Slope Flying in the San Francisco Area
Dan Fulmer is about to launch at a favorite spot south of San Francisco.

"The ME 109 has slots in the leading edge of the wing to prevent tip stalls. The rudder is enlarged over scale to prevent yaw associated problems."

Details on Dan's planes are on page 10.

R/C Soaring DIGEST

November, 1993
Vol. 10, No. 11

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Texas National Tournament 1993 Texas State Champion Brian Agnew

"We take our overall trophy seriously, and we have always known that it might some day leave the state."

Henry Bostick, President, Soaring League of North Texas

Story on page 5.

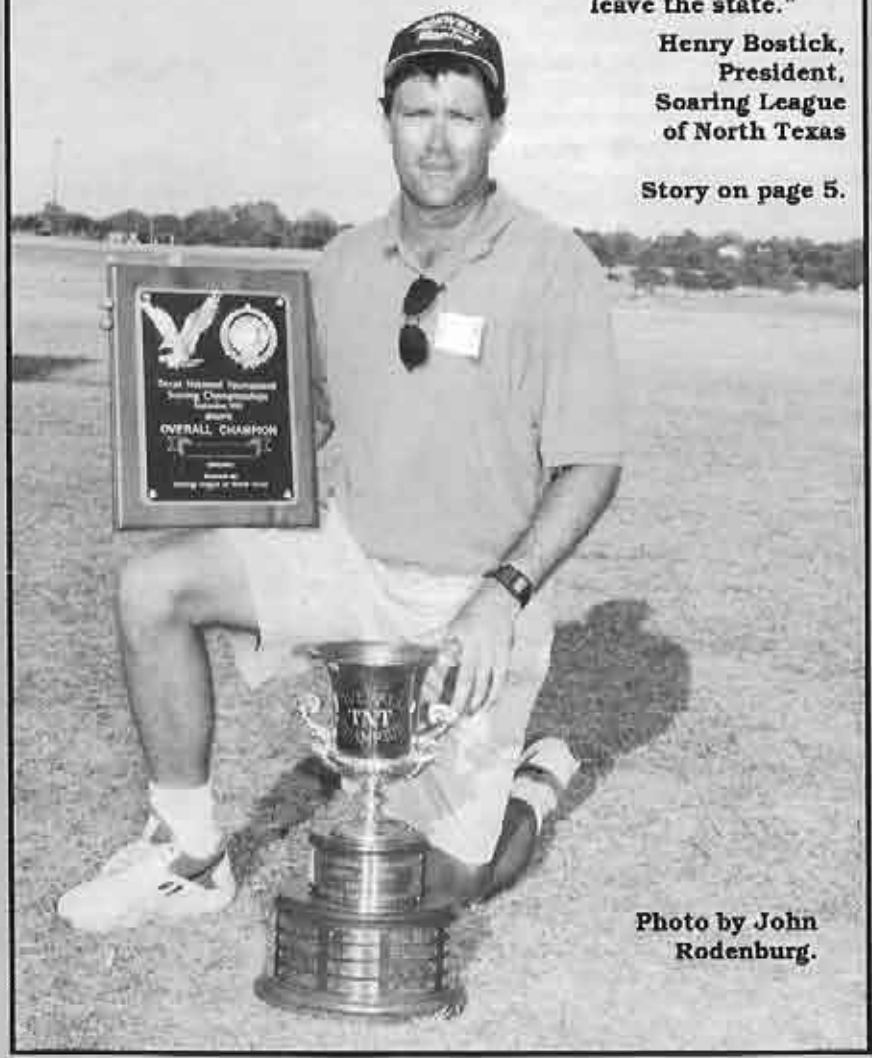

Photo by John Rodenburg.

R/C Soaring Digest

A publication for the R/C sailplane enthusiast!

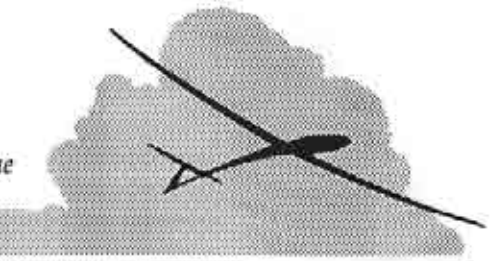

Table of Contents

Other Sections/Information

Advertising

Special Interest Groups & Contacts

R/C Soaring Digest (RCSD) is a reader-written monthly publication for the R/C sailplane enthusiast and has been published since January, 1984. It is dedicated to sharing technical and educational information. All material contributed must be exclusive and original and not infringe upon the copyrights of others. It is the policy of *RCSD* to provide accurate information. Please let us know of any error that significantly affects the meaning of a story. Because we encourage new ideas, the content of all articles, model designs, press & news releases, etc. are the opinion of the author and may not necessarily reflect those of *RCSD*. We encourage anyone who wishes to obtain additional information to contact the author. *RCSD* was founded by Jim Gray, lecturer and technical consultant. He can be reached at: 210 East Chateau Circle, Payson, AZ 85541; (602) 474-5015.

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Martin Simons, Ed Slegers

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Contact David Woodhouse, 96 Division Street, Guelph, Ontario, Canada N1H 1R6; (519) 821-4346 between 19:00 - 21:00 EST.

R/C Soaring Digest
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(214) 442-3910, FAX (214) 442-5258

The Soaring Site

Tangerine Soaring Championships

The 21st annual Tangerine Soaring Championships will be held November 26th - 28th in Orlando, Florida. For additional information, please call or write Ed White, 3601 S. Laurel Ave., Sanford, FL 32773; (407) 277-3862 work, or (407) 321-1863 home. The announcement in a previous issue was incorrect.

Low Lift or Hand Launch

Starting this month, we have a new columnist, Scott Smith from Irvine, California. His subject? Hand Launch. He brings to the pages of *RCSD* a subject in which many of you have expressed interest; however, we are not so sure that this column is for the faint of heart! (If we had only known, we might have checked to see if Erma Bombeck knew much about sailplanes...) If you want to encourage Scott to continue writing on this subject, please be sure to let him know. His address and phone number are with his column.

On The Air

Starting next month, another column will be added to the pages of *RCSD*: "On The Air with Cornfed". Hmmm. Can you guess what this one is all about?

Clip Art

Gene Zika of Arvada, Colorado, in addition to the great cartoon work he has been sending *RCSD*, has just sent in some clip art that will begin appearing in the pages of *RCSD* with this issue. Your artwork is great! Thanks, Gene!

A Note of Thanks

Another great cartoonist, Curt Nehring of Southern California, sent us a note that says, "Please thank all the readers for their continuing support of SOAR-TOONS and the constant flow of ideas." And, Curt, thank-you for sharing your cartooning with the readers of *RCSD*!

When Pigs Fly!!!

There have been Rhinos and Turkeys

within the pages of *RCSD*, so when a newsletter arrived that said *When Pigs Fly!!!* we took a careful look and noted that it really was a newsletter and that it is published by the Northwest Arkansas Soaring Society, a new club in Arkansas. The Editor/President is Kevin O'Dell, and the newsletter return address is Northwest Arkansas Soaring Society, c/o Wings 'n Things Hobby Supply, 2201 S. Thompson, Suite 4, Springdale, Arkansas 72764.

Advertising Rate Changes

The first part of October we sent out new advertising rate cards to current advertisers reflecting new costs. If you are planning on advertising and were not a current advertiser with the October issue, please let us know, and we'll send you a new rate card. The increase goes into effect January 1, 1994. (There is no change on the classifieds for business or personal!)

A Request from Switzerland

Greg Goldstein, Geneva, Switzerland, has written to say, "...I recall many discussions with fellow fliers, operating our gliders in an inland mountain site, about how we could use some basic flight data such as airspeed and altitude. No "full-size" pilot would consider flying an aircraft without basic flight instruments. For example, at one site I fly there are hang-gliders that all have a rich array of instruments.

"At the "Toledo 93" model exhibition there was a device called the "R/C Talker" by Condor R/C Specialties, which has an airborne pack that measures airspeed, rpm, and optionally altitude, acceleration, and exhaust gas temperature, and sends it to a receiver on the ground. A voice synthesizer then continuously "talks" to the pilot, updating him on flight conditions. Another new device is the Robbe "On-board Computer" (Product No. 8323), that weighs only 22 gms, and measures and records in-flight data, taking a reading each time the pilot touches a specific button on the Tx. Without a downlink, the data are read after landing. On-board sensors for the computer are available for battery voltage, temperature, airspeed, altitude, motor current and propeller revolutions. The cost of the on-board computer without any sensors is 288 German marks (approximately $180.00).

"I find these developments exciting, and suspect they have the potential to allow major improvements in model glider design and performance. If there is anyone out there who has tried them, please let us *(all)* know!"

Flying in Singapore

Earlier this year, we received a letter from Martin Sng of Singapore. Martin said they had only a "handful of 1st season slope soarers". He also went on to say, "Thanks to *RCSD*, we are learning. Last month we had 25 - 30 knot winds; however, at times, we could climb a few hundred feet and frequently we hit a ceiling at about 50 feet. All the planes cannot break through, though there is no change in wind. We cannot understand this happening. I would be thankful if you could explain the situation and advise us on how to break the ceiling.

"At present, we fly light planes and I, myself, have a Chuperosa and the Vertigo in the pictures. Next season, we may have more fliers and heavier 2 meter planes. We may also lose the hill (where we fly) because the site is in a public park and densely populated. Should that happen, we can try high start, winching, F3J and other silent flight at the reclaimed land where we fly powered R/C and the Brooklyn Dodger."

While we answered Martin Sng's question at the time, we thought that some of you that are new to *RCSD* might be interested in our response. "...Based on the flying conditions you have described, it is best that I send a copy of your letter and this one to Martin Simons, as he is more qualified to answer your question regarding the 50' ceiling. However, it does sound like there is an inversion layer over Singapore, and you might want to check your local library and read up on this subject as it relates to full-size planes and meteorology/weather. Another thought would be to keep track of the time of day that you fly. If you are experiencing this problem mostly in the morning, then it might be better to fly in the afternoon. Martin (Simons) has several books that are available. Page 13 of the January 1993 issue lists several and how to obtain them."

Flying in Singapore - Martin Sng photographs.

A Letter from Germany

Edgar Filk of Germany, has written to say, "Here in Germany model flying and especially gliders and electrics are still going strong although the newcomers seem to be more middle aged rather than youngsters. At least, that's the tendency in our club. We have 23 members and fly for fun, only. Our airfield is registered for models up to 20kg of weight. Around 5 - 6 people fly 4 m models with full house control, the others smaller ones, 3 or 4 stick with rudder - elevator models. We fly thermal only. In summer, some of us travel to Austria to fly alpine. Myself, I enjoy a good slope and do so during our annual summer holidays in England, where my wife's family lives. This is where I met Graham Woods and got to know your magazine and Viking Models. At the moment, only 12 of my 18 models are in flying condition. The thermal season is coming to an end in September and during the winter we fly electric.

"My favorites are scale like the big ones (ASK 18, B4, SB 10, ASW 22), sleek open class F3J soarers (mostly O.D. except a Havel Supra), and fast thermal and slope models (Ellipse F3b, 1/5 scale Salto). Last year, like many other people, I bought an MC 20 radio, which is very popular over here and quite cheap.

" Plans for the building season are (1) Repair, (2) Repair, (3) a new slope model, and (4) A quarter scale aerobatic. I will be happy if I manage half of this, but never-the-less.

"Please keep up the good work and do not change the character of the magazine."

Thanks for the input on what you're flying, and hope the repair work goes well!

Junior Class NATS Results

In the September issue of *RCSD*, we failed to include the junior class NATS results. The three soaring classes (2-meter, standard, unlimited) were all won by twelve year old, Michael Wilson, the son of Edwin Wilson of Louisville, Kentucky.

In correspondence with Edwin, he said, "Michael was the only junior in the soaring events at the NATS, so first place was automatic (Cody Robertson was the only senior). To his credit, Michael flew very well. At one time Friday in unlimited class, and before the throw away rounds, he was tenth overall on the score sheet.

"If I can brag on him, this came right after the Mid-South contest in Huntsville where Michael took a second and a first place. He has more LSF trophies than I do (3) plus five trophies from previous NATS. If the truth be known, in about three or four years I may have to retire competition flying to keep from being embarrassed as Michael is pushing me now to keep ahead of him and his flying."

Well, Edwin, you certainly <u>can</u> brag on him! We are sorry for the omission. Congratulations, Michael! Because of the omission, your Dad sent in the photo of you with Joe Wurts, and he and Jeff McComb provided Jeff's excellent article, "Thoughts of a Novice", which appears elsewhere in this issue. Thank-you, all!

Happy Flying
Jerry & Judy

Dave Nash & 1/4 scale P51 at Point of the Mountain, Utah. "It flew for about 30 minutes on the maiden voyage. Must see to appreciate." Bob Harman photo.

"ASK 18" 4,5 m scale 13 lbs., glass fuse., white foam/balsa wings/ glassed. First flown in June 1993, site - Germany. Photo by Edgar Filk.

"Cantaloupe", O.D. 100" slope model, RG 15, site - England. Photo by Edgar Filk.

Michael Wilson & Joe Wurts at the NATS. Photo by Edwin Wilson.

Photos by John Rodenburg

Sportsman winners on Sunday (L - R): Paul Perret, Loyd Chandler, Skip Lindsey, Jim Taylor, John Rodenburg

T.J. Langner (L) took 1st place overall Jr.; Lee Farris (R) took 2nd.

9th Annual Texas National Tournament - 1993

...by Henry Bostick, President
Soaring League of North Texas
Dallas, Texas

This year's Texas National Tournament (T.N.T.) was hosted by the Soaring League of North Texas at our own flying field, the campus of The University of Texas - Dallas. Obviously, the "bragging" rights associated with being the Texas State Champion brings fliers out of the woodwork, and this year was no exception.

We are very fortunate here in Texas to have four very active sailplane clubs located at: Dallas, Houston, Austin and San Antonio. Since the host duties rotate between the clubs, it becomes important that the event is more successful each year; the bragging rights "thing", again! After all the work spent in the 12 months proceeding the T.N.T., I still found myself spending the better half of Friday

Brian Agnew (R) and Bob Ross (L) - winner of the Banshee 2 meter sailplane manufactured by Brian and donated by Slegers International.

Fred Weaver (R) and Perry Gilstrap (L) winner of Infinity 600 radio donated by Airtronics.

David Layne (R) and James Crenshaw (L) - winner of the Saturn 2.9T manufactured and donated by Layne/Urwyler.

Fred Weaver (L) and Fred Rettig (R) - winner of Thermal Eagle donated by Airtronics.

Henry Bostick (R) .T.J. Langner (L) - winner of the Futaba radio donated by Futaba.

Dale Nutter (R) and Perry Van (L) - winner of Dale's D&D Specialties "NEST".

Jerry Slates (R) and Jim Taylor (L) - winner of Saturn 2.9T donated by Jerry and Judy Slates.

morning, the day before the T.N.T., trying to second guess what could go wrong. Friday afternoon was spent going over everything (again), flying, and generally having a good time.

A number of out of town guests arrived on Friday and joined club members at the field to practice flying while everything was being set up. These included Brain Agnew - Florida (Agnew Model Products), Fred Weaver - California (Flite Lite/Airtronics), Gavin Botha - California, David Layne - California (Layne/Urwyler), Bob Sowder - Tennessee, Mike Kelly - Tennessee, Fred Rettig - Alabama, and a number of others too numerous to remember all the names. (I pulled some airport duty, picking up first Fred Weaver and then Brian Agnew. Fred lucked out as the air conditioning on my SAAB went out on the way to pick up Brian, after I had dropped him off.)

Saturday dawned with perfect weather for the first of two days of great flying for the 92 entrants. Two meter was flown on Saturday with Brian Agnew (Florida) taking 1st place expert, Julian Tamez (Texas) - 2nd, Don Chancey (Texas) - 3rd, Les Akers (Texas) - 4th, and D.O. Darnell (Oklahoma) - 5th. We did have a few casualties, including two fly-aways. One was David Layne's new Saturn 2 meter prototype and the other was George Parks Falcon 600. Both were found, but only George's was able to continue. As the old saying goes, "You can definitely chase a thermal downwind, but you can't chase a thermal downwind indefinitely."

Saturday night, Jerry and Judy Slates hosted a BBQ at their place and I had a few people over at my place for food and drinks.

Sunday was overcast and slightly windy. As the day wore on the overcast broke and the wind didn't get any stronger, making it another great day. We flew open with Fred Weaver taking 1st in expert over Brian Agnew who took 2nd, Fred Rettig (Alabama) - 3rd, Les Akers (Texas) - 4th, and Tom Jones (Texas) - 5th.

Texas National Tournament
1993 Overall Results

Junior	
1 - T.J. Langner	7814
2 - Lee Farris	7197
Novice	
1 - Mike Bishop	5956
2 - Doug Reeves	5301
3 - Brent Burton	4250
4 - Check Stevens	3831
5 - Therese Chandler	3498
Sportsman	
1 - Skip Lindsey	8217
2 - Paul Perret	7936
3 - Loyd Chandler	6845
4 - Ned Snead	5179
5 - John Rodenburg	4923
Expert	
1 - Brian Agnew	10914
2 - Les Akers	10739
3 - Fred Rettig	10664
4 - Fred Weaver	10652
5 - Don Chancey	10374

When the scores for both days were combined, Brian Agnew took overall with a total of 10,914 points out of a possible 11,000 (99.2%)!! As you can see by the photograph on the cover, we take our overall trophy seriously, and we have always known that it might some day leave the state. Well, it finally happened, but it went to an excellent flier and a very nice person. Of course, Brian has to bring the trophy back next year to Austin where the 1994 Texas State Champion will be determined. Les Akers was 2nd, Fred

Prize Raffle

Raffle Items	Donor	Winner
Infinity Radio	Airtronics, Inc.	Perry Gilstrap
Thermal Eagle	Airtronics, Inc.	Fred Rettig
7 Channel Radio	Futaba	T.J. Langner
Banshee	Slegers International	Bob Ross
Saturn 2.9T	Layne/Urwyler	James Crenshaw
Saturn 2.9T	R/C Soaring Digest	Jim Taylor
Stiletto fuselage	Viking Models, U.S.A.	Brent Burton
Obechi Wing & Stab Set	Elf Engineering	Brent Burton
Obechi/Composite Wing Kit	Kennedy Composites	Fred Weaver
"NEST"	D&D Specialties	Perry Van

Rettig 3rd, and Fred Weaver took 4th overall with Don Chancey taking 5th and making him earn it; and that is the way that all great contests should be decided!

