R/C Soaring DIGEST

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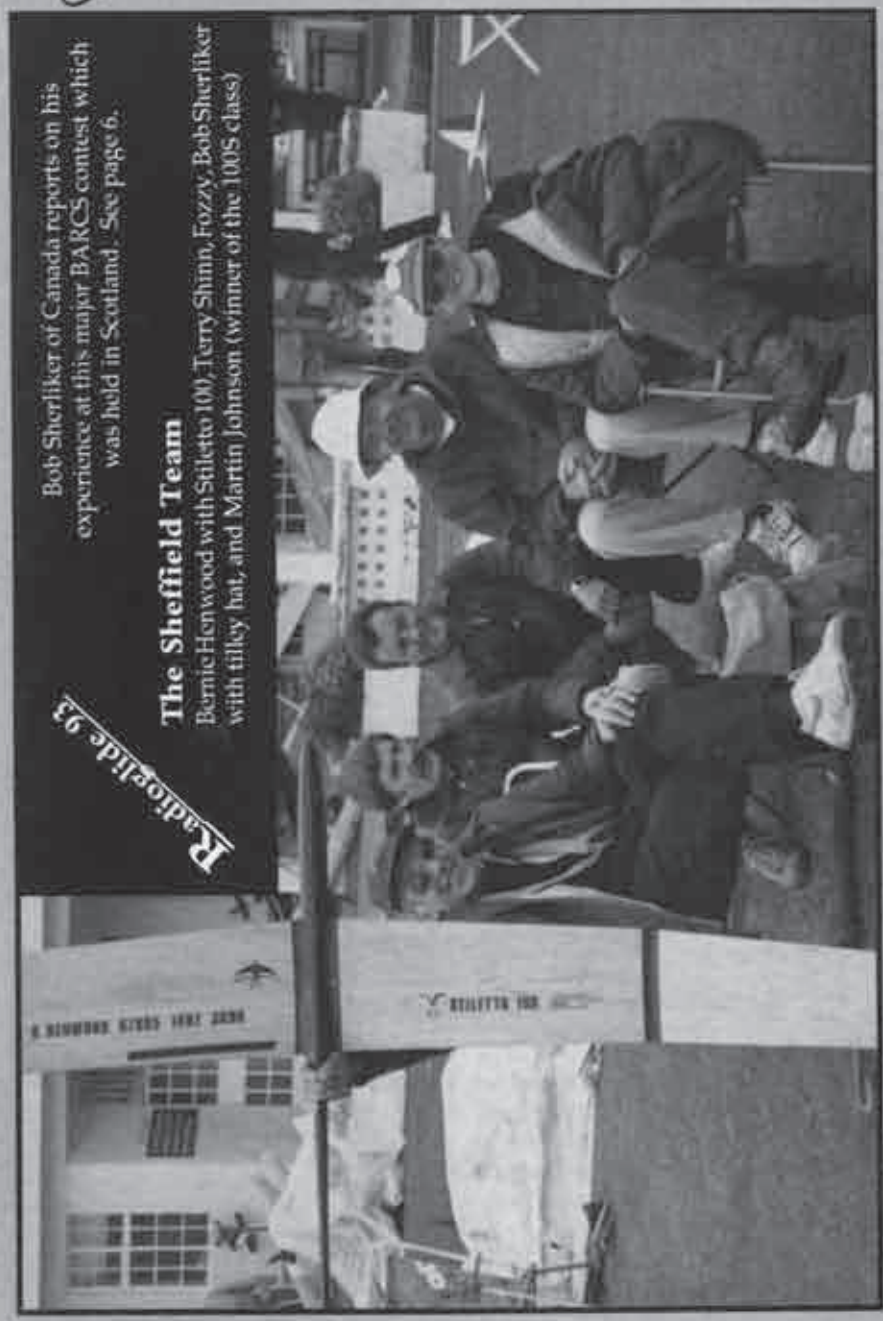


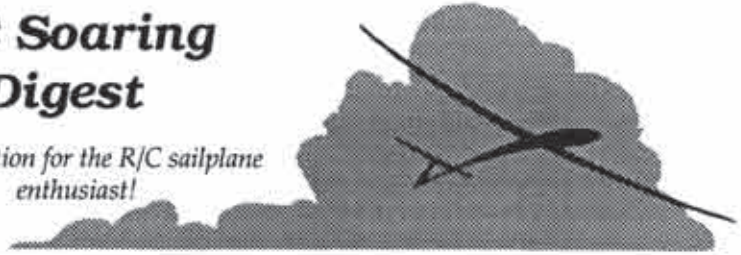
Radioplane 93

The Sheffield Team
Bernie Henwood with Stiletto 100, Terry Shinn, Fozzy, Bob Sherliker with tilley hat, and Martin Johnson (winner of the 100S class)

Bob Sherliker of Canada reports on his experience at this major BARCS contest which was held in Scotland. See page 6.

R/C Soaring Digest

A publication for the R/C sailplane enthusiast!



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

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The Soaring Site

Quiet Flight International (QFI)

Quiet Flight International is a new monthly publication with an international flavor. It is edited by Dave Jones, former editor of *Silent Flight*., contains 24 full-color pages and deals exclusively with pure sailplanes and electric models with foreys into areas such as rocket powered models, kites, full size sailplanes, etc.

So how can you get it? We'll let you know soon. Dave called to let us know about *QFI*, which is a brand new independent publication, and the first issue should be off the press in the near future. However, Dave has promised us 10 copies for the WSJ so those of you that attend can see what it is all about. We'll try to have ordering information, then, and will be including information in a future issue of *RCSD*. Thanks, Dave! We wish you luck!

From Hong Kong

A new subscriber from Hong Kong, Robert Yan, has written to say, "In Hong Kong I started R/C soaring since 1975 through the introduction from a visiting foreign friend. At that time not many kits were available and local fliers on R/C soaring were unheard of. There were occasionally one or two foreign visitors from Europe flying slope soaring over the hills near the coastal lines. Ever since 1975 when I gave up R/C helicopter (kits were very new to the market and difficult to fly then), I never stop flying and building slope planes and the present one I am building is my number 92. We do have many easy-to-get-to slope sites in Hong Kong for different directions of wind, and our average velocity is between 8 to 15 knots. We do have typhoons, and then we have to enjoy building at home rather than flying."

A Reader Request

Dale Willoughby says, "The thin air at

7500 feet was not very kind to (my) balsa fuselage. ...Does anyone have a fiberglass fuselage that will match my full size Bird of Time wing and stabs and yet capable of an electric conversion using a Graupner 600 BB?" *If any one can help, please let us know.*

SoarSoft Software

Eric Sanders sent in a FAX regarding software upgrades that are now available. He says, "I've added a great new feature to CompuFoil Professional that would be of great use to those that bought the program for built-up rib use. CompuFoil will now automatically generate and print all the wing panel ribs based on the wing geometry, making it a one step operation. I'd be pleased to update those wanting this feature found in the current version 1.7 of CompuFoil Professional if they would send in their disks with return postage." Eric's address is: Eric Sanders, 3904 Traine Dr., Kettering, Ohio 45429; (513) 299-7684.

The Great Race

We received a call from Ron Kukral of New Lenox, Illinois. He called to let us know that the Silent Order of Aeromodeling by Radio (SOAR) Great Race for 1994 has been cancelled, again.

Warmin' Up

(Thanks, Scott (Smith) for coming up with the phrase!) These two words provide the best description of what is happening at several locations across the states. First, the WSJ sponsoring clubs are warmin' up and a WSJ status report on key happenings is included in this issue.

The North Alabama Silent Flyers have a NASF Mid-South Warm-Up scheduled for May 14 at the Hobbs Sod Farm in Huntsville, Alabama. The folks are getting ready for the Mid-South Soaring Championships which are scheduled for June 23 - 26 in Memphis, Tennessee. Lars Ericsson is the CD and he says, "We are hoping to hone our skills for the late June showdown in Memphis. ...We'll be flying the same basic events that will be flown at the Mid-South Soaring Champs, and using a 900 point max for all flight times, and a 100 point max for the 25' circle landing task. We will fly 5 rounds minimum and try to wrap it up in ample time for folks to drive home at a semi-decent hour." The classes are Expert, Sportsman, and Novice; plaques will be awarded in each class through 4th place; Juniors and Seniors will fly with the adults according to skill level. If you have any questions, Lars can be reached at (205) 859-0255 6:30 - 9:30 PM CST.

We also received a FAX from Bob Sowder saying the Fred Weaver and Tim Renaud will be attending the Mid-South event in June. In conversation, Bob said that the pre-registrations are coming in real good!

A Los Banos Slope Scale Soar-In Fun Fly is scheduled at Los Banos Reservoir at Los Banos, California and is sponsored by the South Bay Soaring Society in cooperation with NASSA. Good opportunity to see what is required for the NASSA "National Scale Building and Soaring Achievement Program" and to warm up for the WSJ event.

We also received a call from Ron Kucera, the editor of the *Eagle's Nest*, the newsletter for the Sacramento Valley Soaring Society, Northern California. They are holding their annual Spring Fling Thermal Soaring Contest in Davis on May 14 - 15, which is their annual fund raiser event. Ron also says, "The site itself is situated in a 300+ acre underdeveloped county park and we have tamed about 10 acres right in the middle. There is a lot of clear flying area with the closest trees about 1/4 mile away and some antennas about 1/2 mile away. Many out-of-towners that have flown at our site have stated that it has some of the best thermal activity in central northrn California. The tasks are a little different and we generally try to have a special hand launch as a separate contest on Saturday afternoon. Saturday evening includes a BYOB (bring your own beef) BBQ and usually some daring souls like to try their hand at night flying." Camping is allowed on site. Joan Nolte is the contest director and can be reached at (916) 966-0857.

And, Buzz Waltz, the President of The Desert Union of Sailplane Enthusiasts (DUST) in Southern California has written to say they are holding a scale fun fly on April 23 - 24 on 60 acres of manicured turf in Indio, California. This is their 1st Annual D.U.S.T. Scale Soaring Fiesta. If you don't have a scale plane to fly, bring anything. For more information, Buzz can be reached at (619) 327-1775.

From Germany

The following letter is from Dr. Ameil Klein of Germany.

Dear Editor,

"The German model airplane publications *Modell* and *MFI (Modellflug International)* are interested in soaring activities in the USA — the entire gamut, HLG to cross country, club activities for beginners to national competition. To cover their needs, *Modell's* Rüdiger Götz and *MFI's* Bruno Schliffler have asked me to do a series of articles on American soaring for their readers. I've accepted those assignments.

"Among the first articles I will do will be one entitled "U.S. Soaring Sources". This will be a review of the American columns and newsletters that focus on soaring. Basicly an annotated bibliography, the kickoff article will contain information on how *Modell* or *MFI* readers can subscribe to the American publications — as well as my impressions of the usefulness of the information.

"Would you help me, please? Mention this German interest in an upcoming issue of *R/C Soaring Digest*.

"From newsletter and journal editors, I would be happy to receive subscription information and publication samples. *(I'll subscribe if their journals appear to be informative and useful.)* Incidentally, I have not yet seen your publication. I have learned of it in the November/December issue of F3B/USA,

" From suppliers of sailplane materials — kits as well as related supplies — I would be happy to learn of their offerings — especially if they export.

