window allowed contestants to fly at will any number of flights, to record their four best flights and related landing scores. Two hi-starts were set out: one a 1/4" rubber, the other 3/16" rubber. This gave the contestant a choice of hi-start. Many of the contestants flew their 1.5m in this event, using the 3/16" rubber size. The longest single flight lasted for 29 minutes, and was terminated by the closing of the time window. The next longest flight was 21 minutes, and others were in the teens. This unique format was well received, and certainly allowed for a lot of flight time.

After lunch, we had 6 rounds of 1.5m Man-on-Man competition using four small identical hi-starts. Contestants launch in groups, and the winners of each group fly against other group winners. Next came hand launch and, if one hasn't had enough flying by now, this event will fill your cup. We took our cue from the DARTS club in Dayton, Ohio, and used 10 minute windows to attain two minute maxes. Four rounds were flown and, by now, everyone was full, filled for the day, and ready to pack up.

That's it. Simple to administer, lots of flying time, low key, and very competitive. The 2m format can be expanded into 2 or 3 windows for a 1.5m or 2m only event. The top 3 overall champion score results were: Ray Hayes (3643), Chris Corven (2737), and Paul Sherman (2701).

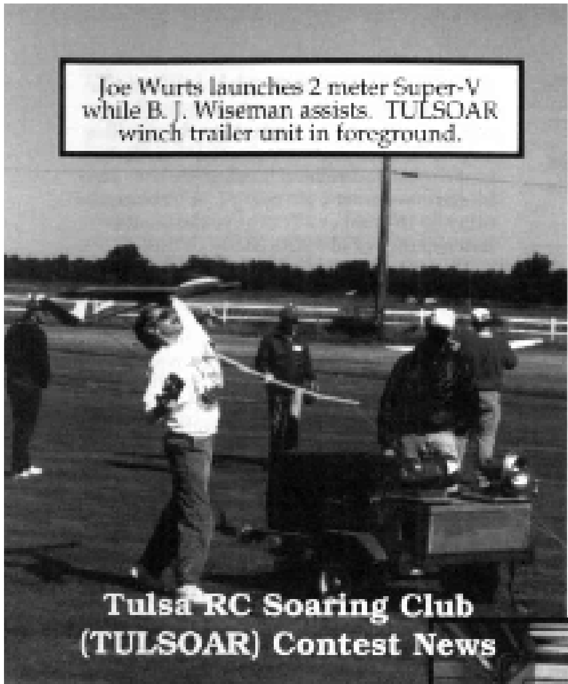
If you want more details and discussion, call me at (810) 781-7018. This may be just what your area needs to rekindle enthusiasm for sailplane contests. Next year's Fall Soaring Festival will follow the same format. You're invited to join us. Correspondence can be sent to Ray Hayes, 58030 Cyrenus Lane, Washington, MI 48094.

A Floating City

...by Scott Hewett

Many times you will hear of an aircraft carrier referred to as a "floating city" with its 5000 person crew. Here is why... During a 10 month deployment of the USS Constellation in 1971-72 in the Gulf of Tonkin, the ship and its crew served 2,835,000 meals, consumed 650,000 donuts, ate 425,000 hot dogs, drank 1,810,000 gallons of soft drink syrup (Burp!), performed 17,289 arrested landings, had 150 combat flight days, and received 875,000 pounds of mail!

■



Joe Wurts launches 2 meter Super-V while B. J. Wiseman assists. TULSOAR winch trailer unit in foreground.