Now comes the "bragging"! Over the course of two days of very intense flying, we launched over 1000 sailplanes. The vast majority of these would be classified as state of the art high performance ships. We only experienced one line break and one retriever problem! The retriever problem was corrected in 30 seconds and the winch was down for five minutes. We never touched a battery, and the launches at the last were as good as the launches on the first day. I suspect that is a record, somewhere. Fred Weaver made my day on Sunday when he said, "I have never seen equipment work that good." Of course, as in anything else, the equipment is only as good as the operators, and we have some of the best. Bob Sowder and Mike Kelly very generously donated a lot of time to the winches, and I think it was Bob that said it was the first time he ever had to stand in line to run a retriever!

As in the past, this year's contributing manufacturers were very generous with their products. It is very easy to ask manufacturers to donate because many of us assume that it is good advertising and PR. It may be to some degree, but generally speaking, most donations are done out of pure generosity, and should be remembered when we purchase products as support is a two way street!

When it's all said and done, the end result of a contest is to bring together a bunch of sailplane fliers and let them have a good time!

I thank everyone that helped to make the T.N.T. a success, members and non-members alike; without your support an event of this magnitude just could not take place. We had a great time hosting this year's event and look forward to 1994. Come fly with us! ■

Joe Welch presenting the original T.N.T. plaque to Jim Ferris at the first T.N.T. Photo by Pancho Morris.

The History of The T.N.T. Trophy

...by Pancho Morris
Mesquite, Texas

The first Texas National Tournament (T.N.T.) was organized at the first meeting of the Texas Soaring Conference, which was called together by Charlie Keyes at Wimberly, Texas in the fall of 1984.

The first T.N.T. was held at Brooks AFB in San Antonio in the spring of '85. It was co-CD'd by Joe Welch and Marshall Long. They came up with a trophy for the overall champion that was a walnut plaque cut in the shape of Texas to which each year's champion's name would be added on an engraved plate. This was to be a perpetual trophy that would be passed along to each year's champion. This trophy was meant to be retired if a flier won it three years in a row. Don Chancey won it in '87, '88, and '89, but refused to keep it so it could continue on. In 1990, Tom Peadon won the award.

By this time, the T.N.T. was growing into the large, regional event it was intended to become. It was felt that, in order for it to continue to grow and attract some of the national fliers and attention we hoped for, perhaps a more prestigious trophy was in order. We wanted to have a very impressive trophy that would be a much sought after prize.

Several boxes of old trophies were found in a mini-warehouse belonging to Johnnie Clemens after his death. Among these was a very large trophy that we believe was from one of the early Plymouth Inter-Nats contests, and that it may have been won by Johnnie. The wood base was in good shape, but the top was not. The Soaring League of North Texas decided to have this trophy redone and donate it as the new Texas National Tournament perpetual trophy. (Tom Peadon, having picked the trophy from the box, took it to a local trophy shop where it was refurbished.) All of the winners' names were placed on the new trophy, and it was presented at the T.N.T. hosted by the Heart of Texas Soaring Society (HOTSS), for the first time, in San Antonio to Les Akers, the 1991 champion. ■

T.N.T. Champions	
1985	Jim Ferris
1986	Jim Ferris
1987	Don Chancey
1988	Don Chancey
1989	Don Chancey
1990	Tom Peadon
1991	Les Akers
1992	Greg Norsworthy
1993	Brian Agnew

Soaring Down Under

A Video Review

...by Gregory Vasgerdsian
Concord, California

Recently, I heard that Mark Foster had a new soaring video out. Upon hearing this I decided to give Mark a call to see if this was indeed a new video or his older "Top Eight Slope Soaring Sights of the West". The new video is called "Soaring Down Under" and was put together by Trevor Broadbent of Australia.

The video starts out at Torrey Pines, California with scale slope soaring featuring a nice 1/4 scale ASW-20L, Discus and others, and follows the models from launch to "retracts out" rolling landings just like the real ones. The video is put together with various musical scores and some nice visual studio effects too. Throughout the video the music score is dropped out whenever a model makes a low high speed pass so you can hear the whoosh! Definitely fun! It also visits Malibu, California for some winch launching on the slope with a pair of Ka6E's. From the U.S. it's off to England and the White Horse Club for some aerotowing. Scale models seem to be the hot ticket here with an ASW-24, PIK 20's and even a Sperber Junior to mention just a few. I liked this part of the video the most with lots of take offs, landings, and aerobatics in between. Nothing is as inspiring as watching a beautiful ASH-24 do a slow role. From England it's off to Australia with slope soaring sport models in Sydney on a very windy day. One model, an interesting little wing called an Obolisk, could certainly roll forever. Finally, from Sydney, it's up the coast for more majestic soaring with a DG-500, and a DG-600 to mention a few. Viewing time is about 65 minutes.

I think most R/C Soarers will really enjoy this video, and if you're into scale you'll love it. Keep in mind you aren't going to see production-like qualities of a Hollywood film, but it is very well put together and of good quality. Lots of different gliders, changes in music, and commentary keep it all entertaining. If you'd like something to watch where you can put your feet up for an evening, or to keep you motivated this winter, then I would recommend getting a copy. Mark is distributing them here for $25.00 each. Write: Mark Foster, 826 Oneonta Drive, S. Pasadena, CA 91030. ■

Over the Pacific in light winds. Actually suspended with mono. fishing line on wind surfer mast.

P-38 & ME 109 with San Francisco skyline in background.

Slope Flying
The San Francisco Area
Notes from An Avid Slope Soaring Enthusiast

...by Dan Fulmer
2495 27th Ave.
San Francisco, California 94116
(415) 731-1063

Fortunately, I happen to live in San Francisco where the westerly winds blow quite often, along with an ample supply of coastal hills.

The P-38 and ME 109 look very realistic in the air and seem to disappear when they are flown below the cliffs when the camouflage blends in with the trees and shrubs. The P-38 flies like a loaded down floater plane with no bad habits, slow to medium flight speed. I have to be very careful when landing because of the vertical fins below the booms. Any crabbing means the fins take abuse. Also a cartwheel crash (heaven forbid) means no crash protection whatsoever with the 3 fuselage configuration. The bottom line is that the 3 fuselages mean big drag and the plane turns into a big cruiser.

The ME 109 is a different story... It flies much faster than the P-38 but requires more wind and is less forgiving of mistakes. It rolls great, but requires lots of speed to loop. It is very easy to land; just sits down and stops. The 45 sq. in. frontal area on the fuselage keeps the speed down a little. (Maybe I have the wrong airfoil??) But the plane really starts to move out when the wind starts to howl and the cliffs are high and steep. The plane has a deadly head on view (probably what the B-17 gunners thought).

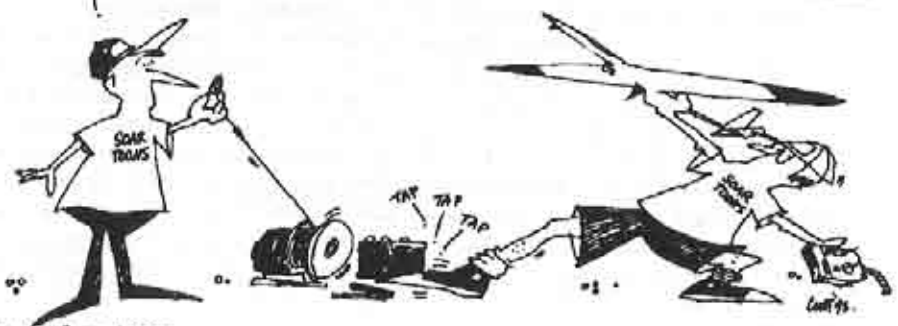
The 100" symmetrical was an experiment to make a large fully aerobatic slope soarer. Extremely light wing loading makes the plane respond to almost any maneuver. Spoilers make spot landings a bit easier. The plane flies very well in all phases of flight. I can put up to 2 1/2 lbs. of ballast in the wing. It penetrates quite well in high winds because of hidden actuators on all control surfaces, and clean fillets on fuselage to wing joint. Plane flies at a medium speed range, which makes it easy to fly in all conditions.

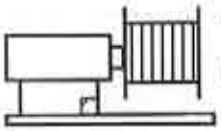
If anyone wanders down to the San Francisco, California area and wants to check the flying sites, I would be more than happy to show you around. ■

P-38	
Span	106" (16" root, 6 " tip)
Wing Construction	Foam/open bays, monokote "D" tube center section
Area	1000 Sq. In.
Airfoil	SD 3021, 3014 tip
Fuselages	3 main pods/glass epoxy 1/16 balsa over foam booms
Tail Feathers	Monokote/balsa built-up
Controls	Aileron/Elev/Flaps/Rudder
Weight	7 1/2 lbs.
Wind Range	10 - 20 mph
ME 109	
Span	85" (14" root, 8 " tip)
Wing Construction	Balsa/fiberglass over foam
Area	950 Sq. In.
Airfoil	SD 7003
Fuselage	Epoxy glass
Tail Feathers	Balsa & fiberglass over foam
Controls	Aileron/Elev/Flaps/Rudder
Weight	8 1/4 lbs.
Wind Range	15 - 30 mph
100" Symmetrical	
Span	100" (11" root, 8 " tip)
Wing Construction	Foam/open bays, monokote "D" tubed full span
Area	950 Sq. In.
Airfoil	SD 8020
Fuselage	Fiberglass over balsa & foam in boom
Tail Feathers	Monokote/balsa built-up
Controls	Ailerons full span/Elev/ Rudder/Spoilers
Weight	4 lbs.
Wind Range	10 - 25 mph

* Everything on planes is scratch built except for the ME 109 fuselage, which is a highly modified power plane fuselage.

Curt Nehring
Southern California





Winch Line ...by Gordon Jones

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

Wiring With Multi-Pin Connectors

More and more folks are starting to use multi-pin connectors to wire the servos in their wings and use multi-pin connectors for the fuselage, as well. A few of the manufacturers are even starting to provide the components for this type of set-up in their kits: RnR and Layne/Urwyler to name a couple. The advantage of this type of arrangement is that you don't have to fish around for the wires, and it takes away the chance of connecting the wrong wires, as well. (See diagram of the wiring.)

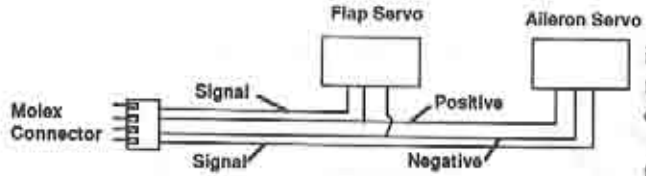
The procedure itself is straightforward and only requires a little time. When you are ready to install the servos in the wing, lay your servos in the wing cavity; then measure the distance to the root end of the wing. This will determine the amount of wire required for both the aileron and flap servos. If you are going to direct wire the servos, accomplish this prior to cutting the wire so that you have enough. Another way is to use Dean's connectors to mate the wing wiring and the servo wires. An additional way of connecting the servos without cutting off the plugs is to obtain long aileron extensions and cut the aileron extension leaving enough wire for the run to the wing root when plugged into the servo. The remaining wire with the other connector can be used for the run inside the fuselage from the multi-pin connector to the receiver.

Once the servos are wired or the extensions cut to the proper length for each servo, make a paper template of the airfoil. This is used to locate the hole for the connector so that it will be closely aligned when it is glued in place. Mark the location of the wiring hole in the wing root; then make an outline on the paper template. Mark the outline of the connector on the wing roots and both fuselage sides being careful to match the fuselage and the template.

Next, cut out the connector holes in the fuselage on both sides. Slide one wing panel on the fuselage and check that the cut out for the connector on the fuselage matches the location on the wing root. Adjust the outline on the wing root to match the fuselage cut out. Repeat this process for the other wing panel. Next, cut out the connector slot on both root ribs. Again, fit one wing at a time to the fuselage and correct any alignment problems. Place the connector in the slot with both sides in place to be sure that it will fit in both slots.

A couple of notes are in order at this point. First is that there are several different types of connectors available. You can get them with four or six pins and in a variety of sizes. These are available in most of the computer or electronic stores. The type that is mentioned the most is the Molex connector; this is a brand that is carried nationwide and offers many different styles of connector. Regardless of which connector you choose be sure to draw a diagram of the way you wire the connectors in case you have to replace a servo at some point.

Once you are satisfied with the fit of the connectors, run the wire through the wing from one servo. Solder the wire to the male side of the connector to match the wiring scheme you have decided upon. Then, run the remaining wire for the other servo through the wing and solder it to the connector. Repeat this process for the other wing. Next, solder the wires that run to the receiver to the female connectors. These connectors should have plugs to fit into the receiver. Once you have completed the soldering, connect the wires to the receiver and check to make sure all of the servos function properly. It is a good idea to label these wires for the receiver near the plug



with the control they will operate.

The next step is to mount the connectors in the wing and fuselage. This is accomplished by joining the connectors so that there is a gap between both sides of the connector. Insert the connector temporarily in the wing, then slide the wing onto the wing rod pushing it down toward the fuselage leaving a gap of a couple of inches. Pull the male side of the connector out of the wing until you can see the entire connector. Apply some epoxy to the male connector (be sure that you apply enough to hold the connector in place during wing removal), and then push the connector into the wing.

Apply some epoxy to the female side of the connector and slide the wing next to the fuselage while placing the female side of the connector in the slot in the fuselage. If you measure the distance of the alignment pin you can use the alignment pin to help with the alignment process. Make sure that both sides of the connector are flush with their respective slots. That is, the wing side of the connector is flush with the root rib and the fuselage side of the connector is flush with the side of the fuselage. Let the epoxy dry and then trim any excess epoxy from around the connector. Repeat the process for the other wing panel and you are in business.

If you want to do the same thing for a bolt-on wing, the process is similar, but you only have to solder the wires to the connectors and they lay loose in the fuselage. Be sure to make a wiring diagram so that you can have a reference if you need to replace either a servo or wires at some later date. ■

on the Wing

B²

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Olalla, Washington
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THE FAUVEL AV 36

Jim Gray, our good friend and long time correspondent, is an experienced pilot of full sized sailplanes and an enthusiastic supporter of tailless planforms. This enthusiasm for "flying wings" dates back to 1958 and a soaring flight at Harris Hill, Elmira New York.

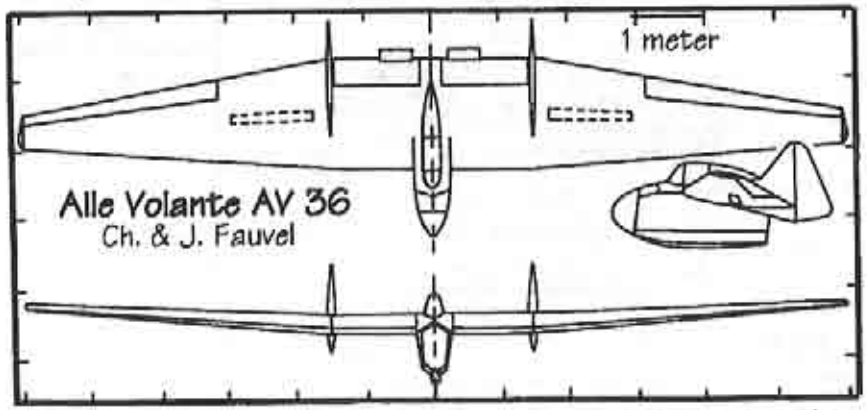
It was during the Snowbird contest of that year Jim flew his Schweizer 1-20 in the company of a Fauvel AV 36 which had been brought to the event from Montreal. While the performance of the AV 36 was a bit better than the Schweizer's, the Canadian pilot was apparently not accustomed to ridge soaring, and so the two gliders were fairly well matched. Flying wing-and-wing with the tailless AV 36 was, for Jim, an intriguing and at the same time overwhelming experience.

When Jim related this event in a recent letter we immediately went to our files and began gathering information. As you will see, the AV 36 makes a nearly ideal subject for scale modeling.

Charles Fauvel was a firm believer in the simple "plank" planform as an alternative to the rather complicated swept wing designs of the Horten brothers. Fauvel argued the plank was easier and less expensive to build, and the completed sailplane, because of its conventional control system, would be easier to fly. His first design, the AV 3, appeared in the early 1930s. Development of the AV 36 probably started prior to 1948. Jean Fauvel, Charles' son, completed the prototype at the end of 1951, with the first flight on December 31.

AV 36 flight performance, when compared with conventional designs of the time, is very good. It has a glide ratio between 24:1 and 26:1, a stall speed of about 30 mph., and a maximum speed of around 124 mph.

As can be seen from the accompanying 3-view, the center section is a simple rectangle while the outer panels are of tapered planform. The panels are separated by the fin/rudder assemblies. The wing of the AV 36 was designed so the spar is a straight line from wing tip to wing tip. The leading edge sheeting is bonded to the spar to form a D-tube, while the remainder of the wing is of open construction with fabric covering. Controls consist of ailerons, elevator, and rudder, with the twin rudders having differential movement. The fuselage is a simple polygon. One bulkhead is attached to the main spar, effectively integrating the fuselage and wing.