"For another article, *MFI's* Bruno Schliffler is keenly interested in something on cross country. If I can get some good pictures as well as technical specifications and comments from your readers, I can work them into something of interest fro German readers. Full credit, of course, will be given the sources.

"For another article idea, Modell's Rüdiger Götz would like to know more about handlaunch in the U.S., particularly building techniques like the styrofoam/glass/kevlar methods WACO's Frank Weston uses on the HLG design he markets. For this article as for all others, I welcome information about U.S. successes — and failures! Here, too, pictures, technical specifications and U.S. comments can be turned into an article interesting to German readers.

"In a nutshell, I would like to encourage a greater flow of trans-Atlantic soaring information. When appropriate, American news will appear in the German publications *MFI* and *Modell*. Flowing in the opposite direction, information from us could be article material for *R/C Soaring Digest* — if you are interested in such an exchange.

"I look forward to hearing from you."

(signed) Doc, Ameil Klein

We provided Doc with complimentary copies of RCSD and our brochure explaining what RCSD is all about. With his next letter, he subscribed to RCSD. He also told us a bit about what is happening on the sailplane scene.

"...I took the back issues of *R/C Soaring Digest* to our last club meeting where the

1993 Winners at Toledo Weak Signals Clubhouse

Back row (R - L): Ben Clerx & Mako, Rich Burnoski
Front row (R - L): Fred Weaver & Thermal Eagle, Skip Miller & Thermal Eagle, Dale Nutter & Super-V

Ben Clerx & Mako

Fred Weaver with Thermal Eagle

Art Slagle & Rich Burnoski

Dale Nutter with Super-V

Skip Miller with Thermal Eagle

Ray checks scores for Chris Corven.

Men at work!

Photos from the 5th Masters of Soaring Provided by Dale Nutter Tulsa, Oklahoma

guys found Graham Woods' article "Fixing Fiberglass Fuzzes" fascinating. Everybody in England probably knows about repairing from the inside as Graham explains. For us, the technique, as he explained it, was new, innovative — and appreciated. Thank you *RCSD* — and Graham — for a valuable tip.

"Our latest project involves getting geared up to build a fleet of sailplanes using the vacuum bagging techniques advocated by Frank Weston and used in all his WACO designs. Believe it or not, despite its popularity there in the U.S., the technique is not being used here in Germany where planking is attached to foam cores in mechanical presses. The materials required for vacuum bagging — materials that seem so readily available in America — are almost unknown here. Mylar's a good example. We're searching for reasonable substitutes.

"Another pet project of mine involves adding ballast — or better said, *not adding ballast* — to a model to increase its windy weather penetrability. I don't like the idea of taking a sound model and reducing — if not destroying — its structural integrity with the addition of ballast. Instead, I'm looking at three-piece wings with various sized interchangeable middle sections. In other words, to raise wing loading, I won't add ballast, I'll substitute a smaller centre section. Theoretically, this should accomplish what I want. And the model will become stronger — not weaker as it does with the addition of ballast. It's neither expensive nor much trouble to build three different center sections for the same model. Anyway, that's what's running through my mind these days as I plan "So Soary" my newest model, a 1.9 to 2.5 meter electric. I'd be interested in comparing notes on this idea with others.

"Meanwhile, greetings from Prüm river valley in the middle of the German-Luxembourg Nature Park, where three months of constant rain and resultant flooding have given us the damp, cool forests and running rivers summer tourists admire — and time for us "locals" to build airplanes. "It must be terrible to be burdened with sunshine, boomer thermals and good flying weather all year 'round," the envious man said."

Doc's address is Dr. Ameil Klein, Maarheckstr. 20, D-54668 Prümzurlay, Germany.

Happy Flying!
Jerry & Judy

The Open flyoff group.
Second from left, C. Foss, winner
Fifth from left, S. Thornton, second
Seventh from left, Sean Walbank
Fourth from left, Calypso that blew me out of flyoff!

Radioglide '93

Pittreavie, Scotland

...by Bob Sherliker
Ontario, Canada

(This report was sent to us by Bob Sherliker, and was originally printed in *The Gull*, Bulletin of the Central Ontario Glider Group, Ron Turner, editor. ED.)

I had the chance to visit with my parents and to enter a top class soaring contest at the same time. Now is this luck or careful timing?

I had entered Radioglide after I had seen the announcement in *RCSD*. This contest is one of BARCS major events of the year, and it was taking place in Scotland at Pittreavie about 10 miles from my parent's home. I had originally intended just to slope soar during my visit, but when I saw the announcement, I had to give it a go!

The intention was to fly my Grifter in the open class and my 2m Chuperosa in the 100S (standard class). A call on the Friday afternoon to the C.D., Brian Sharp, led me to find that everyone was at the site setting up. The Grifter and the Chup had survived CANADA 3000's handling, so off to the field I went. (A Grifter fuzz fits right into the overhead bin with room to spare in a Boeing 757.)

Pittreavie playing fields were about the same dimensions as our club field (approximately 250 metres square), but there the similarity ended. To the south was a major highway with a runabout; on the west side was a whiskey factory and an electronics warehouse which was separated from the field by another major highway. On the north side was a golf course, and at the east end was a small stadium with 60 - 70 foot high light standards. Not as bad as it sounds, but a tad tight. A quick check to make sure the models were okay, a couple of launches to trim out, and everything was ready. (You get lots of help when you're a foreigner!)

Saturday morning at 8:30 AM was when the first slot was to go. I was placed in the last slot so I would get a chance to see how everything progressed.

My Chup was found to be out of class rules and so I was denied entry. (It had ailerons.) However, even though it was only two channel, the class rules state that the controls must be rudder and elevator with spoilers allowed on a third channel. Bernie Henwood, one of the leading thumbs over here, offered to let me fly his Stiletto 100 and the C.D. okayed the change. Not bad, eh? From non-competitive Chup to most competitive Stiletto in a few minutes. Lucky guy!

The 100S class had 94 entries. Five rounds of flying were planned with the lowest scored round to be discarded. Normalized scoring was in effect with a 150m hand tow and a 75m in-or-out landing circle for bonus points. There was an eight minute window to get your best flight.

The 100S event turned out to be an eye-opener for me! Picture just how hectic the launching area could get when there was a bit of lift around and everyone launched at once. Ten flyers launching and heading for the same patch of air can get busy!

This is supposed to be an entry level class in contest flying, but there were not many entry level guys there. My slot came up and I joined up with Bernie and his Sheffield team. My throwaway was this round. The Stiletto was flying at about 12 oz/ft^2 (maybe 10.5 - 11) wing loading and I struggled a bit not knowing local conditions. Combine that with flying someone else's #1 plane, and you can see how I felt a bit intimated. The team worked together, though, with a spotter and talker keeping me informed which really helped me get my confidence back.

There was some lift around all day, and this caused nearly all the pilots to launch immediately. I learned from the Sheffield lads that when conditions were like this, you should try to get into the air and off the line first so you have the best chance of maxing the round.

Round 2 and 3 were a different story as I maxed both rounds and Bernie's Stiletto had become easier to fly. By the end of round 5, I had scored 3500 points out of 4000 which was good for 34th place. I was pleased with the results as I made the top half of the entry. The resulting fly-off had two of our team members entered. The last guy down and winner of the event was Martin Johnson of our team. Watching this guy read air was a lesson!

The 100S class is very competitive. The Stiletto types have an advantage in that they are able to penetrate and use the available lift. Algebras and Sagittas were also very popular and I even saw an Aquila. V-tails were popular, too, with a few pilots.

On Sunday the weather changed from occasional thermals and light winds for 100S to windy and cloudy with showers for the Open class. The task was 10 minutes with in-or-out of a 15m circle (a bit more difficult), same launch line, and normalized scoring. Eighty-one entries made for another hectic launch area. Four rounds were called for with no throw-away. Every round counted.

The first thing I noticed was the size of the gliders being assembled. Most were on the large side, 4 or 5m in span, with multi-function controls. My 3m Grifter was at the smaller end of the scale. A few 100S models were entered; V-tails were quite popular. Most pilots were loading up with lead. I found out why a little later...

As round 1 began, I noticed that line breaks and pop-offs were common. For the Open event, I had teamed with Sean Walbank of *White Sheet* fame and another Grifter flyer.

Compared to the 100S, Open flyers were content to wait when the slot was started.

The weather had changed and there was little chance of flying out the slot. My first slot was under way and I was in reasonable air when I noticed some fliers drifting off to fly over a subdivision, staying there as opposed to where they had originally been. By the time I realized they were holding while I was sinking, it was too late. I'd lost too much altitude and had to land and settle for an 860 point round.

In round two, I managed to max out, as by now everyone was sloping off a 75 foot rise near the golf course. A couple of machines folded wings on launch as the wind increased. Slots were being won with five minute flights and a landing. Scottish thermals, what there were of them, were really small and tended not to grow. It was a brave pilot who went downwind with one. Some did, though, and rewarded by crushing the slot!

On the next day, I was in twentieth place

after round 2. The weather had turned cold with showers and increasing wind. Everyone was now sloping off the golf course, with a few pilots finding occasional good air over the highways. With stronger winds there were more mistakes in the launch area. C.D. Andy Lewis announced that wood should be placed in the green containers and plastic in the blue, please...

I moved up in this round to fourteenth with a 900 point flight. Sean Walbank had maxed round 2 and round 3 and was almost assured of reaching the flyoff with a steady round 4. I needed a max in the fourth round to get in the flyoff. This is where the lead I mentioned was required. With no provision for loading the Grifter, I had to fly light. On the flight line with me was a Calypso F3B. No problem, I thought. I can climb through him in good air. But, you have to reach it first... He had two tow men who gave him a tremendous launch. Must have been 700 foot plus. I got a good launch and headed after him, but with no ballast and a 15 mph headwind, I couldn't reach him. I settled for an 800 point round that was good for 12th place - 70 points short of the flyoff! That was not bad for a first attempt, but I wish I had that last round again...

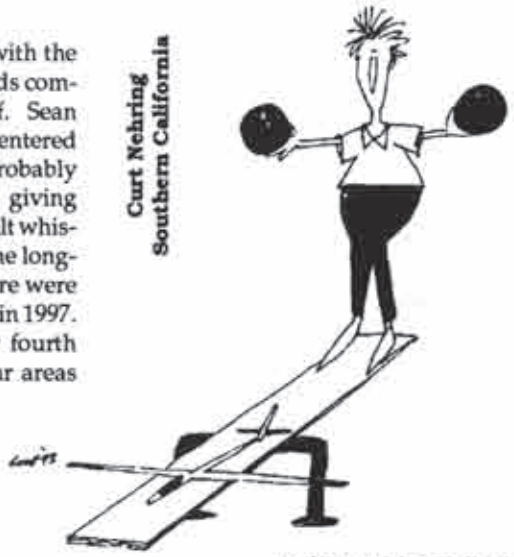
Two flyoff rounds were flown with the top guys in the provisional rounds coming through to win in the flyoff. Sean Walbank finished fifth. If we'd entered the two-man team event, we probably could have won it. The prize giving followed with many bottles of malt whiskey quickly snatched up. I got the longest flight prize (3000 miles). There were many hand shakes and see you's in 1997. BARCS stages this event every fourth year in Scotland, one of the four areas chosen to hold the event.