Tulsa RC Soaring Club (TULSOAR) Contest News

...by Dale Nutter
Tulsa, Oklahoma

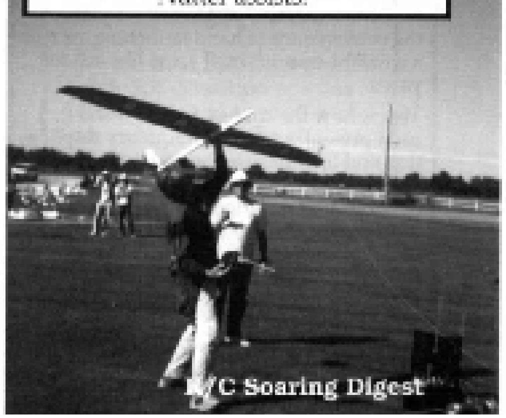
The Annual Last Fling of Summer for '95 is now history. After two days of Unlimited flying, Mike Teague topped 32 major Open Class competitors in a grueling finish Sunday. With near-perfect weather, 35 - 2 Meter and 39 - Unlimited contestants flew 12 total rounds, a new TULSOAR record, and the largest contest in the Midwest this year. On Sunday, the weather was so changeable that Joe Wurts (2nd - 2 Meter) was heard to say, "I don't know where to go." Meanwhile, B.J. Wiseman (2nd - Unlimited) was watching Mike like a hawk and took off after downwind thermals with the slightest encouragement. I tried to explain that Saturday was my first contest day with my new Super-V 100 as an excuse for placing 9th. This might have worked, since I made all my times (9, 9, 10, and 12 minutes + two 98 landings) Sunday. However, computing the Unlimited scores for Sunday just moved me up to 7th. This was a **serious** contest.

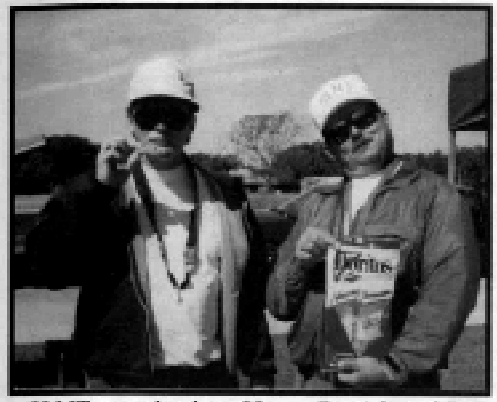
Joe and Jan had a good time. Joe said he enjoyed flying here a lot. He appreciates a tough contest where more than good landings are required. Jim Markle flew his new molded Eagle to 4th, and was not ready to leave. Jim and Kenny were still flying the Eagle when we left to take Joe and Jan to the airport. Rumor has it that Kenny has ordered one!

Les Akers (1st - 2 Meter, and 5th - Unlimited) did a consistent job of flying, placing in both events, which made him **1st Overall**; quite a feat considering the competition. Unfortunately for TULSOAR, Les' score put the SLNT (Soaring League of North Texas) team, including Mark Williams, Henry Bostick (5th - 2 Meter), Robert Taylor, and Jay Schultz ahead, and **we lost** the Red River Revenge. I'm sure the Texans will give us appropriate publicity and a suitable trophy.

CD Mike Teague and score master, Bob Rhea, at work in the U-haul TULSOAR workstation.

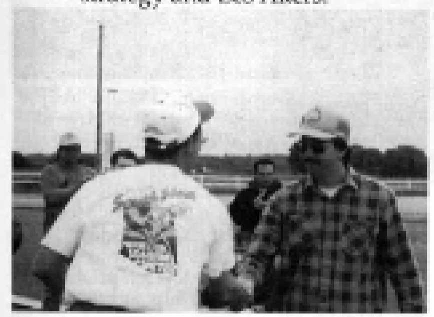
Jim Markle, SULA (Soaring Union of Los Angeles) & TULSOAR member, launching molded Eagle while Dale Nutter assists.





SLNT gang leaders, Henry Bostick and Jay Schultz, consume Doritos to develop Texas lift. They won the Red River Revenge, soundly defeating TULSOAR with their strategy and Les Akers.

Overall & 2 Meter winner, Les Akers, SLNT, is congratulated by Mike Teague.



Unlimited and Overall Sportsman winner, Ted Willimas, receives his awards.

The competition in Sportsman Class grew substantially from last year, with 12 entries in the two classes. Terry Bryant won 2 Meter and Ted Williams won Unlimited and **1st Overall**. TULSOAR members Tom Tapp and Todd Degner, and Randy McCleave from Wichita, Kansas also placed in Sportsman.