The AV 36 is unique not only because of its tailless planform, but also because of its transportability. The nose cone is removed and the rudders are fully deflected and bolted to the trailing edge of the wing. Placed on its trailer, one wing extends over the towing vehicle and the entire sailplane travels down the highway sideways in what is essentially one piece.

Model builders can construct a rather large model which disassembles into three easily manageable pieces - the center section and the right and left outer wing panels. The fins can be made to slide off as well.

Readers interested in constructing and flying a replica of the AV 36 have a couple of options.

Plans for a 1/4 scale three meter span model are available from Verlag fur Technik und Handwerk GmbH, Postfach 1128, Fremersbergstr. 1, 7570 Baden-Baden 1, Germany. The cost is DM 53,-, plus DM 6,- for shipping.

Plans for a larger version, in 3.45 scale, are available from Argus Plans Service. These plans cost £18.45, including shipping, and detail two versions of the AV 36. The construction article, along with five pages of documentation material, appeared in the Spring '92 issue of *Silent Flight*. Having a copy of this magazine is a must for builders of an AV 36 model. Contact *Silent Flight*, Argus Specialist Publications. The plans service and the publications section share the same address: Argus House, Boundary Way, Hemel Hempstead, Hertfordshire HP2 7ST, England.

The designer of the latter model, the late Gordon Waite, used the CJ 3309 airfoil, but performance could be improved by using the CJ 25^{2}09. The CJ 25^{2}09 has the added benefit of more closely resembling the Fauvel F2 airfoil of the full size sailplane. This change of airfoil does not affect either construction materials or methods. However, we note Gordon built three degrees of washout into the wing tips and then added permanent up trim to the elevator. This design requires no washout, and if the wing is built without washout the up trim can be removed from the elevator. This will markedly improve its already good performance.

The AV 36 in model form exhibits the same good flying characteristics as its full sized relative. The conventional control system uses simple radio gear and allows pilots to easily transition to a tailless configuration. The location of the tow hooks makes for easy winch launching and aero towing. Whether flown from a slope or over flat land, the AV 36 is sure to provide good performance and attract positive attention. ■

Tips

...by Jim Hammond,
Taiwan

Tip O'The Week 1

When rubbing down glass or paint, etc., the paper tends to develop smears or gets filled with the medium being removed. This happens especially when it 'ain't quite dry. (We all do this, don't we?) If a small amount of dishwashing liquid or soap powder is added to the rubbing down water, then a double effect is noticeable:

1) Filling or smearing of the wet and dry paper is reduced, so lifetime is longer. Smears which do appear are easily removed.

2) Grease, fingerprints, leftover mold release, wax, etc., are removed as you work. You degrease as you rub down.

Tip O'The Week 2

When making fillets on molds, instead of using colloidal silica to form edges after gelcoat, use glass rovings. This makes a many times stronger and more durable "corner", and increases mold lifetime significantly.

Understanding Sailplanes

...By Martin Simons

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South Australia 5069

The Cross Country Sailplane

(Notes prepared for the MARCS Symposium, October 1992.)

The experience of full scale cross country soaring

I begin with this heading because it seems to me that model cross country soaring is about to enter an era where the knowledge acquired by full scale soaring pilots, will be of most direct use to model fliers. There always has been a close association between models and full scale aviation. Most pilots of the larger aircraft have been, or still are, active modelers too. I suspect that most pilots of model sailplanes have tried, or would like to try, full sized soaring too. It becomes expensive in time, energy and money if one becomes seriously involved. I should say nevertheless that modelers generally would benefit from some full scale soaring experience. (For one thing, they might discover some truths about turning downwind, circling in thermals, stability and centers of gravity, and safe flying generally.)

The link between the two forms of soaring will become closer in future when we begin to fly model sailplanes across country as a matter of regular routine.

Hill soaring across country

Hill soaring cross country flying by models is already well established.

In a few well chosen places, with plenty of alternative slopes for different winds, cross country contests are held regularly. A course of some difficulty, with turning points in awkward places and some testing manoeuvres as well, is laid out and the pilots struggle to complete the task. They are normally expected to land on top near the starting place, or cross a finish line in flight. Merely completing the course is a challenge, let alone doing it in a fast time. The limits are, often, the pilot's inability to run through rough country and climb over fences and other barriers, while retaining control of the model. There are the usual problems of radio frequency clashes and since the models may be airborne for long periods, it is common for pilots to have spare sets of crystals to enable all to fly.

The models in these contests are taken to the summit, or nearly to it, to be hand launched directly into the slope current. There are a great many excellent slope sites where really long cross country flights would be possible but where there is no access to the top, no place to launch, no place to land, or no way of getting from one summit to another. We should adopt a different attitude for such regions.

It is often possible to launch a model by winch or *hi start* from fields at the foot of a slope, fly back to find the lift and then run along the hill. A four wheel drive vehicle then makes it possible to do a cross country flight. Evidently this kind of flying requires a team of people for each model and, rather like the full-sized equivalent, a pilot will need a dedicated and reliable crew.

There is much fun still to be had with hill soaring but most of what I shall say here relates to cross country thermal soaring. This, too, is not new, but so far as I know, nothing has been said in print about the theories involved or the kind of instrumentation that will be needed. Fortunately, a great deal has been written about cross country soaring for full sized sailplanes and I have, in my time, done quite a lot of this kind of flying. The theories do work providing, as always, that they are used with common sense.

The variometer.

What instruments shall we need?

Full scale thermal soaring in the early days was delayed for lack of one vital instrument. Above level ground, small vertical motions of the air, or, more importantly, of the sailplane in the air, are practically undetectable from the cockpit without a reliable method of judging rates of rise and fall. The pilot lacks any visual reference. So called 'flying by the seat of the pants' is not of much help. A bump from below, a sudden sensation of rising, might mean a thermal but might not. Turbulent air might mean lift or sink or neither, there was rarely any way to tell the difference. The altimeter is quite incapable of indicating small variations of height associated with thermal lift or sink. About 1927 it was realized that an instrument, already invented by balloonists in the nineteenth century, would be useful for soaring. This was the sensitive rate of climb indicator or, as it is now universally known, the **variometer**. When rising air, however feeble, was entered, the variometer would give the pilot an almost immediate indication. The technique of circling in thermals was very soon developed once variometers came into general use.

For cross country flying with models, we must expect to be operating often at considerable distances and heights, so for us, too, it will be difficult to tell whether the sailplane is in lift or sink. We are going to have to fit variometers which will not only indicate rises and falls, but will signal immediately to the pilot on the ground.

Figure 1 illustrates how one of the early mechanical variometers worked. There were other types, produced by firms in Germany and Poland, but this one, the Cobb Slater, or COSIM (Cobb Slater Instruments, Matlock) invented about 1935 in England by Bert Cobb and Louis Slater, was very simple and easy to understand. As distinct from the altimeter, the variometer is essentially a very sensitive flow meter.

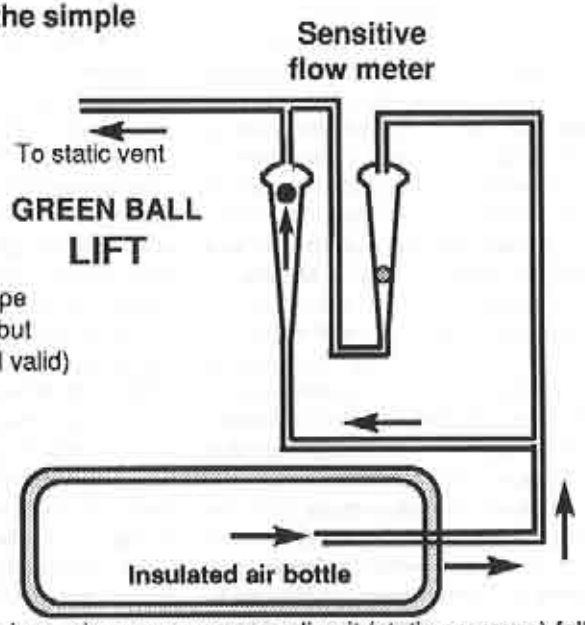
A flask, often a vacuum flask which 'might otherwise have contained coffee, provided a temperature insulated reservoir. On ascending, the reduction of 'static' pressure outside would allow air to move from the flask to the atmosphere, on its way out blowing through the conical tube containing the green ball. The green ball would pop up. Hence, ever since, British soaring pilots have spoken of 'green air' for lift. In descent, the red ball came up. The simple COSIM was sensitive enough to record, almost instantaneously, if one lifted it gently from the floor to put it on the table. I did my first soaring and my first cross country flights, using this type of instrument.

The COSIM was not very accurate in measuring varying rates of climb or descent, especially since in a tightly banked turn the green ball was forced some way down the tube by centrifugal force, to pop up again when the bank came off. (A highly misleading signal if one was not prepared for it.) Similarly, in a 'negative g' manoeuvre, both balls would pop up together. A more serious defect was discovered in dry climates, since static electricity generated by the little pith balls inside their glass tubes, caused them to stick.

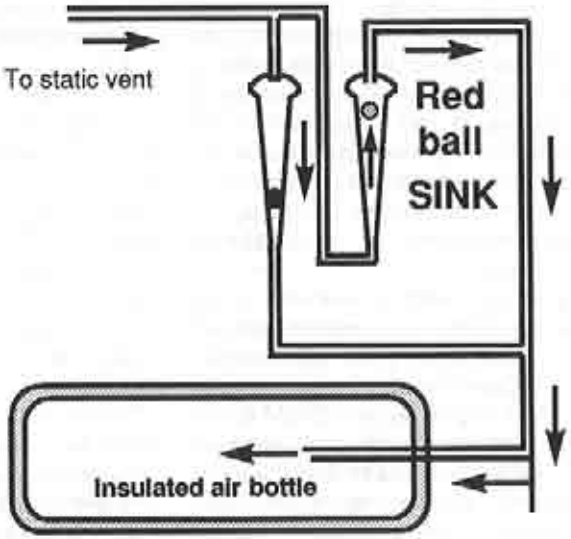
All mechanical variometers rely on the same basic aerodynamic principles although in most types a balanced vane is used for the flow meter, reading to a circular dial with a needle, rather than the Cobb Slater upright tubes. The dial instruments are not subject to positive and negative 'g' errors. Sailplanes today still sometimes carry mechanical variometers in case the more sophisticated electronic ones break down.

The first move toward electronic variometers was to replace the green and red balls, or the delicate vanes of the dial instruments, with a simple Wheatstone bridge electrical circuit which measured the differential cooling, and hence resistance, caused by the air flowing out of the flask, or into it, passing over the heated coils or, eventually, thermistors. These

Figure 1
The principle of the simple uncompensated variometer



As sailplane rises, air pressure surrounding it (static pressure) falls.
Air flows from bottle out through flow meter.



As sailplane sinks, air pressure surrounding it (static pressure) rises.
Air flows into bottle through flow meter.

relatively crude devices worked well so long as the batteries were charged, but were almost too sensitive, being upset by small scale turbulence. Flow restrictors in the plumbing and electrical dampers had to be used to smooth the needle motions.

Nowadays, with pressure transducers and other electronic devices, compensated for temperature variations and coupled to small computers and even navigation systems, the variometer for the full sized sailplane has become far more accurate and is at least as sensitive as the old mechanical types.

One very important improvement, which came with the first electrical variometers, was the invention of the audio variometer. Now, the pilot does not have to look at the face of the instrument, but hears it. This enables a better look out to be maintained, reducing the risk of collisions.

Usually there is a beeping when the sailplane is in lift, with the tone rising to inaudible pitches in very strong thermals. There is a depressing groan in sink.

With models too, an audible output will be necessary, since the pilot needs to keep eyes on the model all the time. It will not be advisable to keep glancing at an instrument panel. The pilot will have an ear piece through which this vital news will come to him.

There is another important principle to be considered.

Total energy compensation

Model sailplane fliers know that if, when the sailplane is flying, the stick is pulled back, the model pitches up, rises rapidly for a little time and loses airspeed. We have to learn the difference between such a brief gain, a 'stick thermal', and the sailplane's behavior as it enters a genuine up current. Similarly, on moving the stick forward, the model pitches nose down, gains airspeed and loses height. In a full scale sailplane, unless compensated in the manner I shall describe, stick thermals cause wildly misleading indications on the variometer.

To compensate for 'stick lift' and sink the simplest devices are the total energy venturi and the 'Nicks tube' or some variation of it (**Figure 2**). Even now, with all the electronic equipment available, every full sized sailplane carries a probe of this, or some similar, type.

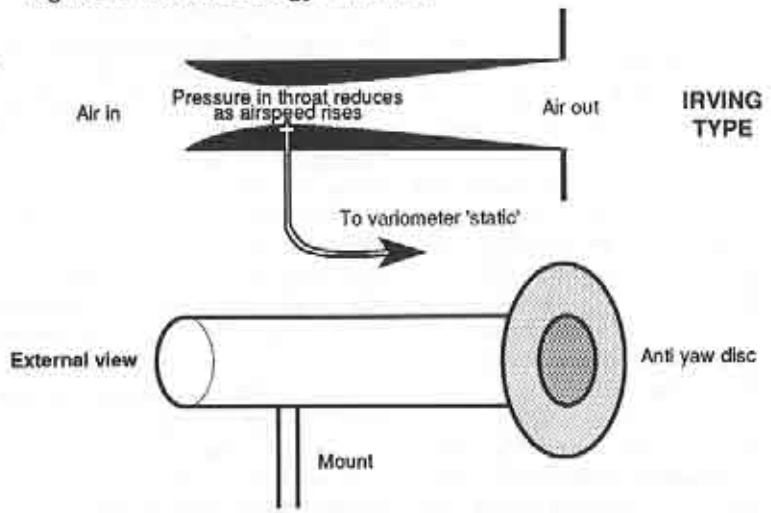
When a fluid flows through a constriction such as a venturi, as Bernoulli showed some centuries ago, the increase of flow speed in the constricted passageway causes a reduction of fluid pressure in the throat. Mathematically, the pressure is in inverse ratio to the flow speed. Flow speed up, pressure down. (The same effect allows wings to provide lift.)

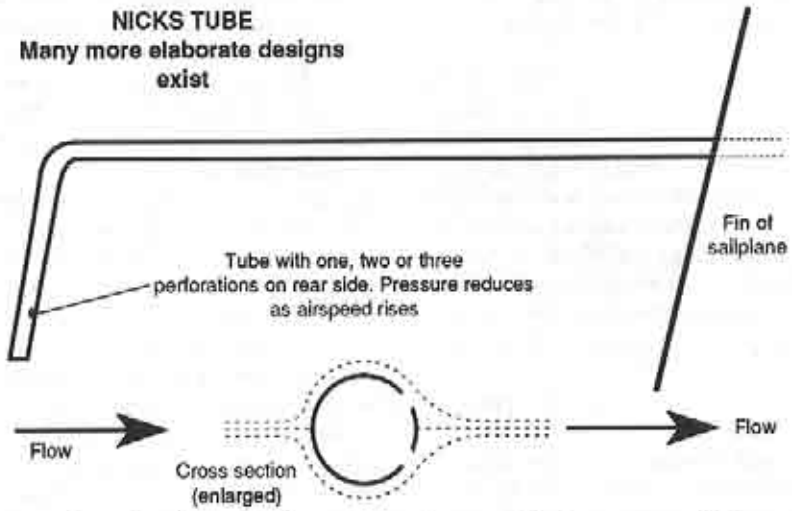
If a venturi is mounted correctly on the aircraft, the pressure in the throat will rise as the airspeed falls and fall as the airspeed rises. A change of kinetic energy in the flow is necessarily balanced by a compensating change in potential energy. By careful design and placement of the venturi, the pressure in the throat can be made to compensate quite exactly for the airspeed variations.

Instead of connecting the variometer to the ordinary 'static' pressure vents on the sailplane (usually two or four small holes on the rear fuselage, or sometimes on the old fashioned 'pitot' head), it is now connected to the throat of the venturi. Stick thermals virtually disappear. The term 'total energy' relates to the total of potential and kinetic energy of the sailplane. In other words, an indication of a rise on the variometer indicates a genuine gain of energy, not a stick thermal, and a down reading on the instrument indicates a loss of energy, i.e., sinking air.

The Nicks tube is even simpler than the Irving venturi but works in an equivalent manner. The pressure at the small vents in the tube follows the total energy equation quite closely. Apparent simplicity conceals a lot of careful research by Oran Nicks, the inventor. Usually the Nicks tube, or a refinement of it, is

Figure 2. The total energy variometer





mounted on the fin, well clear of any aerodynamic turbulence or interference. The drag is slightly less than for the venturi.

Nothing in soaring is ever simple. For various reasons, no variometer is ever quite without lags and errors and no compensator is ever capable of giving perfect total energy information. The sensing head, for example, is often affected by yaw, by aerodynamic turbulence and local pressure variations caused by the airflow over the sailplane. It takes an appreciable time for flows in the long lengths of plumbing which connect all the parts together inside the sailplane, to reach the sensing instrument. Condensation and dust, after a while, find their ways into the system. A microscopic leak in the tubing can cause complete confusion. There are also some inertial and lag effects on the sailplane itself, so that changes of speed and height are not instantly apparent. In practice, the pilot learns to allow for these errors and delays. The seat of the pants remains useful.

Cross country soaring models also are going to need compensated variometers, which must signal gains and losses of total energy, rather than stick thermals. Without this we shall be confused rather than helped by the messages sent to us from the sailplane.