A few observations in closing:

- Ladies flew in both the 100S and Open flyoffs.
- I was surprised to see flying over major highways.
- The organizers of the event ran an excellent show: loudspeaker system, frequency control and computer scoring setup which gave results immediately after the slot ended; all worked efficiently and helped to make the contest memorable. (C.D.s never get enough praise for the time and effort they put into a contest.)
- The 100S class would be a more interesting contest at this level if ailerons were allowed. A sportsman's class within the event could be created and restricted to rudder/elevator models.
- A few of the fliers I chatted with preferred BARCS open class over F3J which has a tougher and more rewarding landing task.

I would recommend a trip to Radioglide for any competition-oriented flyer. You'll find a top class field, good camaraderie and, for us landlocked Canadians, some fabulous slope soaring. ■

Curt Nehring
Southern California



Jer's Workbench

Tools required to build models

(L-R) Miscellaneous tools: sanding block, clamps, small files, small screwdrivers, razor blades, modeling knife, hand saw, pins, hand drill w/bits, square and masking tape. Building board below

If we stop and think about it, there are really very few tools required to build models, but there are a lot of really nice tools that make things a lot easier and there are the tools that would be nice to have. This will be a two part article. First, I will talk about what we can get by with, and part two will cover tools that are nice to have, and some of the tools that I can't live without.

While living at home in my pre-teen and teenage years, I had a nice, warm basement to work in. I had lots of room with a 20 foot work bench, lots of shelves to store things on, a radio to listen to (We didn't get TV until 1955 in Chico, California.), and access to my father's tool box for all of the tools that I needed. Then I left home and went to work for AT&T and found myself traveling a great deal, living in hotels, motels and small apartments. It was 16 years before getting my first home where I could set-up a real work shop.

But anyhow let us go back a few years to when I moved away from home and began traveling and living out of a suitcase. When traveling I had a small building board about 12 inches wide and about 60 inches long and a cardboard box for what few tools I had. Everything that I owned would fit into the back of my 1941 Buick, including one and some times two airplanes, with maybe one under construction, I was flying power at the time and didn't get into gliders until 1970.

One thing about living like this is that you can find out what you can get by without, but living in hotels or motels it's best to be on the good side of the housekeepers and or managers. Ask if you can borrow or maybe keep a vacuum cleaner in your room to clean up; they really get upset if they find a lot of sawdust or wood chips in the carpets. I know. Picture this if you can; while living in a San Francisco hotel around 1960, I built a 1/5 scale WWII Stuka Dive bomber. When it came time to paint the model what did I do? *No, I didn't paint it in my room.* Late one night I went out onto the sidewalk and spray painted the model under a street light. I have also painted several models in parking garages. But one nice thing about this hobby, while traveling the way that I did, was that I got to meet a lot of nice people and because I was living in a hotel or motel at the time, they would take pity on me and invite me to their homes and let me use their shops. To them, again I say thank-you!

Back to the tools... One thing that you do need is a good building board. If you

live in a hotel, motel or small apartment you can do your building and then pick up the building board and move it off of the table or move it out of sight. As for the tools themselves, very few are required to build a model. The picture shows what you can almost get by with, which includes cutting tools, a modeling knife and or razor blades, small hand saw, hand drill and a few drill bits, a square, small files, screwdrivers, pins, masking tape and a sanding block. And as time goes by you may find other tools to add to your tool box, but not everything needs to be purchased at once.

Next month I will tell you about the other tools, the ones that will make building a bit easier or maybe the ones that you can't live without. ■

Timer, I Need a Timer!

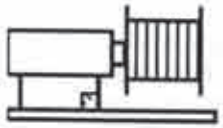
...by Pancho Morris
Mesquite, Texas

Since we are starting a new contest season, I thought I would talk about timing a contest flight. The timer is very important and plays a big role in a successful flight. Before the flight, the timer should be ready when the flier is ready to fly. He should help the flier make sure he is ready and have everything he needs for his flight. He should have a stop watch that he is familiar with. During a flight is not the time to find out that you do not know how to read or operate the watch. The timer should get the winch line and help the flier hook up his plane so that the flier can concentrate on getting his plane ready to launch and his mind into his flight concentration. During the flight, the timer should keep the flier appraised of what other fliers are doing and any indicators of lift that might be around. This is not the time for idle chat either with the flier or, especially, with other spectators as this can be very distracting to the flier. Unless you are positive that you are a MUCH BETTER flier than the flier, do not tell him how he should be flying. If you are his personal coach and mentor, this is OK, but it can be very hard on the flier's concentration to have someone telling them how to fly when he is trying to make his time or landing.

Keep the flier posted on his time. I like to get every half minute. Other fliers may like something else. You should find out before the flight begins what kind of time calling the flier wants.

Most fliers like a specific count when they are approaching the target time. When I am two minutes to the target time, I like my timer to give me every fifteen seconds so that I can set up my approach to my landing pattern. During the last minute, I like to get every five seconds. Most fliers like to get the last 30 seconds counted out either down or up. I like to get every five seconds to fifty, and then have the timer keep quiet. My thinking is that if I am at the right spot in my landing pattern with 10 seconds to go, I will not be more than about 3 seconds off on my time and I would like to concentrate on the landing points. I am willing to give up one or two flight points when there may be 100 landing points at stake.

The timer should then measure the landing points or mark the landing if there is another flier coming in and then measure when it is clear. He should then turn in the score to the scorekeeper. ■



Winch Line

Gordon Jones, 214 Sunflower Drive,
Garland, Texas 75041; (214) 271-5334
After 5:00 P.M. CST

Balancing Your Sailplane

Setting up the balance on a sailplane is a task that can make it fly right off the board without a great deal of trimming later on. The secret is to take your time and balance the wings, stab and the whole plane for the center of gravity. If you build two wing panels, chances are that one is going to be slightly heavier than the other. It only takes a couple of minutes to add the amount of weight needed to make them weigh the same. This will lessen the chances that you will require a lot of trim when you start flying. The same is true for the stab as well, but in the case of the stab you'll find a way to remove weight so that you are lessening the amount of weight that will be added to the nose for CG placement.

Most kits come with instructions or plans that indicate the forward and aft limits of the center of gravity for that plane. In most cases this is a conservative estimate of where the CG should be for the initial flights. In most cases, after the initial test flights and sorting out the controls, you should start working with the CG to find that point at which you are comfortable and where the plane flies the way you want. There are a couple of short cuts that I use that make the process a little easier and don't take very much time to perform.

Use a piece of masking tape on the bottom of the wing panels at the CG location to mark the forward and aft limits of the CG, or the CG location, if that is all that is provided. When setting the CG, I generally set it for the center of the two limits as an initial starting point. This will depend on the ability of the flyer, but in many cases this is going to put you closer to what you finally want anyway. With the masking tape in place and the CG locations marked, I then add weight so that the airplane balances right on the CG. I also have made a stand that sits in very close to the fuselage to further increase the accuracy of the CG location.

I use buckshot in single grain increments in a small plastic bag so that I can get an exact CG. Using the buckshot gives you the ability to add small amounts of weight so that the end result is a sailplane that will teeter back and forth on the balancing stand at the intended CG location. And using the buckshot and plastic bag also lets me change things if I put another radio in the airplane for some reason, or if I sell the airplane later. Then someone else won't have to hack out great globs of epoxy and weights to get it to balance.

Once I am satisfied with the CG location with this amount of weight, I remove the bag of shot and insert another bag. I then move the plane to the rear CG location and then repeat the process for the rear CG location. This gives me an accurate weight setup for the aft CG location so that I don't have to guess about how much weight I want to take out after the initial test flights. I then reinsert the bag with the original weight for initial test flights and I am ready to go.

Once I have the initial flight or two out of the way, I change bags and I am already close to the balance point I am after. If the need arises, I add or subtract weight in small increments with a half-dozen pellets at a time. This way you can make sure you are not over doing things with large changes that will do nothing but cause trouble.

Once I get the CG where I want it, I next fly the airplane with additional ballast on the CG for windy days where the additional weight helps penetration. I add pre-selected weights, again measured

prior to flying. I also set up a chart with the number of ounces and the effective wing loading. This way I know what the wing loading is, and after flying with this amount of ballast I know what the response is like with the additional weight. After flying at a particular weight you can even make notes on the change in flight characteristics if you desire.

Setting up the initial CG and adding additional ballast is not difficult; but it like most things can be made easier with a little effort. ■

Low Cost, High Tech Wings

...by Jim Reith
Southbridge, Massachusetts

Everyone that catches the R/C "bug" spends a lot of time drooling over the latest and greatest planes in every catalog and magazine that comes their way. Sometimes it seems that if you want to be competitive and get yourself out of the middle of the pack, you need to apply for a second mortgage. I'd like to take you along a route to get to that high tech ship without snapping your shoestring budget. What I'm about to describe is a way to take an existing plane and make it more competitive without breaking the bank. I used this method to upgrade a Gentle Lady several years ago and was asked to write up an article to help people save money while learning.

One of the things you notice in the dream ships we all see is that they are predominantly foam wings. There are several excellent foam cutters commercially available but if you're on a tight budget, they might be out of reach. When I cut my first foam wing, I used a cutter similar to what I'm about to describe. I still use one to cut up the big foam blocks into blanks. First we need to find a piece of wire which we can heat up to cut the foam. Sig sells nichrome wire which you might be able to get at your hobby store, stainless steel fishing leader (uncoated) is available from tackle stores, or my current favorite is old braided control line flying wires. Next we need a power supply to heat the wire. This is preferably an adjustable supply and I have used model train transformers in the past as well as transformers plugged into the light dimmer outlet in my house. Make sure you don't damage the dining room table or you won't get out flying for awhile! I currently use a power supply I built for about $30 out of parts from the local Radio Shack. I used one of their 2 amp 25.2 volt transformers and some lights, switches, terminals, an enclosure and a circuit breaker. If people are interested in plans for this they can send me a long SASE and I'll forward them copy. Next we need something to hold the wire while it's hot. A simple bow can be made out of a piece of wood and some music wire. Go to your hobby store and get the

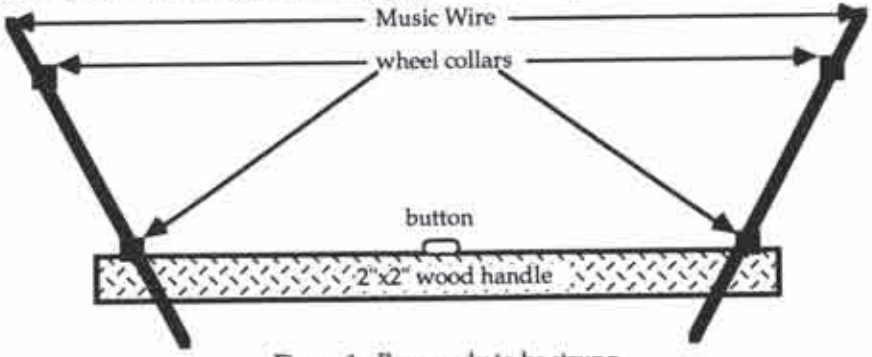


Figure 1 - Bow ready to be strung

thickest piece of music wire you can find wheel collars for; I try to use 5/32" or 3/16". Pick up 6 wheel collars as well. Get a piece of wood that's about 2" x 2" (I use half of a 2 x 4 that I split the long ways.), and about 6" - 8" longer than the biggest core you'll probably cut (I try to stay under 36" cores to keep quality up.), and 2" in from the ends drill holes the size of the music wire pointing outward at a 45 degree angle. Next, take your music wire and cut it in half. Install a wheel collar on each half about 4" from the end and slip these wheel collar ends into the holes we just drilled so the wire is sticking out angled away from the center like figure 1.