Since Les won 2 Meter with his Falcon 600, and Mike won Unlimited with his Peregrine in Open Class, it was a sweep for a major meet sponsor, Airtronics.

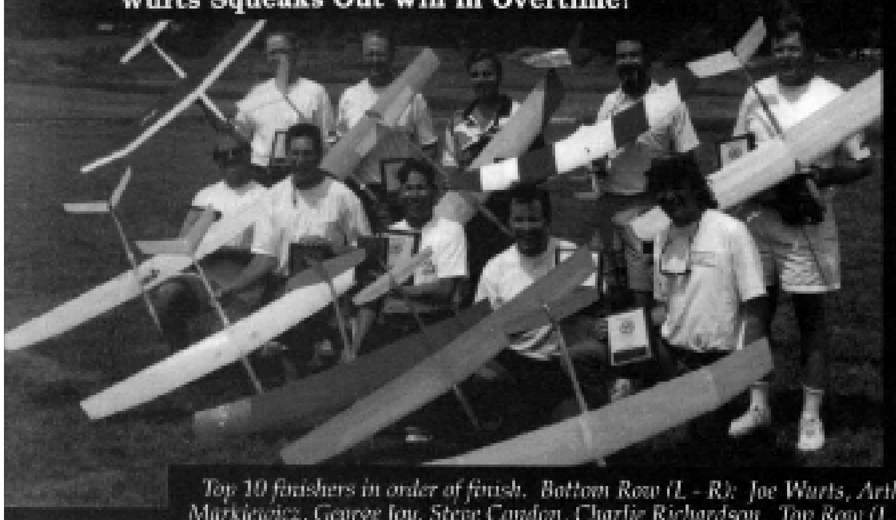
We were pleased to meet Jim Frickey's bride, Kathy. As usual, Jim flew well and placed 3rd in 2 Meter. Mike Fox and Rusty Shaw traveled two days, joining Tim Gastinger in KC to attend. Both Mike (3rd - Unlimited) and Rusty (4th - 2 Meter) placed well, as usual. We were really glad they all came.

Doug, Kenny, David Odendahl, David Register, Bob Rhea, Denny, Cal, Todd, Mike, Heidi, Donna and others worked hard to put on a great weekend. About 65 % of the TULSOAR members were there at Blue Springs. Donna and I enjoyed seeing and socializing with our friends, on and off the field. We heard many favorable comments and no complaints. ■

TULSOAR Last Fling of Summer '95
Pilots & Workers Raffle Sponsors
Aerospace Composite Products
Airtronics
Tim McCann
Mike Fox
RnR Products
ICARE Sailplanes
Soaring Specialties
Jim Sulivan Estate
TULSOAR
Dale & Donna Nutter
Ultimate R/C
Viking Models, U.S.A.

2 Meter Sportsman winner, Terry Bryant, TULSOAR, receives Mike Teague's congratulations.

International Hand Launch Glider Festival '95
Wurts Squeaks Out Win in Overtime!



Top 10 finishers in order of finish. Bottom Row (L - R): Joe Wurts, Arthur Markiewicz, George Joy, Steve Condon, Charlie Richardson. Top Row (L - R): Ron Schark, Steve Stricklett, Ben Clerx, Mark Gumprecht, Gordon Jennings.

...by Ron Scharck
La Jolla, California
Photos by Don Richmond

As I pulled out of my driveway on Saturday, May 20th, a heavy gray overcast sky with intermittent drizzle greeted me. Only those of us who have spent the many hours necessary to put on a two day, championship event such as the International Hand Launch Glider Festival can appreciate that very hollow feeling you get when something you have worked so hard for is threatened. You hope against hope that by some miracle the heavens will split and bright sunshine and clear skies will appear in time to "save the day". My normally optimistic outlook on life was gently being eroded with each synchronized swipe of the wiper blades - compounded by the sound of speeding tires on wet pavement. This is Southern California, damn it! It's not supposed to rain here!