Other Instruments

No other instrument is so important as the total energy variometer, but an accurate altimeter with temperature compensation will be needed for the model and equally, an airspeed indicator. I shall not describe how these work, except to point out that both need to be connected to atmospheric probes which must be carefully placed to avoid, as far as possible, position errors. For example, the altimeter requires a 'static' pressure connection, not to the interior of the fuselage, but to the outside air. This static vent has to be placed where the pressure input is not upset as the aircraft changes speed, yaws or stalls. This placement is very far from easy. The airspeed indicator also requires a static vent and a pressure input. Both may be provided by a pitot head which has to be clear of turbulence.

Altimeter and ASI will be required not merely because it is nice to know height and speed, but because they will be be combined with the variometer readings to maximize cross country performance. Next month: Classical cross country soaring. ■

Get The Lead Out, Baby

...by Pancho Morris
Mesquite, Texas

You're asking yourself, "What is Pancho doing writing about ballast?" Yes, I do have a reputation for building my planes pre-ballasted it seems. Ballasting is an important consideration for flying. Here in Texas we are often blessed with more wind than we would like.

Many people think that adding weight to a sailplane does not make sense as it will make the sailplane come down faster. Increasing the weight of a plane does not change the glide angle of the plane for a given trim, it just makes it fly down the glide angle faster. It is coming down faster, but more importantly, it is moving forward faster. If your plane has a forward speed of 15 mph at its best glide trim unballasted, and adding a given amount of weight increases that speed to 25 mph, it is obvious what effect this will have on a day when the wind is blowing at 15 - 25 mph. You will be able to still fly at your best glide angle and move forward. You will also be able to ride that thermal farther down wind before you have to come back home. Since your ship now has much more mass, it will be much less affected by gusts and turbulence. This is very helpful on landing. The drawback is that you must land a bit hotter because of the extra weight.

Ballast is added at the balance point of the plane so as not to change the trim. The ballast must be very well secured so that it does not shift or come free. Ask about the Hobie Hawk and fishing weight or ask Doyle Modesto about his Ellipse. A radical shifting of the CG can be very exacting.

Since adding ballast allows you to fly faster and cover more ground to find thermals you might not otherwise have reached (and take them further downwind), you may find that by making your plane heavier, instead of coming down faster, you can stay up longer. ■

Low Lift or Hand-Launch Topics

...by Scott Smith

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Introduction

Hello, my name is Scott Smith, and I intend to make sure that there is a hand-launch, or HL, column in *RCSD* every month. My qualifications? I am a dedicated but mediocre middle-aged HL contestant who is warped enough to be passionately in love with hand-launch. Hand-launch has seen accelerated growth in the last year, and it is time for there to be a focal point for this holy sport. I wanted to be its metaphysician and spiritual spokesman[1]; and so I appointed myself to be its columnist. Be forewarned; my writing style is off-hand, irreverent, irrelevant, opinionated, inflammatory, and, in-short, *wacko*. I.e. somewhat like Dave Thornberg's.

'Nuff introduction.

Why Hand-Launch?

Those of you who, like me, are obsessed with what is written about "how to be a better pilot", will note that two of the all-time greatest RC soaring spokesmen of all time, Joe Wurtz and Dave Thornberg, have written (and I paraphrase because I lost my interview notes):

To become a great soaring pilot, master Hand-Launch first.

Presume, for sake of discussion, the accuracy of the statement above. Its truth kinda grabs you in the gut, doesn't it? You know, learn to thermal close to the ground and all that. However, there are subtle inuendoes in the wording that lead to great spiritual malaise, and I want to point them out so that your soaring point-of-view is corrected.

First, what is meant by, "First"? This implies that hand-launch is simply a training ground for F3B, F3J, slope-racing, and other (yawn) contest activities. Drop "first"; lots of pilots have stopped and are existing, yea thriving, in hand-launch alone, thank you very much. We'll look at the reasons why shortly.

Second, why does one have to master hand-launch in order to be "great"? What does "great" mean? In answer, I suppose that many pilots would propose that a "great" pilot is one who is a consistent contest winner.

Here's the problem: if you buy this baloney about consistency and winning, then most of you will never be great. Because, except in exceedingly tiny contests, for each winner there MUST BE MANY LOSERS. That's the definition of competition, right? I feel extremely remorseful about having to say this, but someone has to say it: The vast majority of you will be LOSERS for the rest of your soaring lives!

How unfortunate! How unfair! How un-American (or un-Swedish or whatever citizenry you pledge allegiance to)! How FACTUALLY WRONG! For in hand-launch, there are many other means to achieve greatness. All you have to do is find your own path!

Fortunately, I have found a path, and I will share it with you. I assure you I am a great soaring pilot. No, I haven't won any contests (or even come close), but my name is known throughout the HL community in Southern California. How so, you ask? Simple, I fried my HL sailplane in the power wires during a competition a year ago in September. The skin vaporized in a great blue-white ball of fire, and everyone startled when they heard the explosion. I ran over to the still smoking carcass, gingerly picked it up, wiggled the control stick, and yelled to everyone that it was still alive! Even today, new pilots come up to me and ask me if I am the one who electrocuted his sailplane. Joe, eat your heart out.

Okay, here's why many sailplane pilots remain fanatically loyal to hand-launch:

Great Spectator Sport

Here's why:

Beauty - It still takes my breath away to see the simul-launch at the beginning of a round. 5 to 9 sailplanes thrusting into the air, then madly dashing to the same cubic yard of airspace where the wisp of a thermal seems to be.

Excitement - You want action? You want violence? You want carnage? Watch 6 sailplanes 20 feet off the ground in the same weak, sagging bubble: 3 going clockwise; 3 going counter-clockwise. It's better than figure-8 racing!

Suspense - For several years, the famous Riverside meet was held at a school yard next to high power lines and a busy street, both located upwind of the field. I still remember Patrick Conway trying to get back through the wires, center-punching one that stopped the bird dead in the air, dropping 1 foot horizontally and continuing back to the field. Heart-stopping!

Drama - There was the pair of sailplanes returning so low (3-4 feet) that they were zig-zagging through the auto traffic. Neither one had enough altitude to make it cleanly over the school fence, which each needed to do to save his flight. One managed to pull up into a stall an inch over the fence, it teeter-tottered over the other side and onto the field. The other simply punched through the chain-link fence; its nose stuck though to the other side and therefore it was considered "within the landing area". Inspiring!

Disaster - Dr. Norm, another famous Southern California pilot, had his freshly rebuilt glider aloft for 9 minutes 30 seconds. He had 30 seconds to get his plane on the ground or lose all points for his remarkable flight. Unfortunately he was still 300 feet up in a hat-sucking thermal. So he put it into a dive, at first slowly, and then accelerating sharply. At 60 feet everyone was screaming for him to pull out. Alas, the air speed overpowered the elevator control and it slammed vertically into the street at an estimated 80 mph. It was spectacular! The timer was so pumped up he gave Dr. Norm 9:55 for the round, forgetting that the street was outside the acceptable landing area. And, I confess, we never reminded him.[2]

These kinds of cheap thrills happen far more often than in other sailplane contests. Why?

Accessibility to Mayhem

Because the equipment is so inexpensive, pilots feel they can take more chances. The fact that an airplane weighs under 1 pound and is loaded at under 5 oz./ft^2 doesn't hurt safety either. So the pilots GO FOR IT!

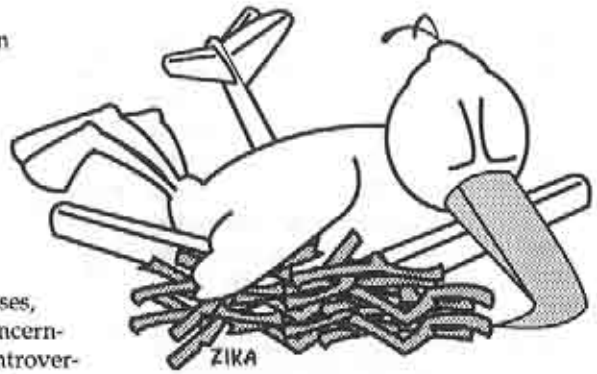
New Frontiers in Aviation

Unlike F3B in which all the plane designs are cookie-cutter, many designers of HL aircraft still really don't know what works[3]. Wing design benefits little from the famous Princeton airfoil tests because the Reynolds numbers are very small, 50000 or less. Controversies abound! For example, there is great debate between the importance of stability, because the lift is so turbulent, and, as Dr. Norm likes to call it, "turning authority", which is important because the lift is so turbulent. There is a still a large unsettled wilderness of discovery which should cause the pupils in the eyes of even the most burned-out experimenter to dilate with excitement!

An Invitation to You

In the coming months, I promise to share with you the most entertaining stories and the most promising ideas from the HL brethren. Indeed, if you have stories or ideas worthy of this fine fraternity, I beseech you to please write or phone me;

I will treat each submission with the care that it so richly deserves. I promise!



Conclusion

Next month: lame excuses about why pilots don't try hand-launch, excellent new HL technologies like rubber noses, and more techno-babble concerning the latest HL design controversies. Hope you tune in again.

✈ ✈ ✈

[1] As soon as I see one, even ONE, female contestant out there (and I sincerely hope she will show up soon!), I will correct this to "spokesperson".

[2] Since I lived close by, I took the demolished receiver to Airtronics for repair; they repaired it for $17.60, including tax. No kidding.

[3] That's because it would appear that some of them don't know what they're doing. ■

Vintage Sailplanes

...by George Siposs
Costa Mesa, California

Each year, on Memorial Day weekend, the Vintage Sailplane Association organizes a gathering of vintage sailplanes at the Hemet, California airport, about 75 miles west of Los Angeles.

In addition to some beautifully executed restorations of TG-4, Bowlus Albatross, and vintage German gliders, there is a hanger exhibit devoted to R/C models of vintage planes.

This year, a quarter-scale engine-powered plane airtowed a KA-7 model to the

Part of the outdoor exhibit features a KA-6 (the big model).

Beautiful model of an Army Air Corps TG-4 training glider.

Grunau Baby - That's how gliders should look!

Steglmaier's winning Minimoa - This is a model!

Carl Walter's Baby Bowlus flew very well.

...and the full-size Bowlus Albatross.

delight of the crowd. Carl Walters' Baby Bowlus was scratch built. He used stuck-together aluminum cigar tubes for the boom. The pod mold was shaped of foam, covered with epoxy and fiberglass, and then gasoline was poured inside to eat up the foam. Monokote was used for the final finish. Steglmaier's beautiful Minimoa won the top award. In the evening, old-time home movies of Hawley Bowlus flying his plane 60 odd years ago delighted the crowd.

If you are in the area, make it a point to visit Hemet airport on Memorial Day weekend. The best action is on Saturday. ■

"Jeff McComb at Huntsville right after receiving his first trophy for flying. Note the writing in the background" Edwin Wilson photo.

Thoughts of a Novice

...by Jeff McComb
Louisville, Kentucky

(The following article appeared in The L.A.S.S. Word, the newsletter of the Louisville Area Soaring Society, Louisville, Kentucky, and has been printed in MASS Mail, the newsletter of the Memphis Area Soaring Society, Memphis, Tennessee. We believe that most of you have not seen the article, so have obtained permission to reprint it, again. The article was written after Jeff attended the Mid-South Championships in Huntsville, Alabama this last June. Edwin Wilson provided us with Jeff's picture!)

For the entire time we packed the van, the little voice kept saying, *"Jeff, this is a contest. Why are you packing your airplanes? This is for the experienced guys, not you. You're going to look like an idiot. Just forget about it."*

Maybe the planes won't fit, I thought, and I can stay at home. Maybe I'll step on a wing and... Oh yeah, Ed brought extra planes. Man, he'd have to think of everything, wouldn't he?

So, off we go, heading towards the interstate and the rain. RAIN!!! I could now relax, knowing that the rain would stop me from flying - or rather, from making a fool of myself. But no such luck. When we arrived at the field the next morning, the clouds started to break up and, as if by magic, the wind died down providing what would be "perfect" weather. Perfect for everyone but me, that is. By now that knot in stomach was as big as a watermelc and growing rapidly. This was my f venture at another field and by comp son to "Old Faithful", this one wa monster. In fact, this place was so h that even I laughed (nervously) w they talked about boundaries at the pil meeting.

As a relative newcomer to the spor just intimidates me when I see these g unpacking their ivory inlaid veneer, tr hinged, foam contoured, velvet lir flight boxes. The voice says, *"Jeff, le your* ***beginners*** *stuff in the van!"* At le it only takes me a few seconds to take rubber bands off and get ready!

All at once the sideline takes on appearance of "Canopy City" with w to-wall airplanes. But wait a minute! supposed to be flying with the **NC ICES** and I don't see any Gentle Lad out there. *"Jeff, you got suckered, but th is still time to get out!"* uttered the voi again. But how can I? They have radio gear at the impound and my elev year-old son, Chris, is saying, "C'm Dad! You can do it!"

As I watched these hi-tech, ballis missiles zoom into the sky, Ed point out people that I had previously or read about. The voice was getting loud and my hands were now starting to sha Ed's turn came and went; he did w with a nine minute flight and perf landing. Then, (Oh, hell!) they called group.

There were only two in my group a no planes in the air to follow. *"Maybe th know I'm a novice and everyone rushed to out of the way,"* the voice screamed. hardly heard Ed saying, "Calm dov take a deep breath, and just fly yc plane." So much to remember: turn on the transmitter, plane, check trim, direct drive winch... Be careful. What else? What else?!? The guy working the winch says, "A Sagitta. Hmmmmm. I haven't seen one of them in a while." Is there time to run? No, I realize. I'm the only one on the flight line and all the experts are watching. The rudder on my plane is quivering and I'm not touching the sticks. My hands are shaking uncontrollably. How am I going to land without the tennis courts or power lines as references? Is this really fun? Up we went and hit some lift. Eleven minutes, four seconds later I nailed an eighty point landing. *"See, I told you there was nothing to worry about. Why don't you listen to me? I knew you could fly with them!"* that voice taunted.

I wanted to jump up and down and wave my fist in the air, but it seemed more appropriate to act like it was no big deal. My shirt was wet, but it seemed easier to explain it away as humidity - not nerves. Yes, this was fun and it accomplished goal number one: to have fun. Goal number two was: not to be last, and this was accomplished by placing a respectable sixth on the first day. I was then told that the top three novices beat the first place sportsman so they would move up before the second day of competition.

The icing on the cake was my third place trophy for my performance on the second day. I cordially invite everyone to drop by to admire it anytime. I wanted to put it on the wall in the bedroom, but my wife wouldn't let me.

What you don't see or feel by not trying this is that wonderful companionship and friendship that develops among RCers. These guys are down-to-earth and also aim to have fun. It's also more fun to talk to them in person than to just read about them in some magazine. They all seemed to find satisfaction in getting someone back in the air. "Loan extra wing rods, servos, and fuselages" was an unspoken rule.

Just as there are different kinds of proficiency at our field, there are different stages there. I did not find novices or juniors excluded or shunned or laughed at by "The Experts". I did, however, find an abundance of encouragement, advice, and new friends.

Thanks, Ed Wilson, for twisting my arm to go. Maybe now I can help twist some arms, too. The more we get to go on these jaunts, the more fun we can have. Also, a huge thanks to Mid-South for a great tournament.

You guys that have just built number one, landed for the first time, or just soloed, keep in mind that even these experts went through this and put a great many years into gaining the skills that they now have. I don't want to leave the impression that I'm ready for the expert class. I'm only a novice wishing more of you have an experience like this. If you are not repairing your airplane each time you fly, you may be ready for a novice tournament, too. Let someone twist your arm. If not, at least go and time for an expert. You will gain so much first hand knowledge and experience.

P.S. - Some of you experts at our field better watch out for Mike Wilson. He beat both Ed and myself on the second day and is maturing into a very good flier. Fortunately, he is still in the junior group. Mike took 2nd on the first day and tore the competition up by over 600 points on the second day for 1st place.

P.S.S. - For two and a half days, we ate, slept, talked, flew a few sailplanes, and the excitement even caught up with my son, whom I have been trying to hook into the hobby for two years. We really enjoyed the time together and... What's a few more planes around the house, anyway? ■

Keystone RC 1993

For those who may not know, the Keystone RC (KRC) meet, which is held in eastern Pennsylvania, may be the largest meet for electric powered planes in the world. The nice thing about this event is that it is not a contest, but a gathering of electric fliers that want to show off different types of electric planes.

This year, the KRC started on Friday night with a demonstration of night flying. The next day, unfortunately, was a day of some rain, partial clearing, and a very low ceiling. Flying was understandably less than it normally is. But it was interesting to see all the fliers trying to get in a few flights between rain drops.

Four motors and it flew great.

Electric Pattern

Larry Sribnick with Airtronics Falcon 550E.

Robbe Display

Joe Salvatore with a Jade Impulse.

Another very large multi-motored plane.

Bob Shipton modeling the latest in the fall fashion head gear for the F3E pilot.

One thing I noticed was the ever increasing number of vendors that have been coming to the KRC meet. Some, like Kirk Massey of New Creation's RC, came all the way from Texas to show his electric products (of which he has many). As always, Larry Sribnick of SR Batteries was there giving seminars on battery and motor care. This is very informative and a must for all electric fliers. I also saw Ted Davey (*RCM* electric columnist) with his fine line of electric planes. I was so busy with my own display that I missed many of the other vendors. Sorry I could not get all their names. The point being that if you want to see what seemed to be many dozens of planes and a large amount of vendors all in one place, go to the KRC meet.

Example of what was for sale.

New Creation's R/C

KRC Field

As you can see in the pictures, there were all kinds of electric planes. Myself, and I think most of you readers, prefer electric powered gliders, of which there were not too many, but it is a thrill to see a four motor plane or a pylon racer flying. The engineering that goes into some of these projects is amazing.