Now, put a wheel collar about 1" down from the end on each free end. Get your cutting wire and make a loop at one end and crimp it with a piece of brass tubing. Make sure that the edges of the tubing are smooth so they don't cut the wire off. The loop only has to be big enough to slip over the music wire. Now make another loop in the wire the same distance from the first one as the distance between the holes in the wood. Now put one loop over the end of the music wire and slide it down to the wheel collar and then bend the wires inward and slip the other loop over the other piece of music wire. The wheel collars will keep the loop from going down to the wood and you should add two more wheel collars to keep the loop from slipping back off the ends. You now should have a bow that looks like figure 2 with the cutting wire across the top.

The reason you need to put the wire under tension is because it stretches when heated. If you use too much tension the wire will stretch and not return to its normal size when cooled. Eventually you will stretch it to where it becomes too thin and breaks. If you don't use enough tension you'll get wire sag in the center when you try to cut cores. I find that the nichrome and stainless steel wires stretch over time and have had much better luck with the braided line (around 500 cuts per wire). One other thing I did to my cutter is to install a momentary push button switch in the center of the wooden handle. This allows me to control the power and hold the bow with one hand without having to reach over to the power supply. This has worked out very well since I often use it when I'm alone. I complete my bow with a set of 16 gauge power leads with alligator clips on the end. I made mine about 12 feet long so I can move around in my shop. You can hook the power leads up via the central

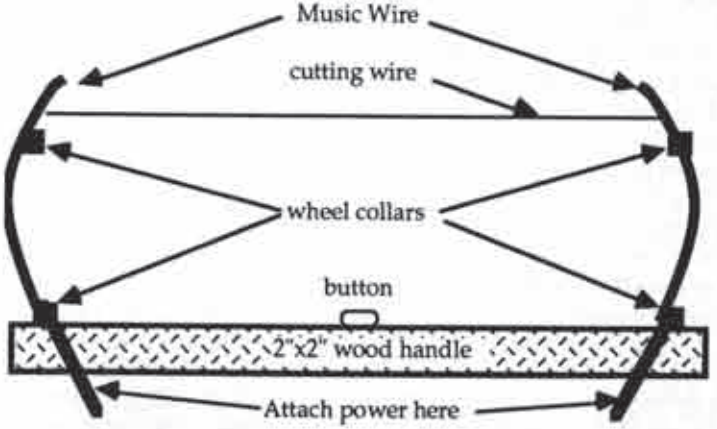


Figure 2 - Bow strung with cutting wire

push button or directly to the ends of the music wire protruding from the back of the wood handle.

Now that we have a bow, we need something to cut. First thing we need is some foam. You can usually find foam at the local lumber yard to be used as insulation (at least up here in the northern climates where we see snow in the winter). There are several types and weights so you need to decide what you want to use. For most applications that will involve sheeting, 1 pound per cubic foot white expanded bead polystyrene will work well (ask for white beadboard at the insulation section). If you intend to use fiberglass to sheet your wings then you might be more comfortable with extruded polystyrene. Dow Grayboard is a good choice here.

Now we need a pattern to cut it to. I've used several things for my templates but I usually go back to a good grade (5 or 7 ply) of 3/32" plywood. Many articles talk about attaching the templates to the foam blank but for production work, I find it easier to attach them to a piece of wood for a base. If you try to pin the templates to the cores the pressure of the bow on the templates can move them and cause you to not cut an accurate core. I use a pine board cut slightly longer than the length of my core and use drywall screws to attach the templates to the ends. To cut the templates I usually glue a paper template (either computer generated or a photocopy from the plans or a book) to the wood (one for the top and one for the bottom) and then draw lines extending the trailing edge outward in a straight line. I also mark the templates at several points along the template and number them from the leading edge back. 8 is usually enough and is simple to do since you just divide the length in half, and those halves into quarters and then finally those quarters into eighths. This is easily done by folding the paper templates in half three times before attaching them to the wood. These marks are your cutting stations and are very important for getting an accurate cut. I cut the templates out near the line and then use a sanding block to bring them down to the exact shape. Then I coat the edge with thin CA and let it cure. I lightly sand the CA'd edge and recoat. I do my final sanding with 600 grit paper and run my fingernail over the edge to check for nicks. Any roughness will show up as a ridge in the cores so take your time. I then clamp the top and bottom templates together and drill 1/8" holes where I'll screw them onto the base. This will align the templates when I change them. Now screw the bottom templates onto the base being very careful to get the two ends aligned to the same incidence. Sometimes I'll draw a centerline on the top templates and install them first to position the holes making sure that the centerline is the same height above the base on both ends of both templates. With the holes done in this manner you can remove the top templates and install the bottom ones knowing they are aligned.

When we discussed the bow we mentioned line sag. No matter what you do, you'll always have some. It might be 1/16" or more or less but there's always some. This sag is due to the center of the wire being pulled back by the drag of the cutting process. It tends to be worst at the end of the cut so I generally start cutting at the leading edge where the curves are more pronounced. The reason we extended the trailing edge in a straight line is so that the center of the wire will pull out of the foam at the same level as the two ends and give you a straight feather trailing edge. You want to cut the bottom of the core first so that the core settles into the bed and you don't have to compensate for the wire thickness (kerf).

Let's get cutting! Find a friend/spouse/older child to help out. Explain the following to them. When you are cutting you want the wire to stay down

on the template and to move as smoothly along the template as possible. You don't stop and you keep moving at a steady pace. I usually have one person calling out positions and the other person keeping up on their end. It usually sounds something like, "Coming up on one...at one...half way to two... at two," and so on until you're done.

Stabs and tiplets are higher taper than wings and sometimes you can cut them with just one template. If you look at the shape, it's really just a triangle with the outboard point cut off. Many articles talk about using a wire with a handle at one end and a pivot at the other. You put the pivot out at the "cut off" point of the triangle and the template at the root end. One of the problems I have is maintaining tension on the wire and pressure on the template and smooth motion along the template. Here's a simpler way that removes one of these tasks (maintaining tension) and uses the bow you've already made. I mount my template on the end of a board and draw my lines along the leading and trailing edges to find the pivot point. I mount a block of wood near the pivot point so that I can attach a scrap of plywood that will stand up parallel to the template over the pivot. I then saw a kerf down into the plywood to the same height as the centerline on my template. I then slip one end of my bow into the saw kerf and hold the other end on the template. You can then cut out the tiplet/stab in the normal manner with the plywood pivot holding the opposite end in one place. Geometry will take care of the inner "template" and the bow will take care of the tension. You just have to follow the template and keep the bow moving at a constant speed.

Now that you've got a set of cores, you need to figure out how you want to cover them. Balsa and obechi are the normal materials but sometimes you want to try out something in a disposable form. I've used colored poster board (5 big sheets for a dollar) on a set of HLG wings to try out different airfoils. There was a recent article in one of the magazines about using brown paper and white glue so you don't have to invest $10 in wood to try out an airfoil on a wing. Works great for disposable slope combat ships as well. Vacuum bagging is all the rage at the moment and does do a nice job on wings but it involves equipment and fiddling and can be a project in itself. Before people used vacuum, they used weights. The easiest method for holding the skins on the cores while the glue dries is to put a board over the core/sheeting "sandwich" and stack books and bowling balls and other weight to "press" them in place. To set up this "sandwich" you need to put the bottom core bed on a sturdy flat surface; cover it with wax paper. Then take your wing skins and tape the trailing edge together with a slight gap so they will fold over flat. Coat the inner surface of the skins with your glue and let it soak in a little and then scrape most of it back off. Now put any trailing edge reinforcement on the glue surface and position the core on the skin with overlap all around the edges. Fold the top skin over and place it on the wax paper in the lower core bed. Put another piece of wax paper over the top and put on the top core bed. Now put a board on top to press this sandwich together slightly. Before you start piling weight on the board, align the leading edge of the core with the leading edges of both skins at both ends. Once you get it all in place, start piling books or other weight evenly across the top. For a normal wing you want to use 50 - 100 pounds per panel. Water jugs can also be used (water is about 7 pounds per gallon).

For glue, I've found an interesting source of epoxy that I can get at my local lumber yard. I have used a two part, clear bar top finish. When you open up the package it warns about epoxy resins (but doesn't mention it on the outside); it

mixes 1 to 1 and cures within 24 hours. I have also tried F77 spray contact cement but I really prefer to use an epoxy. To keep up with our low cost theme, I've found that using clear plastic "on the rocks" glasses as mixing cups works well. To mix proper amounts of epoxy, I put one cup inside another and mark the level of one part I need on the outside cup. I then fill a second cup to this level (with the first cup on the outside again) and pour the first cup into it and mark the 1-to-1 both part level on the outside cup. I then carefully drill small holes, the side of the tip of a felt tip marker in the outside cup and I can then put the pen into the holes and rotate the inside cup to make the measuring marks. Every time you need a new mixing cup, you just pop it inside and mark it. Always the same. Always accurate, cheap and disposable. If you use different amounts of epoxy for different jobs, just mark more levels at different points around the outside cup and you can make the right measuring marks for the right job. I always make the marking holes vertically aligned so I always know which pair are which amount.

That's about it. Low cost high tech at its finest. You can always spend more money and the commercial cutters are great quality but sometimes you just want to try something out and this is a good low cost method that will get the job done.

About the author: Jim Reith runs RA Cores and cut his first foam cores in the early 70s when he discovered he didn't like cutting out ribs when scratch building. Eventually he built more sophisticated cutters and started doing cores for friends and finally went commercial in 1992 when a friend used him as a source in a construction article in a national magazine. Jim's latest cutter is completely computerized and template free. He can be contacted at P.O. Box 863, Southbridge, MA 01550 or (508) 765-9998 evenings. ■

On The Air With Cornfed

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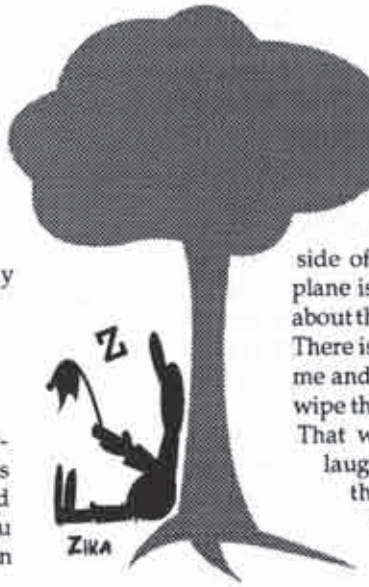


Memories

There won't be much flying in the article this month. Just kinda wanted to reflect back on life. You know, stroll down memory lane a little.