By 8:00 a.m., the drizzle stopped, leaving no more damage than a heavy dew. By 9:00 a.m., gliders were filling the sky as contestants, those brave and hearty souls that took a chance on Southern California weather and won, loosened their arms and made subtle trim adjustments. The second annual International Hand Launch Glider Festival was happening. And there was joy in Mudville!

As you would expect at a two day championship event, the field of entries included a host of the local (Southern California) "big guns" in hand launch gliders. Joe Wurts, Arthur Markiewicz, George Joy, Steve Condon, Ben Clerx, Gordon Jennings, Charlie Richardson and Paul Naton all had sights on the Championship Plaque. As Joe will tell you, this is not a bunch of guys to take lightly. As a matter of fact, Joe had to reach real deep to pull this one out.

The contest consisted of ten rounds of preliminary competition (six rounds on Saturday and four rounds on Sunday), followed by three rounds of head-to-head competition between the top ten pilots to determine the Championship and final standings.

The tasks were chosen to test not only the thermalling and precision handling skills of the pilot, but also to test his ability to use strategy. Of the ten preliminary rounds, only two were repeated, giving the contestant a wide variety of tasks. A couple of the less traditional tasks that were popular included "Sum of Increasing Flights" and the "Ten Second Two Step".

The "Sum of the Increasing Flights" task has a 10 minute time window during which the pilot accumulates as much flight time as possible under the following restrictions: there must be at least three launches; the flight time of the first launch must be at least 15 seconds; and in order for the following flight times to be counted each must be longer than the previous flight time. For example, if your first launch results in a flight time of 16 seconds, the next flight time must be at least 17 seconds to be counted, etc., etc., etc.

Sounds simple... right? Consider that you hook one of those phantom thermals during your third flight and you are convinced that with your superior thermalling skills you will be able to wait it out until it develops into that "hat sucker". However, in spite of your thermalling skills, about 2 minutes into the flight, the phantom disappears and the next thing you know you have your plane in your hand and your timer is writing 2:04 onto the third slot on your score card. Guess what? Your next flight time must be 2:05, or longer, to count. This task combines piloting skills, athletic skills and *strategy*.

Top Team: George Joy, Ron Scharck, Mark Gumprecht.

Arthur Markiewicz shows great launch form.

1995 IHLGF Champion Joe Wurts receiving congratulations from C.D. Steve Stricklett.

The "Ten Second Two Step" also has a ten minute window and allows the pilot unlimited throws. This objective of this task is to get the most number of flights in the following sequence: 10 seconds; 20 seconds; 30 seconds; etc., to a maximum possible flight time of 1 minute 40 seconds. In order for the flight to count, the elapsed time must be *at least* equal to the time required. The only penalty for going over the prescribed time is that it eats into your total time. The pilot with the most number of qualifying flights wins. Precision is the name of the game here.

When you use terms such as precision, athletic, piloting skills and strategy, can the name Joe Wurts be far behind? Not in my book. Once again, Joe proved that he is the finest hand launch glider pilot in the Western United States and most probably, the world, by winning the International Hand Launch Glider Festival for the second year in a row. This year was not the cake walk that last year was, as Joe was in third place behind TPG's Arthur Markiewicz and George Joy after the preliminary 10 rounds were completed. Out of a possible score of 10,000 points, Arthur lead with 9,678.56 points followed by George Joy with 9,650.62. Joe was only able to amass 9,634.87. Joe was perfect throughout the first seven rounds. After round 9 he was only off perfect by 54 points. It was in round 10 that Joe lost his deity status by landing off field a couple of times and scoring a scant 685.

In true championship form, Joe regrouped in the final three rounds of the fly-off to outscore Arthur by 103 points (out of a possible 13,000). George Joy came in third with 12,376 points, just 209 points away from the Championship plaque. Rounding out the top ten were Steve Condon (11,923), Charlie Richardson (11,737), Ron Scharck (11,105), Steve Stricklett (10,924), Ben Clerx (10,919), Mark Gumprecht (10,449), and Gordon Jennings (10,368).