Some of the best known electric fliers also came to the KRC. For example, to only name a few, Steve Neu of the USA F3E team came from California to demonstrate his F3E plane. Keith Shaw as always is a show stopper with his many fine planes. John McCoullough, one of this year's AMA National winners, and John Mountjoy (*RC Report* columnist), came up to fly from North Carolina. Bob Shipton came from Detroit to model his new "head gear". Larry Sribnick flew a beautiful Airtronics Falcon 550E, and my friend Mike Prager flew a very fast Surprise that was unbelievable on only 12 cells.

The KRC is a very well run meeting. The club does as good a job as I have ever seen in keeping things running smoothly. There was a large raffle, food available, porta johns and overnight camping at the flying site. Try not to miss it next year. It is well worth attending. ■

New Zealand Soaring Champs 1993

Christchurch, March 13 - 15

...by Rob Condliffe and David Griffin

New Zealand has just held one of its most successful Soaring Champs in many years. All the aspects of a great contest came together for us; the weather was excellent for each of the contests, and there were plenty of competitors, few crashes and lots of flying!!

The Soarchamps are held each year in a different part of New Zealand, with each island taking a turn at playing host. As New Zealand is divided by a stretch of water, "The Cook Strait", which takes 3 hours and lots of dollars to cross, the country is not as small as may first seem, so north and south don't often meet in competition. There are many good fliers on both islands, so when we do meet, the competition is usually hot.

Christchurch, a city of 350,000 people, about halfway down the South Island, played host to this year's event. We have large areas of flat plains surrounding us on three sides and plenty of large sheep fields to fly from. On the other side of town is a range of hills about 1500' high with some excellent slopes.

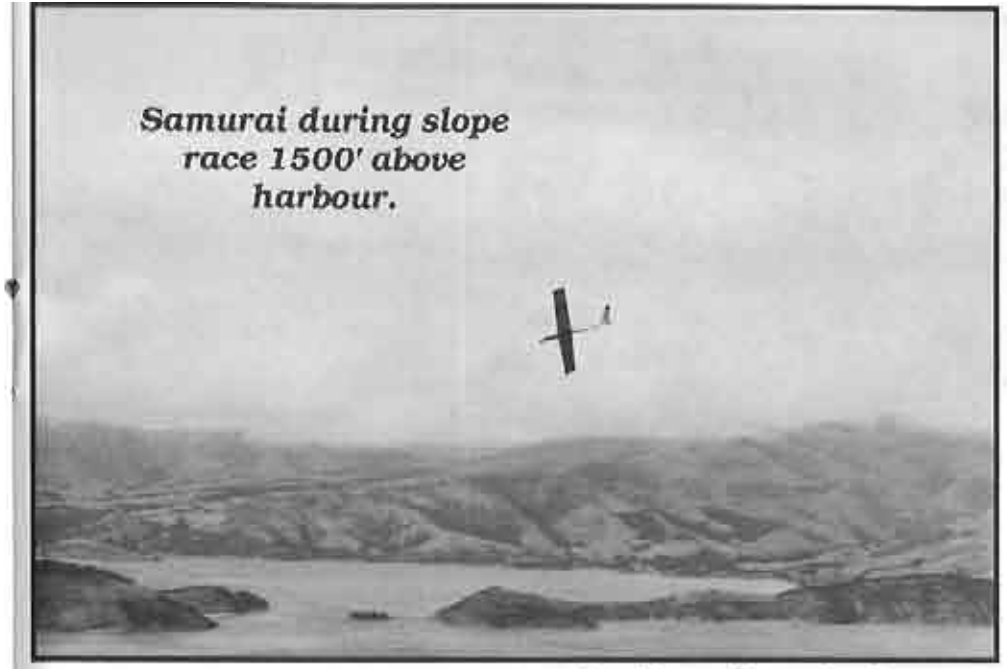
Friday, practice day, two winch lines were marked out to cover the two most likely wind directions. As luck would have it, we used one course on the practice day and the other for all the competitions! Something of a record though, to go through a whole contest without a change of winch direction!

The North Islanders and many of the locals spent the day sorting out gear, testing new planes (Yes, it happens here, too!), and practicing F3B speed and distance. I don't know what it's like in your F3B comps., but I wish I could consistently turn in the same times during the contest that I manage in practice!

F3B

Saturday started early for our intrepid F3B fliers. The day dawned calm and clear as 22 fliers set up their gear. These conditions remained with us most of the day, with wind rising to 10 knots later in the day. It was impressive to see around $18,000 worth of winches sitting on the base line, most of them using Bosch motors to overseas specifications. They all proved very reliable all weekend, particularly the most popular, made locally by Kelvin Lilley.

We engaged the services of a non-competing contest director, Gary Burrows, to manage the event, which he did in fine style, encouraging/pushing/



Samurai during slope race 1500' above harbour.

shoving, etc., the 20 odd competitors through three rounds by 5 PM with even time for lunch! The competition was a vastly higher level than has been seen in New Zealand before, mostly due to more competition, dedicated equipment, I.E., vacuum bagged wings (a new technique to most of us in the last 18 months or so), decent higher power winches, and practice. A highlight was Dave Griffin's third round speed score of 21.4, which equaled the New Zealand record. In all there were 18 runs under 30 seconds, so the standard, while not up to world champs pace yet, is definitely turned in the right direction. Just 18 months ago very few competitors flew less than 30 seconds in speed. In distance, the best effort of 17 was managed by Warrick Gatland, with a few 16 lappers to keep him honest, the average being around ten laps. Most of the speed and distance flights were flown without the aid of thermals.

Most of the models flown were of own design, featuring vacuum or dry bagged wings and RG15 profile. Radio gear was predominately Futaba with a few JR and a sole Multiplex set. A Flite Lite Composites Thermal Eagle was well flown and could be a real threat when the owner gets more practice in. An Airtronics Legend also performed well, particularly in distance and duration. It also turned in a very respectable sub 30 second speed run.

Congratulations to Kevin McFall for his steady consistent flying which won him the Gatland Cup for F3B. He joins some famous names in New Zealand aeromodelling, a fact he was obviously aware of by his look of delight when presented with the trophy.

Sunday dawned with mist and fog, a good omen, as there was no wind and as soon as the fog lifted, we were away. The conditions again remained the same all day with even less wind than the day previous, which suited the owners of "floater" type models just fine.

Thermal A

This is a national contest class which features 4x1 hour rounds; the target is a 6 minute flight plus spot landing. Best three flights count.

Thirty competitors took part, eight of these strangers to this level of competition. However, they handled the day like old campaigners with the veterans

New Zealand soaring enthusiasts.

freely giving help and advice. Greg Burt had to be talked into coming! His second placing being particularly satisfying as he flew one of the low tech models, a Topflite 2M Metric, a really competitive plane in this weather.

Star of this event, and the weekend as it turned out, was Kevern Oliver with his well sorted out Airtronics Legend. These little beasties really perform well as long as you put in the practice and become more aggressive in your thermal hunting. Don't expect them to float around like an Oly 2. You will be disappointed! Keverm once again did nothing spectacular, just consistent performances.

246810

This new event was well received. It was run in two complete rounds so that each flier would have a helper available and the frequency to himself. You had to get 30 minutes of flying into one hour! The goal being to fly for 2, 4, 6, 8, & 10 minutes in any order and land on a spot with the standard FAI scoring. You had to be organized! This was won by Captain Skyhook, himself! Craig King, with his massive V-tailed soarer which, as rumor has it, has thermals built into the wings! A lot of competitors were not used to the varying time targets and you did not have to nominate your flight target length UNTIL you landed. Then, you looked at your flight and decided where to put it!!! Some came unstuck! Surprisingly, the 2 and 4 minute targets seemed more elusive than the longer times.

Electric

Max 7 cells, three flights, goal 7 minute duration with the motor off, no recharge, all three count

This was to prove to be a battle between the old guard with their usual aircraft and the three new WACO 10-550's of Oliver, Griffin, and Kaiser. These kevlar aircraft were powered with Astro FAI 15s, running 9.5 x 5 props, and using 1700 scr packs. Performance was very good, but time was needed to get used to these little beasties; boy, do they go on 10 cells! Interestingly, they have their servos mounted in their V-tailed feathers! No, I have not written it wrong! By using fat blades and thin servos, it is possible. The old master, Angus MacDonald, took this event by masterful flying. He flew a Stratus 1200 scr pack. Only using 50 sec. motor runs, he was in a thermal on power, every run, and that's what made the difference. The low key nature of this event is enjoyed by all and the event is sure to grow.

Champagne Flyoff

I think this may be a unique New Zealand event, flown at the end of the day in, hopefully, still air. All launch about the same time; last one down wins a bottle of champagne! We also ran a sweepstakes on this event and all interested put in a dollar; fliers were randomly matched in pairs, and the pair with the highest time won the stake.

This time around though, we ended up flying two groups as there were so many fliers. Little could we foresee what was to happen. The first round launched into awesome lift. The guy who hand-towed Dave Griffin's Legend said it was like catching the big one out fishing as, half way up, the tow line suddenly became very taut and he started running backwards! In a very short time there were only a few planes easily visible with most up around 1500-2000'. Mostly, they went straight up in a matter of min-

Kevern Oliver - overall champion with Samurai.

David Griffin with own design F3B ship, 3 metre, RG15.

Overall Champion	
1 - Kevern Oliver	Legend, Samurai, Waco 10-550
2 - David Griffin	Legend, Mach 1, Waco 10-550
3 - Mathew Dimock	Aquila, Bullet
F3B	
1 - Kevin McFall	Enzedee (OD)
2 - David Griffin	Mach 1 (OD)
3 - Stu Grant	(OD)
Thermal A	
1 - Kevern Oliver	Legend
2 - Greg Burt	Metric 2m
3 - Lesley Stockley	Falcon 880
Galtech 2, 4, 6, 8, 10	
1 - Craig King	V-tail Thing
2 - David James	Illusion
3 - Marty Kiel	Thermal Eagle
Acorn Models 7 x 7	
1 - Angus MacDonald	Stratus
2 - Marty Kiel	Sagitta 600
3 - David Griffin	Waco 10-550
Slope Race	
1 - Matthew Dimock	Bullet
2 - David Griffin	Waco 10-550
3 - Kevern Oliver	Samauri
Champagne Flyoff	
Craig King & Stuart Grant	

utes! People were lying on their backs trying to help the pilots keep their planes in sight! Rob was keeping time for Angus MacDonald, as he had drawn him as his partner in the sweepstakes running for the event. Initially, he said he despaired, as Angus was the worst off of the lot! For ten minutes he flew at about twice the height of the trees working small thermals as they came through. Finally, there was a kick, and he was away, circling well into the distance until Rob had to tell him which way it was turning, a beat back towards us several times, and once again drifting to almost out of sight.

Twenty minutes and a few more planes drifted into view, thirty, and there were only 4 left. Angus' batteries were nearly flat, so he hung around at low height. As he touched down at around the 33 minute mark, the warning signal on the Tx went off; too close for comfort. The winner of the first heat was Craig King, once again using the 14 ft??? What's it called, Craig? A great

flight of some 38 minutes. So much for weak evening thermals!!!

The poor guys in the second heat; the lift had gone by them, but Stuart Grant still managed to blow the opposition away with over 15 minutes. The winners of the sweepstakes pairs were Gatland and Reddish.

Slope

We fly our slope races 10 laps over 1 100 metre course, 2 up at a time, 4 rounds, with the best 3 counting. Rob drew the short straw to run this event. The weather man, the day before, said, "Light winds," and once again he was wrong; this time we wanted wind and did we get it! Up to Hoon Hay Park overlooking Lyttleton Harbour, one of New Zealand's most photogenic race courses, 1500' up a slope of about 80 degrees.

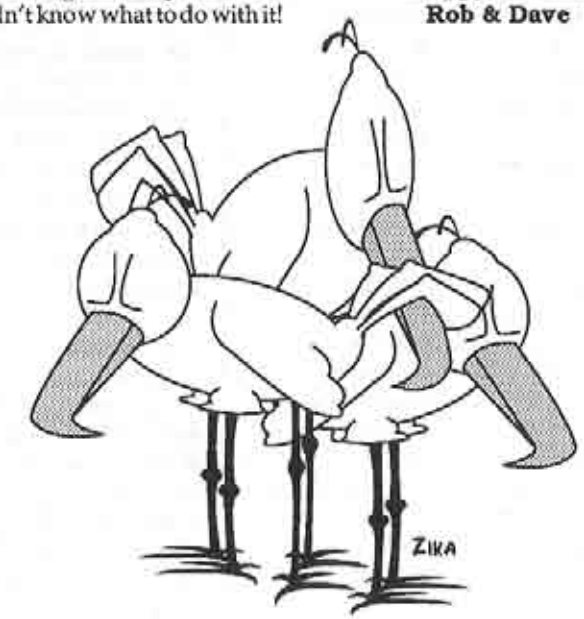
40 very exciting and very close races later we had the results: Matthew Dimock, flying an Australian made Southern Sailplanes BULLET (HQ 1.5/9%???). It was fast any way you looked at it. People new to this form of flying came away looking like they had won Lotto and didn't know what to do with it!

It was a sad moment when Dave Griffin's F3B came to grief in the first race. Dave managed to fight back to second place though, flying his WACO 10-550 with the prop taped up. The model had only been finished a few weeks and wasn't finely tuned so, at speed in strong lift, Dave had his hands full with a very exciting and quick model. Humorous note: mounteering needed to get at Kevin McFall's wreck. Lots and lots of ropes! Interesting note: Kevern Oliver's Sig Samurai pivot wing - Wow, it goes!

Tailpiece

The standard of building and flying in New Zealand has really lifted over the last few years and all concerned are enjoying a much higher level of competition. Most fliers went away from the nationals with greatly renewed enthusiasm. Plans are well in hand for many new models to fly faster, higher, and longer. The goal for many of us is next year's F3B world champs in Australia and the 1995 F3B world champs.

Happy Thermals,
Rob & Dave ■



Tip Stall Control Using Gurney Flaps

...by Phil Pearson
Issaquah, Washington

Phenomenal success controlling tip stalls may be achieved with the use of a 1% Gurney flap. "Airfoils at Low Speeds"[1] (SOARTECH 8) states, "A Gurney flap is a simple, thin tab on the order of 1%, cord, which is perpendicular to the lower side of the airfoil at the trailing edge." The Gurney flap provides a remarkable increase in lift with a low drag penalty at high lift coefficients.

The reason for this experiment is to determine if higher camber at the wing tip will produce lift beyond the stall of the inboard lower camber section. A detailed explanation is contained in "Model Aircraft Aerodynamics"[2]. (Thank-you, Martin.)

The tip should contain washout equal to the difference in zero lift angles between the inboard lower camber section and the outboard higher camber section. This allows the wing to operate at a uniform coefficient of lift across the span yielding more efficiency than the non-uniform lift distribution on a wing using washout or decreased camber at the tip for tip stall control. In reality, the tip washout for zero-lift-angle alignment is not too critical with the Gurney flapped SD7037 used on the Dodgson Pivot or my class A handlaunch design, Sunspot.

The addition of a Gurney flap to the wing tip is a quick method to illustrate the possibilities of the method. I reasoned this device increased the airfoil's lift coefficient similar to a higher camber airfoil and could be easily taped onto the plane. I made the flaps of 10 mil mylar by scoring with an X-Acto knife and then bending the mylar to 90 degrees. The flaps were 6" long with a 1% local chord depth and Scotch-taped to the underside of the wing tips at the trailing edge. The test plane is my polyhedral handlaunch, Sunspot with a SD7037 section. The increase in handling is very startling... No tip stalling in slow, tight thermal turns, and very little increase in drag! I suggest the use of thin Scotch double sided tape to hold them on, and Scotch tape over the flat part of the flap. The flaps were tested on the Pivot at higher speeds and the drag increased adverse yaw, but the lift helped the turns. I cut the length down to 3"; the adverse yaw became negligible and the lift contribution remained very favorable. I think this is a good demonstration of the increased-camber-at-the-tip stall control concept.

As a reminder to modelers that may try this experiment, non-alignment of zero lift angles may result in increased tip stall, so it is important to be sure the wing has some washout (Most will have several degrees built in.), and start with a modest length and depth of flap. Yaw forces increase with speed (low lift coefficients), and the length of the flaps may need to be adjusted in order to trim the model.

The results of my tests have been quite startling and have improved the tip stall of many types of models including scale, handlaunch, and slope soarers. These results are indicating higher camber airfoils at the wing tips produce favorable performance advances.

✈ ✈ ✈

I have since built several handlaunch wings with a SD7037 inner panel and a transition to a SD7032 in the tip panel, as well as a Dodgson Pivot wing with the transition running from root to tip. These wings handle very well in turns and have a very wide speed range. I'm satisfied the concept works very well and I will use it in an open class wing.

[1] *M. Selig, J.F. Donovan, D.B. Fraser, "Airfoils at Low Speeds", H.A. Stokley, 1989, page 74 (S2091)*

[2] *Martin Simons, Argus Books Ltd., 1989, p. 86, 87, chapter 7.6, Stall Control by Camber Changes* ■

1993 International Modelers Show

...by Jerilyn Schmidt
Greco Technologies
South Pasadena, California

The 16th annual International Modelers Show (IMS) was held this year the weekend of January 8-10. The photos show a few of the interesting things there were to see.

Futaba Corporation

Don Rice is holding Futaba's newest radio the 9-ZAP. From initial looks this radio seems to be the wave of the future. Comments from Don Edburg, the Soaring Editor for *Radio Control Magazine* and the person who is writing the manual for the radio, are extremely positive. Don says, "...It will do anything you could possibly want, and then some!" This new radio comes with programs for sailplanes, power planes and helicopters; plus it will have a module that will let you synthesize any channel. Futaba Corporation, 4 Studebaker, Irvine, CA 92781; (714) 455-9888.