As for memories made as each day goes by, how about the first time you landed your plane by yourself, or the day you turned a student flyer loose? Oh, the smiles and handshakes! Today is a day for making memories. You know that's what life is really about: making memories.

I remember one recent downwind landing I made this past winter. I launched into a strong wind. Right on top of the launch I thought I hit a bump of good air, so I turned and went downwind. I was just circling only to realize that I was way downwind. Maybe five miles... Well, it might as well have been. A light came on in my head that the plane would be a little late getting back to the field. (Dah!) So, me and the dogs take off runnin' towards the pasture fence. They go under, and I go over still flyin' the thing mind ya. I'm praying I don't catch my jeans on the barb wire, dodging cow pies and watching my plane at the same time. (This is really a true story!) By this time, I am thinking that I'm gonna get the plane back, but only if I can get over the line of trees. The plane disappears behind the trees; then it pops back up over the trees. All this is happening inside of about a minute. The plane is flipping and flopping about three hundred feet away. There is an open field between me and it. I pull the flaps and wipe the sweat from my brow. That was close! Now, I can laugh at that memory, but at the time it was a real adrenaline rush!

When we take time to reflect back on the past, it often seems like just yesterday. But yesterday was when my biggest worry was getting the trash out to the street on time so Daddy wouldn't put me on restriction for another month.

Today is a day to stop and smell the roses. Take time to laugh with friends, or love the baby. Do what it takes to enjoy and build precious memories. The present is like a sunrise. The day goes quickly and then it is only a memory.

I hope ya'll made your way to Church this Easter, and that you take time to evaluate your life and see where you stand with God, and that He will be in all of your memories, too.

Signing Off,
Cornfed

P.S. Say your prayers and take care of your health.

ATTENTION: Brian Smith of Ohio. I hope you did not need the coat you loaned me back. The other night it got real cold and the dog needed something to cover up with. I think it will clean up, but I don't think I can find a patch big enough for the right elbow. ■

Arm Wear or Hand-Launch Topics

...by Scott Smith
2 Sugarpine, Irvine, CA 92714
(714) 651-8488 evenings after 7:00 PST

Grounded!

Yup, dang it. I've been bothered by shoulder pain, so I went to see the friendly HMO doctor. Looks like slight tendon tear. Rx: anti-inflammatories and rest, total (gulp) rest. So I went to the March 5 Torrey Pines Gulls hand-launch contest and, (whimper), helped out. Did not throw, not once.

As a result, I will be doing much investigation of why physical injury happens in hand-launch and how to prevent it. It is no fun not being able to do what you love so much.

Also, with apologies to Kenneth Griffith, I will be exploring alternative launching techniques more earnestly. I fully expect to be able to throw again, but, as they say, there are times when you can and there're times when you shouldn't.

Hence, **if anyone has information on preventing physical injury, rehabilitating such injuries, and/or alternative launching techniques, please send it in; it will receive 'top billing'.** Of course, everything gets top billing in this column. Thanks...

New England R/C Soaring Convention

Mark McReynolds attended this interesting get-together back in Portland, Maine, on November 20, 1993. There were two guest speakers on hand launch: Rick Roelke on HL construction and flying, and Terry Sweeney on building a 4 oz. RC HL glider. Thanks to Mark for the following notes that he took:

Rick Roelke on flying techniques:

- Want lots of up-elevator available to enable tight turns.
- Small cross-section aft boom assists in turning (which you are always doing).
- Plane should be 90° to wind at end of launch to be in best position to find lift.
- Can slope on trees; dense trees are best, porous tree lines will suck gliders into their branches.
- Don't ever leave lift. If you find it, TURN! Bank hard and learn to center in low narrow lift. (Scott: The plane needs to be almost perfectly adjusted and balanced to do this well.)
- Ballast according to wind conditions:

Wind	Total Weight (oz.)
0 - 10	< 12
10 - 14	13 - 14
15 - 17	15 - 16
> 20	17

- Trim to neutral; that is, in the dive test, the plane neither arcs up nor tucks under.

Terry Sweeney on building a 4 oz. glider:

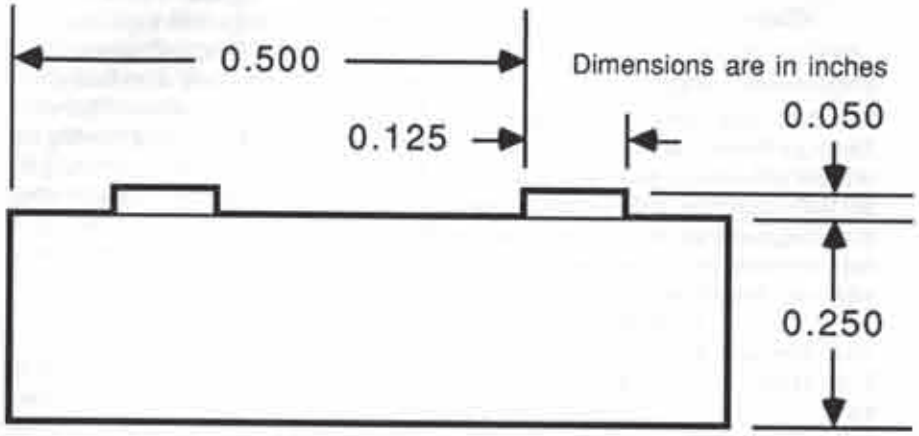
- Tekin receiver and servos. Lighten these tiny things any way you can.
- Micafilm
- 10 lb test Kevlar for pull/pull system

When finished, the wing area was 200 sq. inches. I'm guessing the wing span was NOT 60 inches.

Thanks also, Mark, for the photos of pilots flying in 20° weather; brr, I think I'll stay inside until July.

Bill West - Turbolaters

Bill showed me how he is using turbolaters to improve sink rates slightly for planes that may be "permanently ballasted" too heavy; yet you still want it to perform in very light lift. It has a serious deficit on penetrating, though, so you probably only want to consider this for the early stages of a contest before the wind kicks in.



To use, repeat the pattern above as shown below on a thin piece of clear plastic sheeting, the kind of sheets that are used in overhead transparencies.

Cut them out using scissors and/or razor. Bend the little tabs up. Tape the assembly on the top of a wing tip parallel and back from the leading edge about 30% (experiment with this). Do one for each wing tip.

What this will accomplish is that your plane will now resist tip stalling during slow tight thermal circling. Also, the wing lift is increased, and so the sink rate is reduced.

Bill says that he can't tell any change in launch height; evidently the increased drag is compensated for by the higher lift?

Anyways, if you are desperate to have your plane perform better when the best lift available is very weak, you might want to experiment with this. When the wind picks up, then pull them off.

Torrey Pines Gull Contest Highlights

On March 5, the Torrey Pines Gulls hosted their second 1994 hand launch contest. Conditions were alternately great and lousy. Here the weight of the plane seemed to play a big role. Todd Kingsbury put **The Fear** into everyone with his 9 oz. high-aspect ratio home brew ship which he flew with great skill. However, a moderate breeze kicked in during the last round, and somewhat heavier ships came into their own. George Joy scavenged a victory by situating himself way downwind of everyone else and picking off the garbage thermals revealed by others. Great flying by both pilots.

Just wait 'til summer. ■

WORLD RECORDS

...by Graham Woods
Hertfordshire, England

Albert Ross is a well known flier from the Southern Hemisphere who holds some of the world distance records. He pointed me in the direction of the Guinness Book of Records to see about the World Records held by some of his contemporaries. I was quite impressed.

➢ **Duration**

Well, how long do you think? One day? Two days? A week, maybe? No, try again. OK, a month? A year? Wrong. Not one year, not two, but from three to ten years! Hardly believable, but the book of records has it that **Sooty Tern** takes the biscuit (or rather the fish) for the duration record. This bird, which most of us would probably think was a gull except for its forked tail, leaves the nest as a fledgling and stays aloft through its adolescent life until it is ready to breed. The book has this period down as three to ten years.

➢ **Altitude**

Pelicans and storks fly high during migrations. How about 10,000 feet? Wrong. Try 37,000 feet (11,277 metres). Another 'well known' feathered friend, **Rüppellis Griffon Vulture**, managed this incredible altitude when it had a mid-air with an aircraft over the Ivory Coast (West Africa). Presumably its remains ended up inside the cock-pit (Sorry!), but whether it was hitch hiking or just got carried away by a strong thermal which took it to the edge of the troposphere (air pressure: 250m Bar, air temperature: -50° C), we shall never know. [No, I don't believe this one either.]

➢ **Speed**

We might be able to match our feathered friends for speed, however. The fastest bird is the **Peregrine Falcon** but it could only manage 168 mph and 217 mph in measured 30° and 45° dives. Quite impressive, though they'd probably beat a model in a vertical dive. This bird manages to fly fast by pulling its wings to reduce wing area, thereby increasing its wing loading. It regularly halves its wing area during normal flight but in a dive retracts its wings completely for minimum body only drag and greatest distance.

➢ **Distance**

How about the longest flights? Birds migrate — must be thousands of miles. Yes, and no. Yes, thousands of miles, but in this case not migrating.

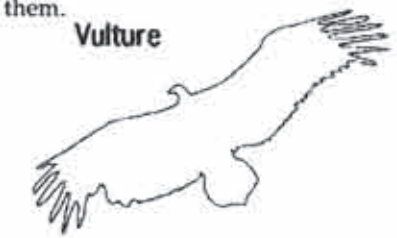
The Wandering Albatross, tracked by satellite, revealed feeding trips of 2,200 and 9,300 miles. The satellite tracked one albatross that maintained an average speed of 35 mph for over 800 km. Their weight of 8 or 9 kg, high aspect ratio wings (up to 15:1) and wing loading of over 50 oz/sq. ft. means that they only fly when a good wind is blowing - hence their existence only in the southern oceans (where the Coriolis effect is greatest). Male birds have been known to stay at sea for over 30 days at a time. These birds also have the distinction of having the largest span of any bird, averaging just over 3 metres, but specimens have been measured at 3.63 metres (almost 12 feet). They soar over the sea by using a combination of slope lift produced by the wind on the sea swell and dynamic soaring using the wind gradient.

➢ **Being Different and Living Dangerously**

The **Frigate bird** must take the prize here. Apart from being a rather elegant bird *(Fregata magnificens)* with a forked tail like a tern, this is a sea bird that thermal soars. Thermal soaring over the sea means living dangerously since this is a sea bird that can't land on water for it would not be able to take off again. It must take off from an elevated perch. This species has never been recorded alighting on water. This bird, thermal soaring over the open ocean, does everything in the air, like the Swift, including sleeping and remains aloft day and night for weeks or months at a time. It feeds by plucking squid and flying fish from the surface waters of the 'blue water tropics' and stealing fish from other birds (i.e., kleptoparasitism - Not a bad word, eh?).

➢ **Horses for Courses**

Apart from just the sheer scale of evolution, Nature's aerodynamics have enabled contemporary dinosaurs to diversify and fill every environmental niche with a suitable adaptation. All soaring birds would probably evolve having high aspect ratio wings all things being equal but for the constraints that their feeding, foraging, migrating and habitat put on them.