The Top Team plaques were awarded to the team of George Joy, Mark Gumprecht, and Ron Scharck.

While the field was a tad smaller than last year, we had a number of new pilots compete in this year's event. Jeff Burg and Randall Wilson, both of whom are from Las Vegas, Nevada, made the event a little more "International". Mark Navarre, who has been 60" slope racing in Southern California for a while, showed the field that he was someone to be reckoned with on the HLG field. With the exception of two "throw-away" rounds, Mark posted very respectable scores. Bren Lugo, one of TPG's young phenomenon, had a bit of bad luck (folded wings) in the sixth round where he scored a "0". Had he completed that round with his

It takes a lot of help from dedicated workers to make a contest run smoothly. Here, Jo Joy and Fred Haechel enter scores on the computer. Within minutes after each flight group finished, the results were posted.

average score, Bren would have been in the top 10.

Who says that only a young man with a gorilla arm and an expensive "state of the art" airplane can compete in HLG contests. Here are a few examples that will debunk those theories. Here's the over 50 crowd (of which I am aware) : Don Richmond (60+); George Joy (50); Ron Scharck (52), Rich Strobel (52). In each case these pilots launched their own planes. I must admit that George Joy does have a gorilla arm.

Most of the planes entered were your basic polyhedral wing/glass fuse combination that can be bought for under $100. I came in sixth with an all wood Climmax which I just love. It cost $60. Six of the top ten finishers, including 1st and 2nd, were flying straight wing aileron ships. While the straight wing aileron ship, first used by Joe Wurts, has been catching on in popularity, you may want to think twice before going the "next step" when building your new competition HLG. Even the best pilots say there are definite trade-offs that occur when you go from the polyhedral HLG to the "sexy" straight winged, aileron versions. The straight wing ship will go further, faster and with greater maneuverability, and the real reason: glide path control. So what more can you want? How about "stabil-ity"? With the aileron ship you have to fly it constantly and if you do make an error in judgment it costs you dearly. Joe Wurts told me that if it were not for Hand Launch Golf he would still be flying a poly ship. It seems you can putt better with a straight wing aileron ship!

A number of hand launch glider manufac-turers attended IHLGF '95 including Charlie Richardson of CR Aircraft flying his Climmax, Merrill Farmer of MM Glider Tech flying his Illusion, Mark Hambelton of DCU flying his Viper, Ken Williams of K&A Models was flying his Quest, and Randall Wilson was showing off his new creation, which he and Mark Levoe will be kitting under the name of, you guessed it, the SUPER V HLG.

One of the most popular events at the IHLGF is the Saturday evening barbecue which was catered by Tony Roma's (Pacific Beach). The rib and chicken combination, together with baked beans, corn on-the-cob and cold slaw proved to be quite a crowd pleaser again this year. There was definitely a whole lot of good old finger licking going on.

This year's contest ran 110% smoother than last, and for that Steve Stricklett and the other members of the IHLGF Committee are to commended. We learned from our previous mistakes and we made the corrections. The two most outstanding improvements in this years contest versus last year was the inclusion of a PA system that allowed us to use a computer generated timing system, which all but eliminated any confusion as to the start and finish of a heat, and the magnificent computer generated scoring system that provided computed scores within 5 minutes of the end of a heat/round. Both of these improvements were the handiwork of Don Richmond who programmed the scoring system. Don gets the 1995 IHLGF Achievement Award.

A major part of the efficiency of this contest can be directly attributed to the volunteer workers that contributed their time and efforts to ensure that the meet ran smoothly. Jo Joy, Linda Stroble, Karla Shelby, Dave Condon, Gary Knapp, Norm Swanson, and Marshall Geller all help make this meet run smoothly and efficiently. On behalf of the contestants and the IHLGF Committee, a big thank you goes out to everyone who helped make the 1995 version of the International Hand Launch Glider Festival the smooth running operation that it was.