Greco Technologies

At IMS Greco introduced the Javelin Hand-launch and the Hurricane 60-inch Slope Racer. The Javelin is a competition hand-launch glider designed for the serious pilot. It has a pod and boom fiberglass fuselage with white foam and Obechi sheeting. The Javelin's specifications are: wingspan: 59 in; wing area: 380 in^2; weight: 14 oz; airfoil: SD7037. The Hurricane is designed for the 60-inch class slope races that are becoming so popular. This plane uses the SD8000 for its speed and maneuverability. The plane has a built-up balsa fuse and white foam and Obechi wings. The Hurrican's specifications are: wingspan: 60 in; wing area: 345 in^2; weight: 16 oz. Both of these planes have precision hot wire cut white foam cores for accuracy; and pre-cut machined balsa part and Obechi sheeting for fast and easy building. Also being displayed at the Greco booth was the Greco F3B Winch. It is an impressive machine. Three of them were used at the Team Selection Finals last August. Randy Spencer will be taking one with him this year to the World's in Israel. Greco says they have more new products set for release, call or write them for their new catalog. Greco Technologies, P.O. Box 10, South Pasadena, CA 91031; (213) 680-2070.

Composite Structures Technology

CST has recently moved and they have a new address. Send them a SASE and get a copy of their "1993 Product Hot Sheet" which lists their new products. CST, 2090 Andre Avenue, Los Osos, CA 93402; (805) 528-4875.

Dynaflite

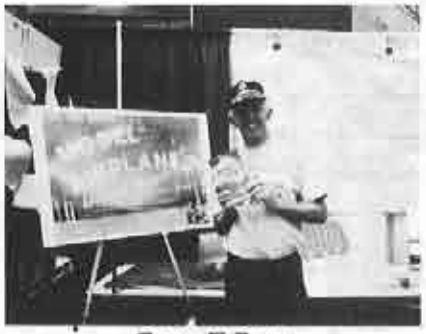
Katie Martin holds the "Quick Kit" version of the popular Freedom. Although, it is not quite an ARF it is still considerably less work than a standard kit. The major components need to be glued together, radio installed and plane covered. Katie Martin is in the booth because Bob and Katie Martin have merged their company, Bob Martin R/C Models, with Dynaflite. Dynaflite, P.O. Box 1011, San Marcos, CA 92709; (619) 744-9605.

Future Flite

The Thermal Thing, new from Future Flight, is available for only $16 plus $4 shipping. This balsa built-up two-meter glider is designed for a fast build. Future Flite feels this two-meter is great value for the money. The Thermal Thing's specifications are: wingspan: 71 or 77 in; wing area: 430 in2; weight: 16-18 oz. Future Flite, 1256 Prescott Ave., Sunnyvale, Ca 94089; (408) 735-8260.

Hobby Shack

Richard Pike from Hobby Shack holds the Super Ridge Runt. This is a larger version of the popular Ridge Runt. It features foam core wings with an E374. It has a wingspan of 52.5 in. and wing area of 320 in2. Hobby Shack, 18480 Bandilier Circle, Fountain Valley, CA 92728; (714) 962-6452.



Pony X Press

Dave Thornburg was showing off his latest release: "Do You Speak Model Airplane?" He is the author of "Old Buzzard's Soaring Book", a must read for anyone who wants to fly in thermals. Pony X Press, 5 Monticello Dr., Albuquerque, NM 87123; (505) 299-8749.

M M Glider Tech

Margret Newhouse is holding the Merlin 60-inch hand-launch and slope glider. M M Glider Tech, P.O. Box 39098, Downey, CA 90239; (310) 923-2414.

Sig Manufacturing

Mike Prat from Sig Manufacturing is holding the Sig Samurai. Sig Manufacturing, 401-7 South Front Street, Montezuma, IA 50171; (515) 623-5154.

Peck Polymers

Sandy Peck of Peck Polymers holds the Genesis. Peck Polymers, Box 710399, Santee, Ca 92072; (619) 448-1818.

Superior Aircraft Materials

Mike Taibi is holding one of their custom cut foam cores. Superior, in addition to their balsa line, is now offering custom cut cores and composite materials. Superior Aircraft Materials, 12020-G Centralia, Hawaiian Gardens, CA 90716; (310) 865-3220.

TEKOA: The Center of Design

Roger Chastain is holding presheeted wing panels for the Shadow 2M. Both new from Tekoa is the Shadow 2M and the method in which the original Shadow and the 2M are sheeted. Also new from Tekoa are the replacement 1/2 inch wing rods for the Shadow. They allow you to read the stress level on the wings during tow. Tekoa, 3219 Canyon Lake Dr., Hollywood, CA 90068; (213) 469-5584.

United States F3B Soaring Team

The F3B Team was at IMS introducing people to the sport of F3B. This picture shows, from left to right, Larry Jolly (Team Member), Joe Wurts (Returning World Champion) and Steve Addis (Assistant Team Manager). They were also selling various products to help raise funds for their trip to Israel for the World Championships. ■

Jer's Workbench

Aero-Towing

(Due to several questions I have been asked regarding aero-towing, this is a complete reprint from an earlier article that appeared in the February, 1991 issue of RCSD.)

Scale gliders take weeks putting together the documentation and drawing the plans. Locating all of the building materials and miscellaneous hardware items is not always easy. The covering detail must be done as authentically as possible with appropriate lettering, miscellaneous markings, hand holds and inspections plates. The cockpit is filled with a life-like pilot complete with sun glasses and a 5 point safety seat belt. The instrument panel has been painstakingly constructed. There is even a working, retractable mono wheel with doors that close. It has been balanced, trimmed and test flown. The model is complete. If you've built a scale glider and are looking for something more, have you considered aero-towing?

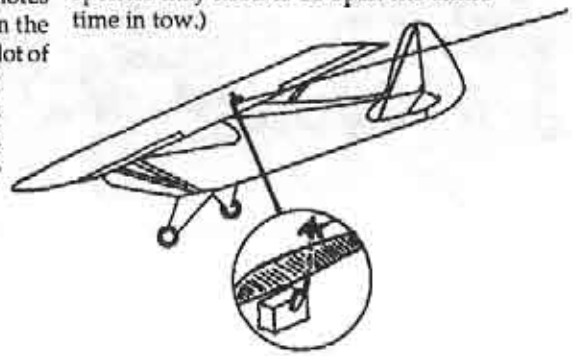
It isn't often that one has an opportunity to be a spectator when aero-towing is being done. So, when I happened across Don Meeks and Rick Meyers at the Los Banos Reservoir in Northern California, I not only stopped to watch, but found myself returning to take notes and query and observe the pilots on the process that they used. I've done a lot of reading on the subject and found that both applied all the techniques I had read about. It was obvious that they had been flying together for some time, because they made it look so easy!

What is aero-towing?

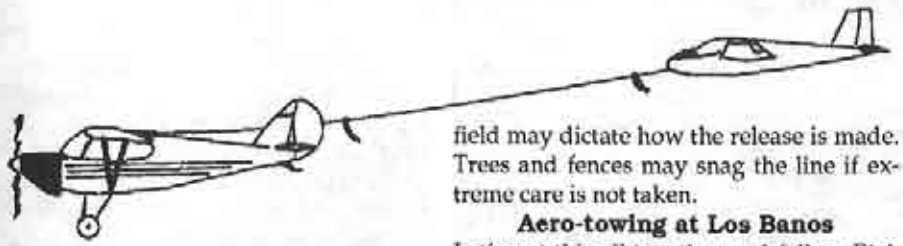
Aerotowing, when done correctly, is a beautiful sight to watch. Of course, it requires two planes and two pilots to perform the tow. One plane is called a tow plane or tug plane. A 1/4 scale PA-18 or a Super Cub are two examples that come to mind. Whatever you choose, don't use a pattern type that can climb to the moon at 100 mph because it can rip the wings off of your glider!

A high winged monoplane with plenty of power and that flies somewhat slow is a good choice for the tug. Keep in mind that 100% power is not required to maintain flight. 50-75% power should be sufficient to take off with a glider in tow.

The glider can be of the polywing thermal type or even be scale. It should have spoilers, however. Why? On tow the glider is going to roll only a few feet before it lifts off the ground and starts to climb. The ideal position of the glider is just a little above and behind the tug plane. If the glider climbs too high, the tug plane will become uncontrollable. Keeping in mind that the use of down elevator or down elevator trim in order to control the climb, will increase the airspeed and probably cause the glider to overtake the tug. If this occurs, the line goes slack and trouble occurs. To overcome this situation and control the climb, OPEN the spoilers about 25%-50% to start and keep the towline tight. (The spoilers may need to be open the entire time in tow.)



To keep the tow line from tangling around the stabilizer and rudder, use wire fenders running from tip of stabilizer to top of rudder.



A positive towline release device is required on both the tug and the glider. This device represents insurance should there ever come a time when the two planes need to get away from each other should trouble ever occur. The attachment should be mounted about 60% from the leading edge top center of the wing.

The tow line should be a braided fishing line in the 50-60 lb. test range. It is important that the towline will not stretch because this can cause the glider to bounce and the tug to be uncontrollable. The larger the glider to be towed, the longer the towline should be. A large 1/4 scale glider with a wingspan of around 150" should use a towline of 100' in length, while smaller gliders in the 80-100" wingspan can use a towline of about 75'.

In order to be able to find the towline on the field once it is released, a 12 - 18" long bit of brightly colored ribbon should be attached to the line.

To maintain a tight towline in a turn, the glider follows the tug a little higher and outside or turns wider than the tug. In order to do this, the glider pilot and the tug pilot maintain a position where they can talk to each other while on tow. The tug pilot announces that he will start the turn and the glider pilot, with a little control, will drift to the left. This should put the glider in position to be high and outside, while following the tug into a right turn.

Once altitude is reached, the glider pilot will release the towline and call "CLEAR!" The tug turns and dives to the right while the glider turns to the left and begins a systematic pattern looking for thermals.

Prior to landing, the tug plane may want to do a fly-by and release the towline before landing. The condition of the flying field may dictate how the release is made. Trees and fences may snag the line if extreme care is not taken.

Aero-towing at Los Banos

Let's put this all together and follow Rick Meyers of Hollister, California flying the 1/4 scale Schweitzer 1-26 and tug pilot Don Meeks of Salinas, California flying a 1/4 scale Citabria powered by a big Zenoah engine.

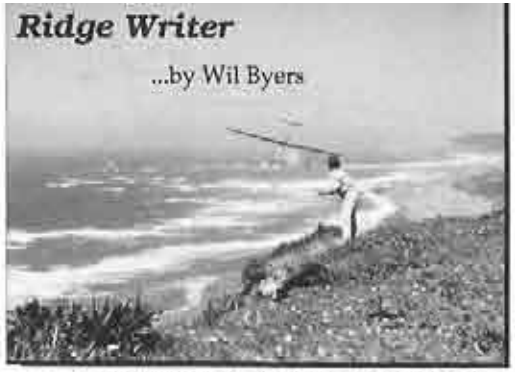
I watched as Rick carried his glider out to the runway and attached the towline to the glider. He checked the line to ensure that the release was working properly, and he seemed satisfied with the attachment. Then, Don started the motor on the tug plane and taxied the tug into position. He attached the other end of the line to his plane. He checked the towline release to make sure that everything was working properly. The two pilots took their positions for take-off, and were close enough that they could speak to each other.

Don throttled up a bit, took the slack out of the line and stopped. Rick opened the spoilers on his glider about 25-50%. I took a deep breath as Rick told Don that he was ready to take-off. Don throttled up and, within a few feet of rollout, the glider lifted gently off the ground. While the tug plane did its job of towing in a straight line and gradually climbing for altitude the glider pilot worked the spoilers in order to control the climb. Don called for a 90° turn to the right, and Rick did a controlled drift to the left which put the glider in position to follow the tug through a right turn which was just a little higher and outside the turn of the tug. The towline was tight. After three or four turns, they were at approximately 500 feet. It was time to separate. Rick called "CLEAR" and simultaneously closed the spoilers. The towline was released and the glider turned to the left. The tug dove to the right and did a fly-by dropping the towline before landing.

They made it look so easy! ■

Ridge Writer

...by Wil Byers



RT. 4 Box 9544, W. Richland, Washington 99352; (509) 627-5224 (7:00 PM - 10:00 PM weekdays, after 9:00 AM weekends)

Pressing

The pressing process this article refers to is that of bonding balsa, plywood, or obechi onto a foam core. It is a process not many modelers are currently using, but is one that can produce very accurate wings. Pressing, if done properly can additionally bond wing skins to foam extremely tight without separation at a later date. This process can and does result in light wings because of maximum utilization of the least amount of adhesive. In summary, pressing is a technique that, if you aren't using, you may want to start to use for your next glider/sailplane.

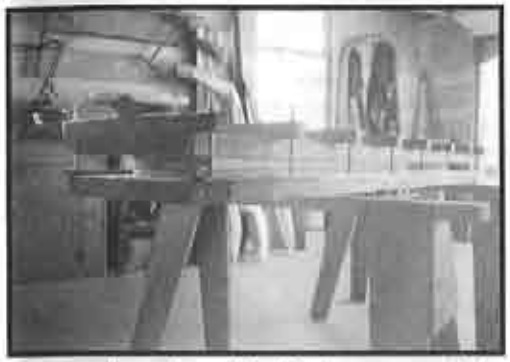
Skinning wings is a process many of us soaring enthusiasts have had trials and tribulations with. It is a process that either makes or **"BREAKS"** your model literally. If it is done poorly, it will result in wings that are weak, are not straight, and/or are not accurate. Improper skinning a set of foam cores can also result in wings that are heavy because extra adhesive was used to bond the skins to the foam core. How many times have your models had the skins de laminate or have you seen a model explode on launch because the wing skins failed? Well, usually it wasn't the wing skin; it was the bonding agent that was used to adhere the skin to the foam.

Skinning wings, however, is a process that certainly isn't difficult and is actually quite enjoyable once you have discovered some basic techniques for bonding them to foam. Wing skinning is quite simple, in fact, if a press is employed. Yes, I know, skins can be applied with contact cement to a board and some type of weight can be used to function as a press, but this is just not sufficient to do the job of building a strong, accurate set of wings. Also, there is the vacuum bag method. The vacuum bag method is such that the wing skins are layed-up and then applied to the core blank. They are then put back in their foam core beds and stuffed into a vacuum bag to be held together until the adhesive cures. It works and actually works pretty well; however, a wing press is not limited by vacuum. Nor is it restricted by the amount of weight that can be piled on top of the cores before the whole mess tips over. The wing press' only limitation is its length.

The first wing press I ever saw was in a copy of *Flug-und Modelltechnik (FMT)* a number of years ago. The article I am referring to showed Hans Muller's shop with a rather large press squeezing the life out of a number of sets of wings. This article inspired me, but I nonetheless continued with my more than inadequate practice of weighting wings because I simply did not know how to build a straight wing press. I would open a Multiplex kit box and marvel at how straight and true the obechi skinned wings were knowing that they must have a machined surface to press their beautiful production wings on. Well, the years slipped by and finally my good friend Mike Mellor came to my rescue when he built me a **super** wing skinning press (see picture). This press has been an invaluable addition to my shop.

Now let me tell you how you can build a press and then how to use it.

The press I have is built from a solid wood core door that is skinned with Formica. It is an old hospital door and is



Two shots of the wing press built for me by Mike Mellor. Note the strong backs and compression bolts. Press is 84" long.

quite substantial. It is also very straight. I think you would find buying a door such as this quite expensive. Nonetheless, you can have a very nice press by inquiring at your local lumber store for a glue lamination beam. "Glue Lams" as they typically called are made from a number of wood laminations bonded together with pressure, glue, and sometimes sonic waves. These beams are usually quite straight and strong. They also may be quite a bit less expensive than a Formica covered solid wood core door.

Once you have found the "Glue Lam" of your dreams you can begin to build your wing press. You will, however, need to have a top half for the press, and a 3/4" piece of plywood will work just fine for this purpose. Next, make some strong backs that will bridge the top half of the press (study the picture for an idea). Strong backs are simply pieces of wood or metal that will transfer the clamping pressure to the press pieces. You can either use strong backs for the top and the bottom of the press or do as Mike did, on my press, and attach a piece of angle iron to the sides of the press.

After the strong backs and angle iron are attached to the press halves you will need to add the connecting bolts. The connecting bolts provide the clamping pressure for the press. What works great for this application is a product called "All Thread". "All Thread" is available at most large hardware stores and usually comes in 36 inch lengths. It can then be cut with a hack saw or appropriate cutting devise to the proper length.

The connecting bolts (as shown in the pictures) extend through the strong back and through the angle iron. Washers and nuts are then attached and the press is nearly ready for use.

The last thing you will want to do to your press before you use is to wax it. **That's right. Wax it!** I waxed mine with a good grade mold release wax. The wax then provides a surface that is free from adhesion by stray epoxy that may be squeezed out of the wing when it is being pressed. Any epoxy that does find its way to the press can then be easily removed from the press surfaces after it cures.

When you have completed the construction of your wing press you will want to smash some wings, right? **RIGHT!!** A word of caution here is appropriate. **BE CAREFUL. THIS PRESS CAN EASILY CRUSH YOUR CORES.** You will want to build some spacers that allow you to compress your wing core only about 1/4 inch once the press is tightened on the core. Be sure you only tighten the press with you fingers before you begin the clamping pressure phase. This alleviates most of the opportunity to warp the cores or pull the skins. Then, only clamp the press down

until it touches the spacer. If you follow this procedure your wings will not be crushed, but the pressure will be sufficient to bond the wings skins on very, very well.