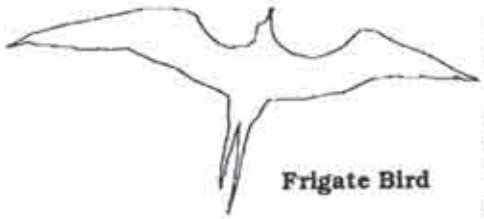
Land birds like the Vulture and Eagles have low aspect ratio wings. For out and out thermal soarers you would think that large raptors and vultures would have high aspect ratio wings like sea birds, but you would be wrong. Birds with high aspect ratios, albatrosses and petrels, **are** very efficient soarers but take-off for them is a problem.

They need either a strong wind, something not found over land masses consistently, or a cliff or similar for take-off. Vultures and raptors land to scavenge or catch prey and have to take off again. A broad wing enables high power output in flapping mode for take-off with a large payload. But even the vultures haven't got it quite right for although they live in areas where there are powerful thermals and dust devils, full bellies can mean no take off. They have been known to beat the ground with their wings trying to release thermals or induce dust devils.

The answer for higher performance thermalling and foraging is the slotted tips common to all land soaring birds. Slotted tip feathers reduce wing tip vortices during soaring flight, reducing the higher drag common to low aspect ratio wings - a compromise solution between take off requirements and efficient low energy budget soaring.

Pelagic birds like the petrels have high aspect ratio wings with tapered wing tips for more efficient soaring. A heavy wing loading doesn't matter for these birds because they do not soar in thermals, but use slope lift and dynamic soaring. A high wing loading gives them not only the ability to cover vast distances at high speed with very little energy expenditure, but penetration into head winds is not a problem, either. These birds are ideally suited to their environment. In fact, albatrosses have an adapted shoulder muscle that effectively locks the bird's wing in the gliding position thus saving the energy required to hold the wings straight and level.

What about the frigate bird? This must be a very special creature for it has adapted to thermal soaring over the sea. It doesn't fly in the southern oceans where a gale blows most of the time, but in the



Frigate Bird

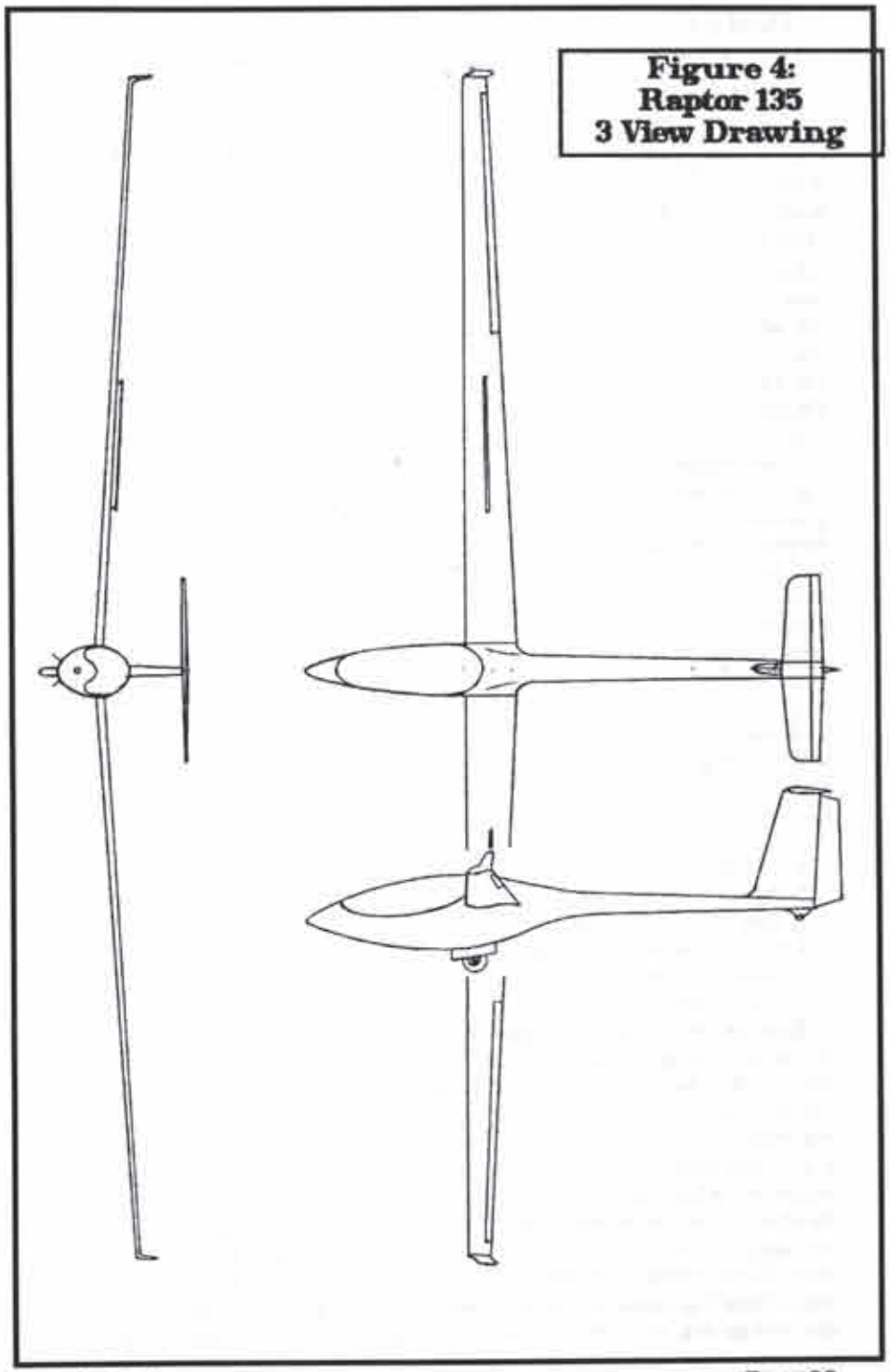
trade wind zones, the area from the tropics to the equator. Here, the Coriolis effect is at its weakest, the winds driven by large scale air movements towards the equator.

The sea is warm (with little diurnal temperature variation) and thermals do apparently exist; the evidence is in the form of 'trade wind cumulus' *(sic)*, unchanging day and night. These clouds are formed by small sea thermals with narrow cores and yes, the Frigate bird has made the adaptation. It has an unusually low wing loading for its size (i.e., large wing area). It is this low wing loading that enables it to circle tightly and make use of the weak thermals that are formed in the area bound by Cancer and Capricorn day and night. The magnificent Frigate bird has the high aspect ratio, pointed tip wings for high performance, long distance and low energy expenditure soaring of pelagic birds. This bird, unlike the land birds, rarely lands and doesn't need the low aspect ratio, high power slotted wing. ■

Vital Statistics

Species	Mass (kg)	Span (m)	Area (m²)	Loading *	A.R.	Tips
W. Albatross	8.7	3	0.5	175	15:1	Pointed
Frigate Bird	1.5	2.3	0.4	36.5	13:1	Pointed
R. Vulture	7.6	2.4	0.8	95	7:1	Slotted
Falcon	0.56	1	0.1	56	10:1	Slotted
Sooty Tern	0.2	0.9	-	-	-	Pointed

* Wing loadings in g/dm² 3.06 g/dm² = 1 oz/sq.ft.



Designing the Raptor 135 Sailplane

Part 1: Introduction and History

...by Dave Squires
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Sunnyvale, California 94086
(408) 245-8111

You are probably wondering right about now, "What is the Raptor 135?" Well, you **should** be wondering. It is a non-existent entity at this point. I have been planning a new full size sailplane for almost a year. It is called the Raptor 135. It will be a 13.5 meter span, hence the '135' in the name. It will be a light weight, high performance, all composite fiberglass ship. The full size plane has as design targets 220 lbs. empty weight, 32:1 aspect ratio, 13.5 meter span (44.3 ft), and a 42:1 L/D. Since this seems like a feasible goal based on computer simulations and a pretty exciting project, I thought I would share it with the R/C soaring community as I will be building a third scale R/C flying model first. I will be providing periodic updates on the progress of the project. This is installment number 1.

The different installments will cover:

1. Introduction and history
2. Performance analysis
3. Scale R/C model construction
4. Scale model flight testing
5. Scale model kit offering
6. Full size update

Now on with this installment

About a year ago I started dreaming about a foot launched ultra light sailplane. The impetus for this daydreaming came from several directions. First, I am a long time hang glider pilot (21 years) and it had not escaped my notice that hang gliders were being auto towed and aero towed to thermalling altitude much like standard sailplanes. Also, the price of new high performance hang gliders was getting up there knocking on $5,000. The best ones are at $4,500 right now. Low performance older sailplanes can be had for around the same amount. Now, low performance in a sailplane means 20:1 to 25:1 L/D. High performance in hang gliders means 12:1 L/D. Hang gliders thermal at about 20 - 22 mph and can turn on a dime. Full size sailplanes typically thermal at 45 knots or 51 mph and the turning radius is pretty large, but they can cover a lot of ground in a hurry when cruising between thermals. Now not wanting to settle for a paltry 25:1, I started looking into designing a composite sailplane.

Having some modeling experience making fiberglass fuselages, plugs, molds and the finished product, I thought, "Well, it might be a lot of work, but the finished product would be fantastic and if I do it right I will have the molds and can maybe offer it as a full size kit." So I started drawing fuselage outlines, wing planforms, etc. I went from aspect ratios of 18:1 or so to 23:1 to 32:1. The wing span increased only a little, but the aspect ratio went toward that of helicopter rotor blades. I even drew up a plane at a 52:1 aspect ratio and 20 meter span (66 ft). Actually, it doesn't look that bad. The wing stresses at the root section might be prohibitive in a full size plane due to the bending moments and loads at higher G loadings. This will take closer analysis. Perhaps I can build a third scale of this one at some later date. Acceptable torsional stiffness might also be unacheivable to prevent high speed flutter.