Always trying to improve what is already considered by many to be the premier hand launch event of the year, we have already started making notations of those areas that can use improvement. We will fine tune those areas that need refinements and make changes to those areas where change is deemed necessary to insure that IHLGF '96 will be even more successful and enjoyable for the contestants. ■

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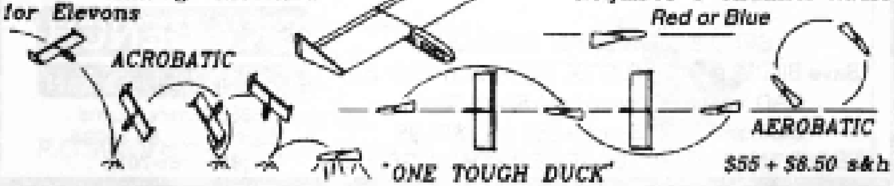
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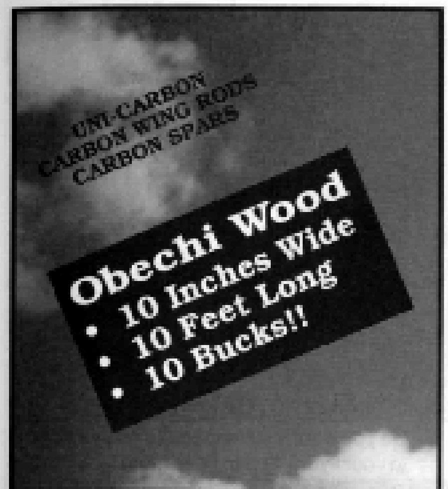
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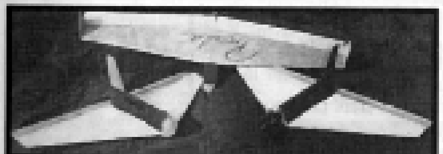