As for a way to apply adhesive to the sheeting in question, I suggest the following procedure. Begin by cutting the appropriate sheeting to the proper shape. Next, clean your cores by very lightly sanding and vacuuming them. In order to prevent the adhesive from being pressed through the sheeting, by the pressure of the press, the adhesive must be thickened. For an adhesive, I have been using HEXCEL® Epolite #2426 epoxy resin and #2176 epoxy hardener. I think this is a great product and is extremely compatible with foam. It is available from Aircraft Spruce and Specialty Company. To thicken the epoxy I use a Thixotropic Silica, which is available from Fibre Glast Development Corp. By the way, Thixotropic Silica is the same as Cab-O-Sil made by the Cabot Corporation. It is simply a thickening agent. So, add it to your epoxy until the resin is the thickness approximately of ketchup.

The next step requires that you spread the epoxy on the sheeting material. You can spread it on the wing skins using a squeegee or adhesive spreader that has grooves cut into the edge. The grooves are about 1/16" wide and 1/16" deep. The thickened epoxy is then spread on the wing skins in such a fashion that almost all of the epoxy is scraped off with only the grooves of the spreader leaving a small ridge of epoxy behind.

After the epoxy is spread on the skins, they are positioned on the core blank and placed back in the foam core beds. The core, beds, and wing skins as a sandwich are then placed into the press. You may want to place a layer of waxed paper between the core beds and the sheeting material to alleviate any bonding between the beds and the sheeting. Once the cores are placed in the press, it is tightened as

Ninja waiting to be launched at a private site in the Columbia River Gorge. Mount Hood makes the backdrop.

Gene Cope poses with his new, scratch built T-53B atop Eagle Butte. Note the super nice cumulus development in the background!

Gene Cope's TG-8 on a winch launch. Model is 1/4 scale replica of WWII trainer, and is built from highly modified Bud Nosen plans.

Eric Molstead's flying site in the dead of winter near Bend, Oregon. The snow is wedged around the wing to keep the model from getting blown over the edge.

Phil Pearson does a low, slow, fly by with super little, original designed hand launch. Joe Conrad looks on.

outlined above. Pay close attention to detail here and make sure the core, the core beds and the sheeting are properly aligned. Also, observe that the leading edge and trailing edge are being pushed down into their respective positions.

If you have done you homework and followed this detail I think you will be quite successful. The result of the pressing process is an extremely good bond between the foam and wing skins. This is a bond that is also light in weight. What you won't get are skinned wings that have the epoxy pushing its way through them. Also, Obechi wood will not soak up epoxy resulting in a poor bond that will separate at some later date.

Give this process a try and let me know what you think. I know what I think and sometimes it is pretty warped!

Aircraft Spruce and Specialty Company, Box 424 Fullerton, CA 92632; 1-800-824-1930

Fibre Glast Development Corp., 1944 Neva Dr., Dayton, OH 45414; 1-800-821-3283 ■

Ed Mason gives a mighty heave to his son's, Drew Mason, P-39 air cobra.

R/C Soaring Resources

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

Seminars & Workshops

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

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

Reference Material

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

BBS

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

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

Contacts & Soaring Groups

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

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

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

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

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

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

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

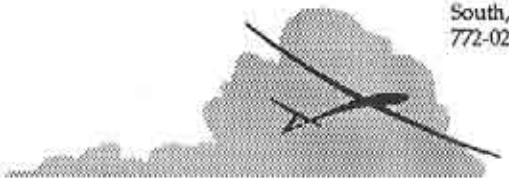
Nevada - Las Vegas Soaring Club, Steven Smith (President), 6978 Starwood Dr., Las Vegas, Nevada 89117 U.S.A., (702) 873-9591.

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

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

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

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



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RC Sailplane Technical Journal

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

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87 1/2 N. Catalina, Pasadena, CA 91106

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

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T.W.I.T.T.

(The Wing Is The Thing)

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

Send SASE for membership application and flyer: "What is T.W.I.T.T." or, send $2.00 for full information package including one back issue of our newsletter, postpaid. Full membership is $18.00 (US) or $22.00 (Foreign) per year and includes twelve issues of the newsletter. Back issues of newsletter are $.75 each, postpaid in USA.

The Vintage Sailplane Association

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

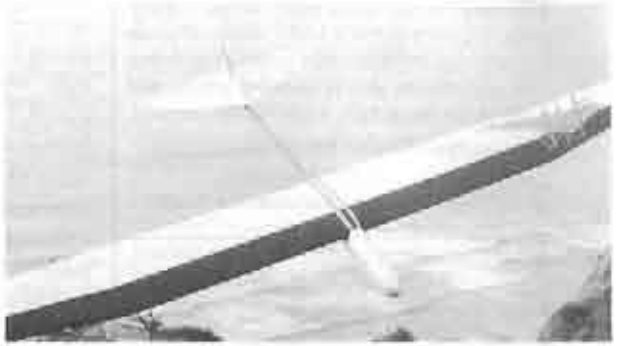
Vintage Sailplane Association
Route 1, Box 239
Lovettsville, VA 22080

NEW PRODUCTS

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

SORCERESS

...from MM Glider Tech



MM GLIDER TECH's release for this summer is The SORCERESS, an aileron version of the Merlin. This new ship has an all new aerodynamic pod design, made with black ABS high impact styrene plastic pod and a streamlined tail, which increases speed and maneuverability. It will fly just about anywhere anytime with minimal lift, and is ideal for someone who doesn't have much room in their vehicle, fitting behind or across the back seat of most cars and trucks.

The built-up wing and solid tail will make construction quick and simple; building time is about 12 - 15 hours. SORCERESS will be available in kit form, which includes machined cut parts, hardware package, written instructions, and a full-size blueprint. Radio gear used is a full size 4 channel receiver with two micro servos and a 250mah battery. Specifications are: 50" wingspan, 6" wing chord, 280 sq. in. wing area, S3016 airfoil, 27 1/2" fuselage, 12" pod, 12 - 20 oz. flying weight, and 6 oz./sq. ft. estimated wing loading.

The SORCERESS kit is available for $36.95 plus $5.00 S&H (plus 8.25% sales tax for Calif. residents). For more information, contact: MM GLIDER TECH, P.O. Box 39098, Downey, CA 90239; (310) 923-2414. ■

Real Ball Bearings

...from Douglass Boyd

When the field coils of the Ford long shaft starter motor are energized, the armature thrusts outward. It is limited by a cast boss in the front bushing housing. The armature rubs against this cast surface, generating heat, friction and drag. Most folks who put "bearings" in a winch motor install needle roller bearings, which run directly on the mild steel shaft instead of a hardened inner race. The casting does not have enough wall thickness to allow a larger needle roller and race, or a genuine ball bearing unit. The hard rollers eventually chew up the armature shaft and create gross amounts of runout. The biggest problem is that roller bearings do not address the thrust load problem.

"REAL BALLS" ball bearing endplates distribute the axial thrust into the bearing itself, dramatically reducing friction and heat. The rear bearing housing features deep fins for efficient heat dissipation, new brush holders and springs, as well as adjustable timing. This allows at-the-field adjustments for wind, drum size, model weight, and launch style. Grease fittings front and rear allow easy maintenance. "REAL BALLS" are CNC machined from solid 6061 aluminum bar.

If running smoother, quieter and faster appeal to you, contact: Douglass Boyd, 29918 SE Davis Rd., Estacada, OR 97023; (503) 692-0363. Special introductory price is $98.00 plus $5.00 shipping. ■

ARIA HL

...from Sailplane Works

The Sailplane works proudly introduces the ARIA HL. This handlaunch glider was designed for the intermediate to advanced builder/flier. It features an epoxy, glass, kevlar, and carbon fiber fuselage, molded finger rest / wing mount, obechi over foam surfaces with carbon fiber reinforcements, removable stab, built-up rudder, and machine cut parts. The plans are highly detailed along with a comprehensive, illustrated building manual. The builder may opt to have two wing kits sent with their ARIA HL, as the plans show the modifications for an optional flaperon slope version, as well. The flying weight is 13.5 to 15.5 oz. and, with attention to detail, has provided a performance envelope not usually found in a small glider.

The price is $99.95 with the optional presheeted surfaces an additional $49.95. For additional information, contact: The Sailplane Works, 3355 South Dunkirk Way, Aurora, CO 80013; (303) 699-0467. See ad for photo. ■

Ultra GP

...from Oakland Model Academy

George Hunter is a new name in the business of glider manufacturing. He arrived on the glider scene without fanfare introducing a pivoting wing model slope soarer named appropriately, **ULTRA GP**.

George's company is the OAKLAND MODEL ACADEMY. The new model George is featuring is for those not faint of heart. It is designed for those individuals wanting to push the outside of the envelope with an advanced aerobatic slope soarer. It is a high roll rate aircraft capable of extraordinary speed when pushed to perform. The ULTRA GP features a hollow core all molded wing set and the fuselage is constructed of epoxy glass with 5 oz. Kevlar reinforcing it. The tail feathers of the ULTRA GP are constructed of balsa sheet and arrive, with the 98% complete model, sanded and ready to fly.

One of the features that is extremely nice on the ULTRA GP is the wing drive mechanism. The drive mechanism is absent the normal drive pins. Instead it is driven by machined bell cranks that lock directly to the wing pivot tubes. Therefore, the drive pins cannot become worn and result in slop and reduced wing incidence return accuracy. The wing drive mechanism also facilitates large wing travel volumes. As a result, the model can produce superb roll rates for the pilot's total enjoyment.

One area that George didn't fail to recognize and address in the design of the ULTRA GP is ruggedness. The GP is as he says, "Engineered to survive the rigors of slope flying". The Kevlar in his fuselage lay-up adds to the toughness. While the wings are molded in such a manner that the leading edges are quite durable.

The specifications for the model are as follows:

Wing Span	55 3/8 inches
Length O.A.	33 inches
Wing Area	311 sq. inches
Weight RTF	24 to 27 ounces
Wing Loading	11.1 to 12.5 oz./ft^2
Airfoils	Mod. SD8000/SD7003

The ULTRA GP is priced at $300. The model arrives at your door step waiting only to have the radio installed and requiring a balance before its first flight. The wings are colored for better visibility and so that you don't have to paint them. Also, the color added to the epoxy saves on the weight associated with painting a model.

The GP is a very good little flyer. It carves graceful turns and tracks smoothly. As with any of the smaller models it does get buffeted some in turbulence, however this ship can accelerate when the need for speed arises and that can save you when the wind is brisk or heavy.

In conclusion, if you are looking for a very nice wing pivot slope soarer that requires little time to assemble and is a great flyer, contact: Oakland Model Academy, 650 E. 17 St. #14, Oakland, CA 94606; (510) 839-0436. ■

"Lil" Bird

...from Sky-Bench Aerotech

...Ray Hayes

The R/C sailplane world, for the most part, is a world of look alikes. In many cases, one design is created from another design with slight appearance changes. This is all right because it can promote improvement in flight performance and construction. Also, it satisfies a need in the human spirit for change, something different. I have competed in R/C sailplane contests in most parts of the USA since 1973 and have witnessed the progression of new designs. None have been as unique in shape as Dave Thornburg's open class Bird of Time first kitted by Dave and then by Mark's Models. Aside from its great aesthetics, in most people's view, it has been an excellent performer.

R/C hand launch gliders are becoming more popular and this may in part be due to the inlanders like myself finding suitable slopes for good slope flying. This being the case, anyone flying a "Lil" Bird will not have an identity problem when flying in a group. Our "Lil" Bird, in the hands of Richard Burnoski, finished in 4th place at the 1993 LSF National hand launch golf contest.

The construction of "Lil" Bird is also unique, featuring a one piece bolt-on wing with 1/32 contest grade balsa sheeting top and bottom, built-up construction for lightness, and a spruce leading edge for durability. Solid laminated balsa stabilizer plus a fuselage designed to hold a large battery pack and full-sized receiver.

The kit contains construction plans, building instructions, machine cut parts including pre-cut wing sheeting, spruce and balsa wood spars, pre-cut plywood and balsa shear webs, wing attachment bolts and blind nuts, stab control cable and brass coupling, aluminum stab joiner tubes and steel wires and 1/64 plywood wood fuse doublers. Because I slope fly my "Lil" Bird in a gravel pit, the kit is engineered to be extremely strong and durable yet have a flying weight of just 12 oz.

In general terms, an R/C sailplane's flight performance is predictable based on airfoil and wing loading. "Lil" Bird's airfoil is 9% thick. This means it will float, penetrate and launch extremely well. A sky high "Lil" Bird is a very enjoyable sight. If you have an open weekend free from interruptions, you can start

Specifications
R/C Hand Launch Sailplane Kit

Flying Mode	Slope, Mini Hi-Start Hand Launch
Wing Span	54.25"
Area	270 sq. in.
Length	29"
Flying Weight	12 oz.
Price	$29.95 + $6.00 shipping

construction on a Friday evening and fly the "Lil" Bird Sunday afternoon, providing your battery is charged.

Optional Items

A. The color trimming can be accomplished with light weight tissue and the trim design is indicated on the plans. Order option A and receive tissue to create the top flying surface trim and cover the bottom of the flying surface, plus application instructions. Choice of colors are: red, orange, blue, yellow or black. Shipped with kits, only, for $4.95.

B. ARF. Pre-built in a jig for accuracy is $78.00; Continental USA shipping is $15.00.

Sky-Bench Aerotech, 69598 Brookhill Dr., Romeo, MI 48065. ■

JR 3321 Servo

...from Horizon Hobby Distributors

The unique, bi-directional mounting ears of JR's 3321 servo make it ideal for glider use, and its super strong geartrain prevents servo damage from hard, trailing-edge-down landings. The 3321 is a true performer for both peaceful gliders and screaming jets. JR radio control products can be obtained from hobby distributors nation-wide. ■

ASW-19 2m Kit

...from ICARE Sailplanes

ICARE Sailplanes, specializing in scale sailplanes, is now offering an ASW-19 kit, which is one of the most reproduced scale sailplanes. Designed in the mid-seventies and produced by the A. Schleicher Flugzeugbau, this T-tail evolved from the ASW-15b and the ASW-17, and is a standard FAI class sailplane with a 15m span. It is a great performer.

The 2m model is a semi-scale reproduction of the original. The fuselage is 100% to scale. It is more suited to slope flying, but will do well on a good thermal day flat land flying. Due to its high aspect ratio, it covers a lot of ground; it is fully aerobatic and has a lot of energy retention.

The kit comes with an epoxy fiberglass fuselage (regular or white), foam pre-sheeted with obechi wings, pre-routed ailerons, pre-installed aileron push cable tubes, clear plastic canopy, fiberglass molded canopy tray, built-up tail surfaces, all wood, hardware, CAD building plan and instructions. You have to install the leading edge and the wing joiner.

Specifications: 82" wing span, 480 sq. in. wing area, 42 oz. weight, 12 oz./sq. ft. wing loading, E203 mod. airfoil. The regular kit is $130.00 or with a white fuselage is $145.00 plus S&H. For more information, send $1.00 to: ICARE Sailplanes, Etienne Dorig, 381 Joseph-Huet, Boucherville, Qc J4B 2C5, Canada; (514) 449-9094, 5:00 - 10:00 PM EST. ■

Computer Controlled Battery Analyzer

...from Vencon Technologies

Vencon Technologies, a manufacturer of industrial battery analyzers, has released the Ultimate Battery Analyzer (UBA). This computer controlled battery analyzer connects to the IBM PC or compatible's serial port and determines the capacity of your rechargeable battery packs and prints their discharge curves.

The UBA tests all flight and transmitter rechargeable batteries. It tests all NiCd battery packs from four to nine cells, with capacities from 10 to 10,000mAh. It will even test nickel-hydride and gel-cells. The UBA allows you to identify batteries that are deteriorating and about to fail. It also cycles your batteries eliminating any "memory" effects and restoring their capacity.

The UBA is available in two models, which both come with a one year full warranty, a 30 day money back guarantee and a manual that explains all the ins and outs of testing batteries. The dual channel model, which tests two battery packs simultaneously, lists for $219.95 and the single channel model lists for $149.95. For more information, contact Vencon Technologies at (416) 398-4534; 5 Graymar Ave., Downsview, Ontario M3H 3B5 Canada. ■

Technical Specifications
JR 3321 Servo

Torque (oz./in.)	59.8
Speed (sec/60°)	.36
Weight (oz.)	.95
Ball Bearing	Dual
Size (in.)	.58 x 1.30 x 1.30

5TH Annual Masters of Soaring

...by Dale E. Nutter
Tulsa, Oklahoma

The MASTERS OF SOARING invitational meet was held at the Toledo Weak Signals field jointly by the Detroit and Toledo clubs September 10-12. This was the first time this meet was held outside California. The meet was open to all LSF Level V members, Level III & IV members with Level V contest accomplishments or two-day Major contest winners. Thirty five competitors from more than ten states and the Contest Director of the recent F3B World Championships, Nave Zvikia of Israel, competed.

Friday was devoted to greetings by the local members and test flying with a winch provided by the hosts. Several contestants made impressive test flights although it was windy. Contest rules were well documented in contestant's packets given out Friday evening by Art Slagle, CD and his two assistant CD's, Jack Van Hee and Dave Leach. They organized the contest with a randomly selected frequency spaced matched Man-on-Man format which was pre-printed and included in the packet. You knew who your competitors were each day for all rounds before the meet. Since this was not your typical "LUCKY MAN" meet you knew you and your sailplane would have to MAX, or, out-fly some very capable national competitors in the same air!

Computer scoring and setup was done by Ray Di Noble with flight operations run by Wilbert Hutchings and Luis Sisneros. Round and cumulative scores were posted after each round.