I have to interject here about the jump to the high aspect ratio. This did not happen assuming the use of the usual materials and construction methods for the German glass ships. I made the jump after learning of aramid paper honeycomb core. It so happens that my brother John works in an aerospace composite factory where parts are made for big planes. He sent me some samples of the

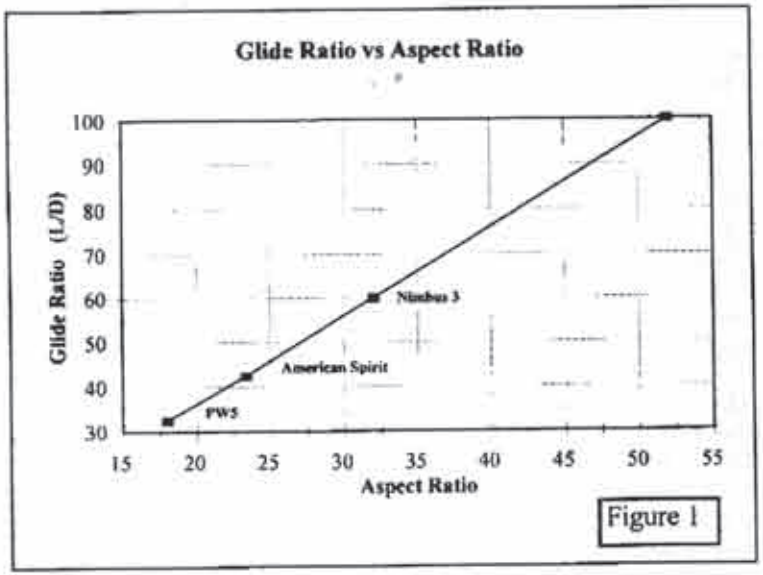


Figure 1

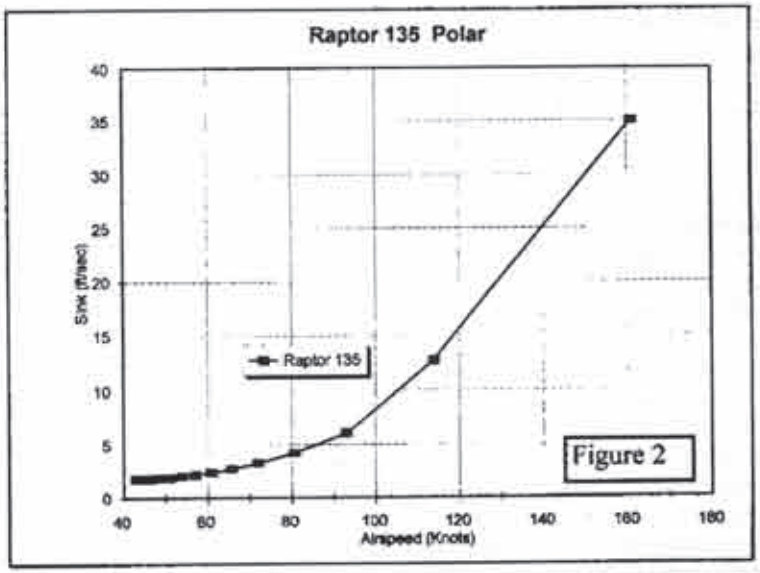


Figure 2

aramid core. The samples convinced me, after some calculations, that it was indeed possible to build a sailplane at 220 lbs. empty weight. Not only could the weight be achieved, but the wing skin stiffness and durability would be better than urethane structural foam. Aramid paper core is amazing stuff. You can take a quarter inch thick section of unstabilized three pound core and jump up and down on it and barely leave a mark. This is only slightly heavier than blue foam. Try jumping up and down on blue foam. You will have major dents, cracks and pieces falling off. Even Rohacell foam can't compare in compressive strength. Three pound core has a compression strength of about 385 lbs./square inch unstabilized. Stabilized it is even stronger. "Stabilized" means, in essence, sand-

wich construction — fiberglass on each side.

Then, I looked into L/D vs aspect ratio of current high performance sailplanes. I wondered if there was any correlation between the two parameters. I took a Nimbus 3, American Spirit, and the new PW5 world class glider and plotted the L/D on the vertical axis and the aspect ratio on the horizontal axis. The result is a straight line through the points. I thought this was pretty incredible. Perhaps I just got lucky and picked just the right combination of planes. So I did a plot of most of the planes from the SSA's 1983 Sailplane Directory. This resulted in a scatter plot. If you take the average you still get a pretty good correlation, however the line slope is not as steep. The best approach is to assume that only the highest performing planes will be used, most modern, etc., since I will be using the latest design and construction techniques. This means, choose glass ships only and the most recent at that. In other words, don't include an SGS 1-26 otherwise you get an apples to oranges comparison. In any event there is pretty good correlation between L/D and aspect ratio at least as a first order estimate. See Figure 1 for the plot of L/D vs Aspect Ratio.

This got me excited. The first pass on the L/D projection gave 52:1 in a 13.5 meter span (32:1 AR), 60:1 in a 15 meter span (37:1 AR), and 80:1 in a 20 meter span (52:1 AR). Looks pretty outrageous doesn't it? Turns out it is. The problem in a shorter span and high aspect ratio is that the parasitic drag from the fuselage is a higher percentage of the overall drag than in a larger span plane. You can only reduce the frontal area of the fuselage so far and still squeeze a human pilot in there. So the next question is, "What is the REAL likely L/D given that I keep the 32:1 AR in the 13.5 meter design and I can make the weight target?"

So what happens next is that the South Bay Soaring Society has scheduled a talk by Stan Hall for the December club meeting. Now Stan Hall is just about the most well known designer of home built sailplanes. He is an aeronautical engineer, worked at Lockheed, helped design the P51 Mustang, designed the Cherokee II homebuilt glider, plus many more accomplishments too numerous to mention here. So I talked to him after being introduced by Walt Gurney, an R/C buddy. I told him what I was planning, and gave him the whole sales pitch. Well, he got very, very interested. I scheduled to meet with him after the Christmas holidays and get into it in more detail.

The meeting was great. We had a great time talking about successes and failures in the past. The upshot is that he thought that I was on the right track. He gave me some valuable information in reprints of articles he had written. Heck, I had no idea this guy was so well published and so "famous". Boy, did I stumble into the right person. I couldn't believe my luck. He was extremely friendly and helpful and one of the nicest people you'd ever want to meet.

Stan gave me just what I was looking for, a step by step cookbook method to determine the performance polars of any sailplane that was similar to the PIK20. The assumptions being that good aerodynamic design practices were being used. This means good streamlining, good airfoil, similar cross sectional area to the fuselage, etc. I took this information and proceeded to put it into my spreadsheet program on my computer. This method is set up perfectly for a spreadsheet. After getting the airfoil polar data from Airfoil-ii analysis and a call to Stan to understand one of the parameters and how to derive it from the airfoil polars I got my first results on screen. The result was over 42:1 L/D in a 13.5 meter sailplane. It wasn't 52:1, but 42:1 is nothing to sneeze at. According to Stan the method he gave me is pretty

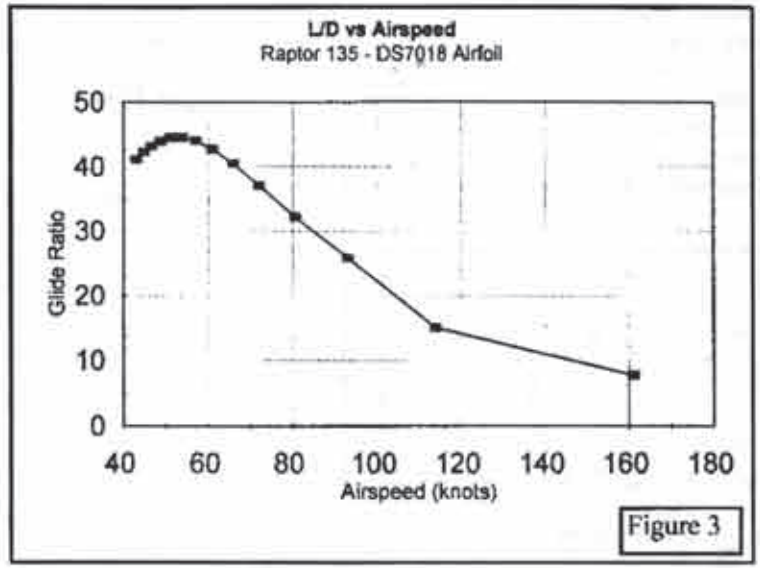


Figure 3

accurate. Flight test polars and calculated polars for the PIK20 are almost coincident, which proves his point. So I can't be too far off. Even if the L/D were degraded to 40:1 it would still be spectacular. Sure it is not the 52:1 originally thought, but I didn't really expect it to hold up to closer scrutiny. Did you?

The sailplane polars and the table of polar data are provided in Figure 2 and Table 1. The plot of glide ratio vs airspeed is given in Figure 3. For those who are familiar with full size sailplanes you can see the performance polar is similar to any of the 15 meter standard class of sailplanes that weigh twice as much. The reason for that is that the wing loading is about the same (7 lbs per square foot). What that means is that I reduced the weight and increased the aspect ratio (reduced wing area) to keep the wing loading in the same ballpark.

The three view of the Raptor 135 is in Figure 4. As you can see it has a very high aspect ratio, meaning very skinny wings. Aspect ratio is calculated by dividing the square of the span by the total wing area. In this case the span (44.3 - 2) feet and the wing area is 56.3 square feet. I subtract out the fuselage contribution to the span (2 feet). The full size root chord is only 22 inches with a tip chord of 10 inches over a span of 21 feet. The wing uses constant taper for easy construction and easy calculation of intermediate chords for foam core hot wire templates.

I am now in the process of building the plugs for the female molds for the third scale R/C model. Wing, stab, and fin cores are cut waiting to be glassed and finished up. The entire plane will be molded — fuselage, wings, stabs, rudder. The idea is to use the same construction methods that will be used for the full size plane and build the model to dynamic scale so that it will fly and handle much the same as the full size ship.

The initial estimates for the model give a best glide speed of about 29 mph and a minimum sink speed of about 24 mph. The weight for the model will be 8.1 lbs empty and 14.6 lbs with proper ballast to simulate a pilot. This is calculated by dividing the full size weights by the cube of the scale factor. In this case 3 cubed is 27. Divide 394 lbs by 27 and you get 14.6 lbs. I have yet to plug the numbers into PC-Soar to see what kind of predictions

it comes up with.

In the next installment I will go into more of the design analysis for the full size plane and the model. I will cover airfoil selection and analysis by computer and Stan Hall's step by step method for determining full size sailplane polars. ■

TABLE 1 - Raptor 135 Calculated Performance Polar Data (Full Size)

Cl	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0	1.1	1.2	1.3
L/D	7.25	14.13	23.96	29.91	34.55	37.95	40.25	41.62	42.27	42.37	42.05	41.4	40.6
Airspeed	161	114	93	81	72	65	61	57	54	51	49	47	44
SR ft/min	2253	818	394	273	211	176	153	139	128	122	117	114	112
SR ft/sec	37.6	13.6	6.57	4.55	3.52	2.93	2.55	2.32	2.13	2.03	1.95	1.90	1.87

Cl = coefficient of lift ; L/D = glide ratio ; Airspeed is in knots ; SR = SinkRate

Slope Planes

...by Pancho Morris
Mesquite, Texas

Many people seem to be under the impression that you need a hand launch plane to fly on the slope. It ain't so, Sam. In fact, if the wind is up at all, you can't hardly fly a hand launch on the slope because they are too light. Almost any good thermal plane can be flown on the slope. Two meter planes can be fun. Light ones like the Gentle Lady are good for light winds, and heavier ones like the Sagitta and Falcon, when the wind is up. Large planes are a real joy to fly on the slope; again, floaters for light wind and, when the wind comes up, get out the fast, heavy ones. Planes with aerobatic capabilities are a real ball because of the constant lift on a good windy day. Large scale ships are beautiful on the slope. I recently had the honor and privilege of test flying Jim Taylor's Krick Minimoa at the slope, and the beauty was almost overwhelming.

Electric motor gliders are real nice because the extra weight of the batteries makes them penetrate well, and the motor can come in handy if you are flying in marginal conditions and the wind dies.

What all this means is keep an eye on the wind forecast, grab a plane, and head for the slope! ■

Understanding Sailplanes

...By Martin Simons

13 Loch Street, Stepney,
South Australia 5069

The Cross Country Sailplane
(Notes prepared for the MARCS Symposium, October 1992.)

Tip Stalling

The fundamental cause of tip stalling is the shape of the wing planform: not the wing profile, although as explained below, profile change towards the tips can help cure the problem, if wisely done.