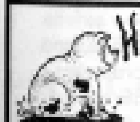

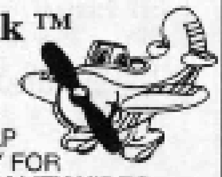

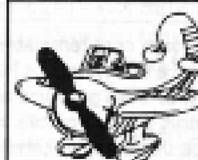

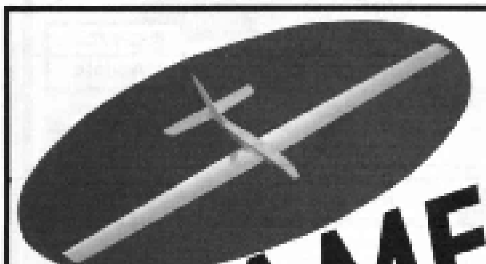

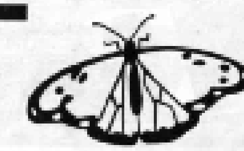

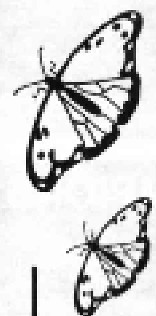

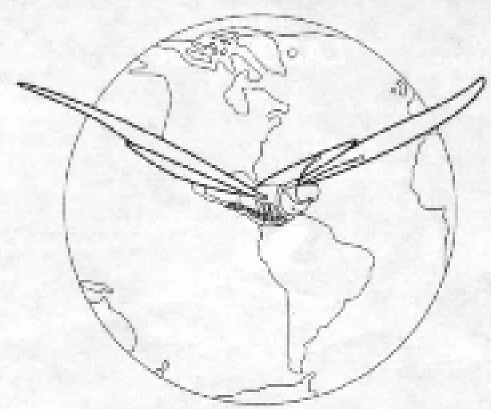

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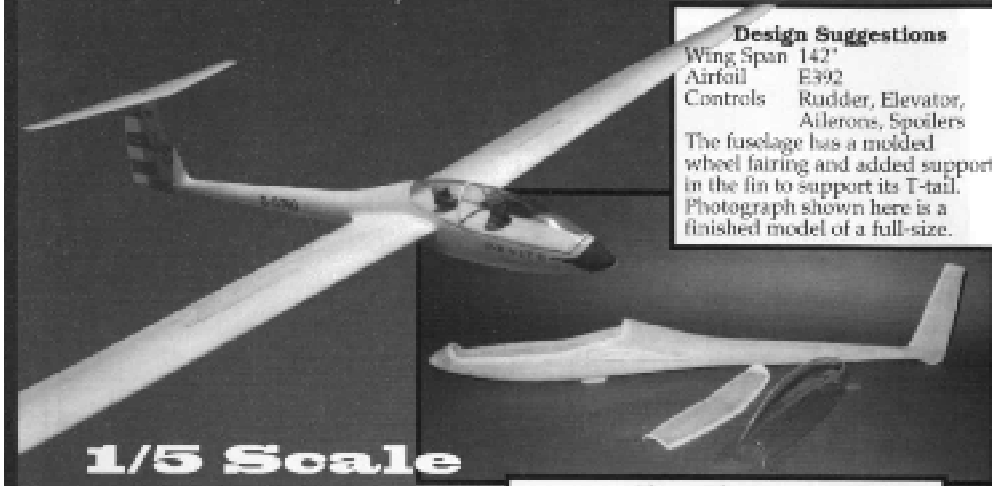

Design Suggestions

Wing Span 142"
Airfoil E392
Controls Rudder, Elevator, Ailerons, Spoilers

The fuselage has a molded wheel fairing and added support in the fin to support its T-tail. Photograph shown here is a finished model of a full-size.

1/5 Scale ORNITH

Short Kit Contents

49" Epoxy Fiberglass Kevlar™ Reinforced Fuselage, Crystal Clear Canopy, Fiberglass Canopy Tray, Drawing

Price: $90.00 + $10.00 S&H

Scale

Epoxy Fiberglass Fuselages	Price	S&H
1/6 Scale DFS Reiher V2 (120"/Scale/4) 46" fuse, canopy, plans	$85.00	$10.00
1/5 Scale ASW-19/20 (132"/RITZ III/4) 54" fuse, canopy, plans	$85.00	$10.00
1/5 Scale Nimbus (159"/Wortman/4 - 5) 54" fuse, canopy, plans	$85.00	$10.00
1/5 Scale Rhoenbussard (112.5"/Scale/4) 40" fuse, plans	$80.00	$10.00
1/5 Scale ASW-17 (135"/Mod. Eppler/4-5) 49" fuse, canopy, tray, dwg.	$90.00	$10.00
1/5 Scale Orlice (135"/E392/3-4) 49" fuse, canopy, tray, dwg.	$80.00	$10.00
1/5 Scale Ornith (142"/E392/3-4) 49" fuse, canopy, tray, dwg.	$90.00	$10.00
1/5 Scale Salto (90"/E387/3) 42" fuse, canopy, plan	$80.00	$10.00
1/4 Scale PIK-20 (150"/E203/4-5) 64" fuse, canopy, tray, dwg.	$155.00	$20.00
1/4 Scale DG-100/200 (147.5"/Wortman/4 - 5) 64" fuse, canopy, tray	$155.00	$20.00
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1/4 Scale Jantar (187" or 202"/Wortman/4) 67" fuse, canopy, plans	$155.00	$20.00
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1/4 + 10% Scale Salto (142.5"/RITZ I/ 3-4) 61" fuse, canopy, frame, plan	$155.00	$20.00
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Design Suggestions

Wing Span 100 - 136"
Airfoil RG-15
Controls As Required
3-view available. Plug-in wing.

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Elf 2m (bolt-on wing mount/up to 10" chord) 44 3/8" fuse, nose cone	$70.00	$10.00
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Wing Area	855 sq. in.	554 sq. in.
Airfoil	SD7037/RG-15	SD7037
Aspect Ratio	13:1	11.2:1
Weight	60 oz.	40 - 43 oz.
Wing Loading	10 oz/sq. ft.	10 oz/sq. ft.

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