Saturday's competition began with four to six contestants launching from six winches in rapid succession. Duration times were adjusted to weather conditions with three seven minute, three ten minute and one seven minute round. The meet was flown with golf cart retrievers. Winching and retrieving with some line breaks kept host members, Tom Como, Joe Cohen, Gary Rowand, Dave Howard and Jim Warner busy with able assistance by contestants Troy Lawicki, Mike Stump, Pat Sullivan, Gil Gauger and others. Two extra winches were available and contestants experiencing line breaks were relaunched quickly.

In an effort to return quickly after a line break with his 2 meter Duck, Troy split s'ed into the broken winch line at maximum speed a few feet off the ground and granulated one of the finest planes in the meet.

Skip Miller treated us to an in-depth account of the recent Israel F3B World Championships Saturday evening. His in-depth article will be published soon.

The Weak Signals field was well maintained and included a clubhouse with large work (picnic) tables inside, well water, electricity, hot coffee and a well stocked wood burning fireplace which came in very handy in between flights in the cold rain Sunday morning. Three five minute rounds (two mostly in cold rain) were flown and then the final round of seven minutes with no thermal lift. Many contestants including the top six who retained their respective positions sloped along a row of trees behind the clubhouse to MAX this final round.

Lunches were provided both days of the contest, with charcoal hamburgers made at the clubhouse and served with all the home fixings Sunday, followed by the awards presentations.

Airtronics Eagles and Troy's Ducks were well represented. Eight different sailplane designs were flown to the top ten places.

Landings were de-emphasized with a 12 point maximum score for landing within one inch of a 12 foot line. With many MAXES these points still carried some weight in the close packed scores. Eleven rounds were flown for a maximum possible score of 11132. The top ten contestants who scored 90% or more of the winner's score are shown in the chart. ■

Masters of Soaring

Name	State	Score	Normalized
Ben Clerx	California	11069	1000
Rich Burnoski	Michigan	10997	993
Fred Weaver	California	10928	987
Skip Miller	Colorado	10886	983
Dale Nutter	Oklahoma	10866	982
Mike Reagan	California	10795	975
Don Harris	Missouri	10464	945
Mike Stump	Michigan	10457	945
Pat Sullivan	Michigan	10388	938
Bob Massmann	Ohio	10079	911

Schedule of Special Events

Date	Event	Location	Contact
Nov. 7	610, 612 DEAF Dallas Electric Aircraft Flyers	Dallas, TX	Jack Hamilton (214) 348-4669
Nov. 13	TPG 60" CL Slope Race	Southern CA	Charlie Richardson (619) 630-8775
Nov. 14	Task T6 Triathalon	Dallas, TX	Chuck Fisher (214) 270-2634
Nov. 28	TULSOAR Fun Fly	Tulsa, OK	Doug Drullinger (918) 838-0282
Nov. 20	2M, Open	San Antonio, TX	Gene Warner (210) 732-3101
Nov. 20	New England R/C Soaring Convention	Portland, ME	Steve Savoie (207) 929-6639
Nov. 20 - 21	CSR State Champs Unlimited Slope Racing	Miguelito, CA	Scott Tooher (310) 323-4304
Nov. 21	5th Annual MASS Turkey Shoot	Memphis, TN	Mike Kelly (901) 756-9410
Nov. 26-28	Variety Buzzards	Orlando, FL	Cy Baylor (407) 699-8750
Nov. 26 - 28	Tangerine Soaring Championships	Orlando, FL (407) 277-3862 W	Ed White (407) 321-1863 H
Dec. 26	TULSOAR Fun Fly	Tulsa, OK	Corey Gilstrap (918) 455-5490
May 28-June 5	World Soaring Jamboree	Richland, WA	Wil Byers (509) 627-5224
June 24-26	Mid-South Soaring Championships	Memphis, TN	Bob Sowder (901) 757-5536
Oct. 1-2	CVRC Fall Soaring Festival	Visalia, CA	

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

Curt Nehring
Southern California

Colorado Short Winch Championships

A Contest Report

...by Frank Deis
Pikes Peak Soaring Society
2680 Fairway Dr.
Colorado Springs, CO 80909

PPSS members prefer thermal soaring events for their club contests. These can become dull, so occasionally it is necessary to add some spice to the events. Normally we hold the winch length constant and change the target flight time — not his time, however.

As usual, PPSS held its regular monthly thermal soaring contest - but that was about the only thing regular about it! It was a simple precision duration contest with a target time of 8 minutes and the FAI landing option (5 points lost per meter from the spot). The CD - who remains anonymous - decided to hold the target time constant and shorten the winch to match the conditions rather than the other way around! Six rounds were flown. The first round used a 200m winch, the second round dropped to 150m, the third dropped to 100m and the fourth dropped to - you guessed it - 50m!! The last two rounds were 75m and 125m respectively. (You should see an F3B ship zoom launch on a 50m winch!)

The contest was an experiment of sorts to collect data on contest performance using short winches and was pretty successful. There were ten contestants, all but two in the open class. There was a broad spectrum of sailplanes including 4 capable of zoom launches and several polyhedral designs that were not. The weather looked awful, but good lift was common most of the day.

The scores pretty much tell the tale. To everyone's surprise, near max flights were common down to winch lengths of 100m. However, it was common to hear pilots complain about how hard they had to work to get their maxs especially at 100m winch length. (The CD loves to hear that kind of complaint. It means the contestants are learning something.) At 50m winch length no one could max even though several pilots claimed to find lift. (Assuming a max release altitude of 50m and a 1.5 foot per second sink rate, the zero lift time should be about 1:40 seconds. Times greater than 1:40 for several pilots indicate they did, indeed, find lift but that they were not capable of turning it into a max. Most thought they should have maxed, but the lift was just too light at the low release altitudes.) At 75m Bob Avery hung on for a little over 4 minutes and then lost it. No one else found anything that round. (The wind had shifted and the weather deteriorated just prior to this round.) At 125m (where dead air times around 4 minutes would be expected), maxs once again appeared.

This all leads to a rough conclusion that at somewhere between 75 m and 100 m winch length, the resulting launch altitude is so low that maxs are very unlikely. This appears to be caused by a combination of two factors. The low launch altitude limits the search time and, hence, the search volume to the point that if you do not launch into a thermal you probably will not find one. The other factor is that thermals encountered at these low altitudes are so light, we are not capable of riding them very well. It is interesting to see that the break point is below 100 m. Prior to the contest, I would have guessed much higher.

There was a great deal of interest in how the F3B like designs would work off the short winches. One school of thought held that their zoom launch capability would give them a great advantage. Lenny Keer, Mike Fields, Bob Avery and John Kappus could all zoom launch with good results while the rest of us could not. It is not clear from the raw scores that there was much difference between the two types of sailplanes although the flying techniques were very different. (The sample size is pretty small.) The total scores showed two zoom launchers at the top and two at the bottom and the first four places alternated between the two types of sailplanes. I would like to think that Lenny and Mike did so well because of their zoom launches, but deep down inside I think it is because they always do well - it is hard to keep a good pilot down!!!

As a CD, you notice a big difference in safety as the winch lines get short. We did not fold any wings on the short launches, but it was clear that everyone's timing was way off and there was some severe wing bending going on. The big safety problems arose with the landings. Given the low altitude launches and the pressure to get a max, pilots naturally stayed in their search patterns much longer than normal. They ended up with insufficient time to set up their landing approaches and the number of low altitude fly overs and strange landing approaches increased noticeably.

Everyone seemed to have a good time and found the contest interesting and challenging. But! All agreed that it was not something they wanted to do again - for a long time. I do not recommend this for a serious contest because it increases the luck factor. However, if you have some hot shot club Pros and you like to watch them sweat, pick a nice day and fly 10 minute duration off a 75 meter winch. ■

Winch length	200	150	125	100	75	50	RAW TOT	NORM TOT	PLACE
OPEN CLASS	Perfect score =480sec + 100 landing pts. Any score ~ 500 indicates a Max								
LENNY KEER	560	430	296	550	247	212	2295	943	1
FRANK DEIS	512	574	276	571	215	287	2435	1000	2
MICHAEL FIELDS	449	512	563	337	194	195	2250	924	3
JACK DECH	196	539	352	309	63	124	1603	659	4
DAVE KURTH	335	580	498	183	177	166	1939	796	5
LEON KINCAID	546	293	172	156	346	264	1777	730	6
BOB AVERY	313	553	239	473	207	150	1935	795	7
JOHN KAPPUS	196	568	328	551	162	63	1888	787	8
SPORTSMAN CLASS									
STEVE TARZA	163	519	255	73	117	156	1283	527	1
COURTNEY BLACKWELL	152	269	196	178	54	94	943	387	2

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R/C Hand Launch **"BIRD OF TIME"** kits available $29.95 plus $6.00 shipping; also ARF $78.00 plus $15.00 shipping. Specifications: 54" span, bolt-on wing, 1/32 fully sheeted top and bottom. Holds full size RX and 270 MAH battery. Ray Hayes, (313) 752-0732.

For Sale - Personal

One set wing and fuselage bags, padded red fabric as used by most Dallas fliers. Wings are 10" x 60" with stab pockets, and fuse will fit most open ships... $50.00. Call Pancho at (214) 823-0208 days Texas.

Airtronics INFINITY 600A computer radio, 6 channel FM, channel 49. 4 (EA) 904102 servos, FM receiver, all nicad battery packs, charger. Complete, new in box, never been used... $299.00. Call Tom at (805) 461-6408 Calif.

Dale King's Special Edition 118" fiberglass fuselage, 3 piece composite wing (RTF) w/o servos... $450.00 or with servos... $600.00; all new Sparow Hawk in box, RG-15, 2 meter from NSP, fiberglass fuse, sheeted wings & stabs, V or T tail. For more information, call Ben at (214) 358-8800 or (817) 428-7617 Texas.

Robbe ASW 24, 3.5 meter w/Starmax 40 gear drive, 10 cell, flies great; Robbe AUTOMAX 6-21 cell peak charger; SWIFT 400; APOGEE, 100", E205, 6 cell gear drive w/spoilers; KLINGBERG WING 100, 100" flying wing deluxe kit, NIB; CHUPEROSA, poly, flies great; WORLD EXPERT 7 ch W/2 receivers; two Futaba 4 channel ATTACK GLIDER radios W/S133 servos; Airtronics Module 7 SP, used once; 2 - Airtronics 94141 servos; 2 - FAT, S133 servos; other extra servos & flight batteries; Magnum High Start for big birds; ACE Fast Field Charger; Other misc. goodies too numerous to mention. All planes & radio gear are ready to go flying! All for $800.00 FIRM. You pay UPS. Willie Bosco, 1588 Miller Creek Rd., Garberville, CA 95542; (707) 923-3897.

New Airtronics 53.1 mhz freq. module & Rx, fits Vision, Infinity & module radios... $100.00; IPD "EZ" retriever... $300.00 (save $75 off new price); show quality Sealy PULSAR, SD 3021 airfoil, new & RTF, never flown... $225.00; BOUNTY HUNTER kit... $100.00; Dodgson CAMANO, needs work... $60.00; PIXY cores... $20.00; Multiplex FLAMINGO CONTEST, needs work, good wings... $60.00; Mark's Models, SENSOAR 117, RTF, w/ailerons... $100.00; Modified GENTLE LADY... $20.00. George Voss, (405) 736-5978 days, (405) 692-1122 eve.; 1403 Lincolnshire Rd., OKC, OK 73159-7709.

Troy Lawicki 2 meter DUCK w/o servos, fuse needs repair, wings built by Jim Thomas... $275.00 - ship COD; Robbe FLAMINGO STANDARD, designed for speed, distance & thermaling tasks, fiberglass fuse, built-up wings with 6 servos... $485.00 - ship COD; German SPACER, all fiberglass, hollow core wings, canopy air brake, excellent condition, ready for the slopes or speed, w/servos... $350.00 - ship COD. Robert Maldonado (517) 851-7386, FAX (517) 851-7336 Michigan.

ANTERES, 100" with flaps & ailerons, completely built and monokoted, fuse is carbon fiber reinforced and fiberglassed, needs painting... $127.00; CAMANO, 100" span with flaps and ailerons, new in box... $130.00; WRISTROCRAT, hand launch with 2-S133 servos, 250 mahr battery and Futaba on/off switch... $100.00; SPORTAVIA with electric motor... $75.00. Call Bill Maserang at (817) 838-2069 home or (817) 336-7411 work, Texas.

Robbe ASH-25, obechi/foam wings, plura fuse., variable wing span, 118-141 w/plug-in tips, all hardware, NIB... $270.00. John Derstine, (607) 732-7218 days, (717) 596-2392 home, PA.

NIB kits: LOVESONG... $175.00; SABER... $207.00; PIVOT... $56.00; PIXY... $112.00; CAMANO... $119.00; ORBITER... $50.00; MARIAH... $112.00; LUMINA... $87.00; ACCIPITER... $112.00; LEGEND... $140.00; CHEETAH... $116.00; MISTRAL... $98.00; FALCON 600... $105.00; PRODIGY... $54.00; QUICK SILVER... $37.00; OSPREY... $50.00; GEMINI (MTS)... $81.00; NINJA... $34.00; PROPHET... $49.00; FLINGER... $19.00; DRAGON FLY... $39.00; GENESIS (Peck/Polymer)... $25.00. All prices incl. US shipping. Call Jack Lynch, (406) 752-4904 Montana.

Vacuum pump, 1/2 hp ball bearing, fan cooled, will put out 80 psi... $75.00; WACO 10-550 pre-bagged, scratch built kit... $225.00. Ed at (615) 239-3314 Tenn.

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1 Stiletto semi-kit, w/S3021 plug-in glass bagged wing. 1 Stiletto semi-kit w/S3021 bolt-on glass bagged wing. $250.00 each. Genesis, built w/wing servos, $650.00. Dale King (214) 475-8093 TX.

Wanted

Bird of Time glider, built, covered or uncovered, excellent/good shape. Call Manny, (714) 492-9553.

Does anyone know the source for the motor used on the sport winch originally manufactured by Fab Tech in Conn? Contact Ken Troxell at (301) 762-6913 or 12504 Circle Dr., Rockville, MD 20850.

FANTASQUE

SD-3016 ROOT SYMMETRICAL TIP

C.A.L. LOADING		SPAN	115
4 LBS.	8.20 OZ.SQ.FT.	LENGTH	67.2 INCHS
5 LBS.	10.25 OZ.SQ.FT.	HIGTH	15.2 IN.
6 LBS.	12.30 OZ.SQ.FT.	TOTAL AERA	9.91 SQ.FT.
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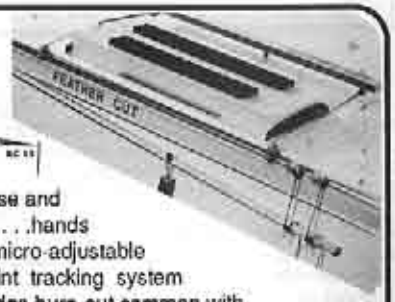
HOT WIRE FOAM WINGMACHINE™

FEATHER/CUT



"FEATHER CUT" creates a new standard in the ease and accuracy of cutting white or blue foam wing cores . . . .hands off! Precise single wire tracking in concert with micro-adjustable balance weights guided by an exclusive three-point tracking system guarantees ripple-free surfaces. No more trailing edge burn-out common with two wire systems. Couple "FEATHER CUT" with Tekoa's "THERMAL GENERATOR" for fool proof temperature control and you'll be a "Pro". . .first time out.

• Cuts straight or taper wings, fins and stabilizers — automatically. • Mounts with tape to the edge of any workbench, even your dining table and stores in its own heavy duty mailing tube. • Complete kit with anodized and plated components - no hardware store trips. • Instructions include "cutting your first wing", "making templates" and more. • 28" fold-bow. 40" and 52" available. Power supply required. • Guaranteed to out perform the rest. • "Simply" the best!

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POWER SUPPLY - $119.50 + 4.50 S&H

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WITH CompuFoil Professional
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-and much more!

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—Announcing the Hot & New

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FEATURING:

- Wing span - 76".
- Wing area - 585 in².
- Airfoil -SD7037.
- Flying wt - 37 oz.
- Sheeting - Obechi.
- Wg Loading - 9 oz/in²
- Groundbreaking ***MonoSeam*** rolled fiberglass fuselage.
- New, integrated-flapperon directional, camber and reflex landing control 4 servo glider!
- Only 2 wing servos needed! Separate flaps and ailerons are optional, for 6 servo system.

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introducing the:

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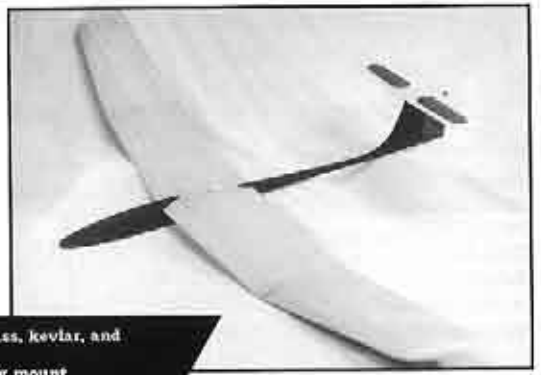
a premium handlaunch glider kit



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-removable stab
-built-up rudder
-comprehensive construction manual
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-machine cut parts
-highly prefabricated
-13.5 to 15.5oz flying weight

$99.95

-pre-sheeted wings and stab option: *$49.95*
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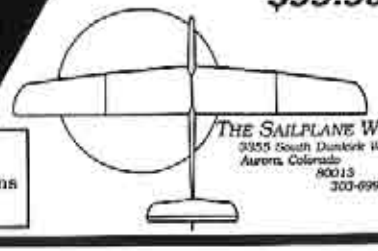

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