Without going into a lot of detail, it can be shown that any lifting wing sheds strong vortices because of the pressure difference between upper and lower surfaces and the tendency for the flow to move round the tips. The effect of a vortex is to reduce the effective angle of attack. This is called the *vortex induced downwash* and the whole wing, from tip inwards to root, feels this effect to greater or lesser extent..

If the wing has a rectangular planform with squarish tips, the tip vortex is strong and concentrated around the tips, much weaker inboard. Hence there is strong vortex induced downwash near the tips of such a wing. Hence while the inner wing is approaching the stalling angle, the tips are still affected by the induced downwash and do not stall. This is a safe wing. It can still be made to tip stall by clumsiness on the controls, but normally tip stalling is easily prevented, even in steep turns. A subsidiary point is that, so long as the outer wing is not stalled, the ailerons remain effective so even if a stall does begin to develop at the root, the pilot can usually keep the wings level.

However, for reasons of efficiency (reduction of tip vortex drag) and structural strength (deep wing roots), we normally taper the wings of a sailplane. This, as intended, reduces the strength of the tip vortices and improves the efficiency of the wing. The ideal, as mentioned already, is the elliptical chord distribution with, perhaps, some crescent sweep back.

The whole point of doing this is to weaken the concentrated tip vortex, and this is very effective. But now, instead of the induced downwash preventing tip stall, the *entire wing tends to reach the stalling angle of attack at the same time.* In this situation, the smallest error in flying, or a minor gust in a thermal, can cause the wing to stall asymmetrically with a violent wing drop.

By tapering the wing even more severely than suggested by the elliptical chord shape, the tips will always tend to stall before the roots of the wing, which is a very dangerous condition. On entering or leaving a turn, when one wing is inevitably at a higher angle of attack than the other (because of the necessary lift imbalance) tip stalling is extremely likely.

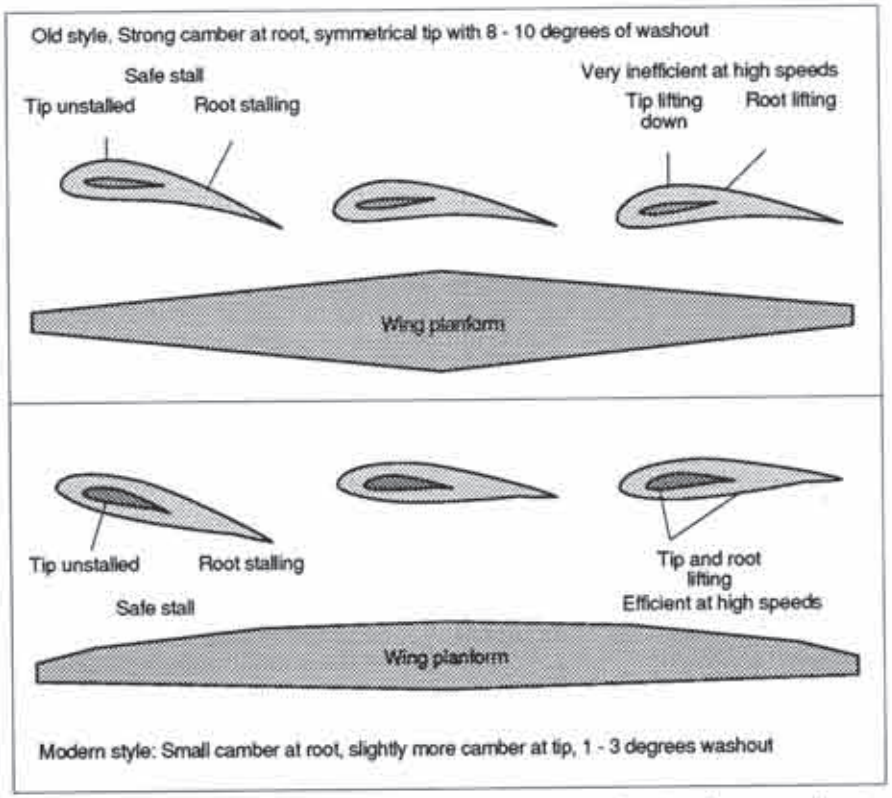
Preventing tip stall

One obvious way of reducing the danger of tip stalling, is never to taper the wing too much. A basically rectangular wing plan, with well rounded tips or with a moderate taper over the outer sixth of the span, does not lose a great deal in drag, compared with the ideal. It is likely to be much easier to fly and may perform very well for that reason even if it loses a little in terms of climb rate in thermals. Since strong tip vortices are associated with high angles of attack, the performance at high speeds (penetration) will suffer hardly at all.

Even so, tapered wings are desirable, being structurally more efficient as well as creating a little less vortex drag.

Sixty years ago one way of preventing tip stalling was discovered. The wing section was changed progressively over the span, from strongly cambered, (6 to 7%) at the root, to symmetrical (0%) at the tip **(Figure 15)**. This was combined with a massive, built in twist or 'washout' of eight or ten degrees, starting from

Figure 15. Prevention of tip stalling



the root or perhaps from half way along the wing. The result was a safe, tapered wing. Very marked tapers were used, the ratio of root to tip sometimes being five or six to one. Such aircraft were very successful for slow speed flight and soaring in steeply banked circles under full control.

Unfortunately, if the airspeed was allowed to increase much above the speed for minimum rate of sink, the washed out wing tips began to operate at negative angles of attack, and lifted downwards. The result was a great increase in drag at high speeds. From the cockpit, the wing tips could be seen bending down.

(Incidentally, down bending tips often occur when the wing itself twists under the strong torsional loads which arise at high speeds, so forcing the outer wing to negative angles of attack. This can be seen happening on some modern model sailplanes.)

A more modern method of controlling tip stalling, is almost the opposite. Instead of running the wing out to a symmetrical tip section, the outer section is usually slightly more cambered than the root. A wing with a 2% cambered root section, for instance, may have a tip with 3% camber, or a 3% root may be matched to a 4% cambered tip.

Cambered wing profiles reach higher lift coefficients before stalling than symmetrical ones, and the more camber there is, up to a point, the higher the maximum lift coefficient obtainable. However, geometrically, the more cambered wing stalls at a lower angle of attack. Hence, with

the increase of camber, a *small amount of geometric washout* is needed.

When the tip profile camber is correctly matched to the washout in this way, tip stalling is prevented and the undesirable down bending at high speeds also does not occur.

There are other tricks and dodges which can be used to rectify a tip stalling sailplane, once its vice has been discovered. The tip profile may be modified by adding filler to make the leading edge more rounded, for example. It is better, of course, to get the design right in the first place.

Penetration

To achieve good penetration, the model requires to be extremely 'clean'. The wing aspect ratio and planform are not very important in this respect. The main sources of drag at penetration airspeeds are the wing profile and the so-called parasitic items, fuselage, tail, and any other protrusions or gaps which contribute drag without lift.

The wing profile is, as a rule, more important than the parasitic drag. With any reasonably well designed sailplane, the wing is always the most important source of drag at high speeds, as well as low. At low speeds it is the tip vortices which create most drag, at high speeds it is the wing profile.

The two most fundamental aspects of wing profile design are still camber and thickness. One is almost tempted to say that these are the only important factors, but this would be overstating the case. It is certainly wise to use a section that will not suffer from laminar separation bubbles and, thanks to the work of wind tunnel testers such as Michael Selig, John Donovan and the late David Fraser, not to forget Dieter Althaus' students in Stuttgart and the teams at Delft and Notre Dame Universities, we have a good idea now of what the best sections are in this respect.

It is still true that if camber and thickness of the wing are wrong, the performance of the sailplane will be very disappointing no matter what profile is used.

On the other hand, if camber and thickness are correctly chosen, the sailplane will perform well. Some further gains should come from a careful selection from those modern profiles which have the required camber and thickness, to gain the last few percentage points. We should also be very conscious of the need for accuracy in building and finishing these profiles.

The first consideration is camber. For cross country flying, the basic wing profile, at the root, should be cambered about 2% or perhaps less, say 1.5%. Such profiles give low drag at high speeds, which is what we require.

Thermal soaring models are often built to float gently rather than to penetrate. The result is, rather large values of camber. Some designers, nevertheless, have adopted, with success, wing profiles with much smaller camber than used to be current.

(I have found, with my own designs, that 1.5% and 2.5% camber are quite satisfactory for ordinary Sunday morning club soaring too. Such models do not fall out of the sky in weak lift, but climb just as well as some of the 'floaters'. They tend to require more radius for the circling since a high airspeed has to be maintained, but in practice this rarely seems to matter. If the thermal is usable by anyone, these models climb. More importantly, they have much better penetration and enable a much wider search for lift after the first thermal. This is what is required in a cross country soarer too.)

With such low cambers for the sake of high speed flight, the use of camber changing flaps and ailerons is an obvious solution to the problem of soaring in weak lift. If lift is unusually narrow, requiring a tight turning circle, then to droop flaps with ailerons slightly, will not actually improve the rate of sink

much, if at all, but it will enable the sailplane to turn more tightly without stalling, and so it may be able to climb in the narrow core.

Note that using flaps without corresponding aileron movement up and down by the same amount, is worse than having no flaps at all. If the flaps go down, or up, without the ailerons, a strong vortex is created at the junction. This increases total drag much more than anything possibly gained from the flap adjustment.

Turning now to wing thickness, large models with wings of 15% and 16% thickness will fly quite successfully. I have two such currently airworthy. They are vintage scale models with thick wing sections, in accordance with the prototypes. They fly well and soar in thermals along with anything else. But these thick wings are not good at high speeds. (Apart from the drag, the camber creates quite serious torsional forces which threaten to twist the wings off if I try to fly too fast.)

Sections 10% or 11% thick seem considerably better. The figures are not exact. Small departures either way will not make much difference in practice.

Ballast

I have not so far mentioned ballast. The diagram **(Figure 16)** indicates the effects of ballast on the sailplane's polar. This, naturally, has to be allowed for in the computerised instrument package. There has to be a switching capability from one polar to the other, according to the total mass of the sailplane. The mathematical adjustment is not difficult.

In full scale cross country flying, it is normal these days to start the day with huge quantities of water ballast in rubber bags inside the wings. With ballast, pilot and instruments on board, a modern 'open class' racing sailplane takes off at a total weight of around 3/4 of a ton. In contests, weighing machines are set up at the take off point and the sailplanes are checked to ensure that no-one is overloading the aircraft. Given the chance, some imprudent pilots would certainly do so for the sake of a few saved seconds which might win a race. They might win the race to their funeral, too.

More often than not, if the soaring conditions are even moderately good, the pilot keeps the ballast throughout the day and jettisons it only after finishing the race, just before landing. (The undercarriage is not supposed to take the landing loads with such a mass on board.)

Evidently, saving weight to enable a sailplane to scratch up in weak lift, is hardly considered any more. The pilot will not try to climb in weak thermals, but will use the extra penetration provided by the ballast, to go looking for a strong thermal. If, after all, none is found, then, and only in a desperate situation, the ballast can be dumped.

With our cross country models, I think the implication is clear. We may use ballast on good days, and adopt the same policy. But we cannot jettison the load, unless it is water or fine sand. If we do run into trouble, the model may have to land prematurely.

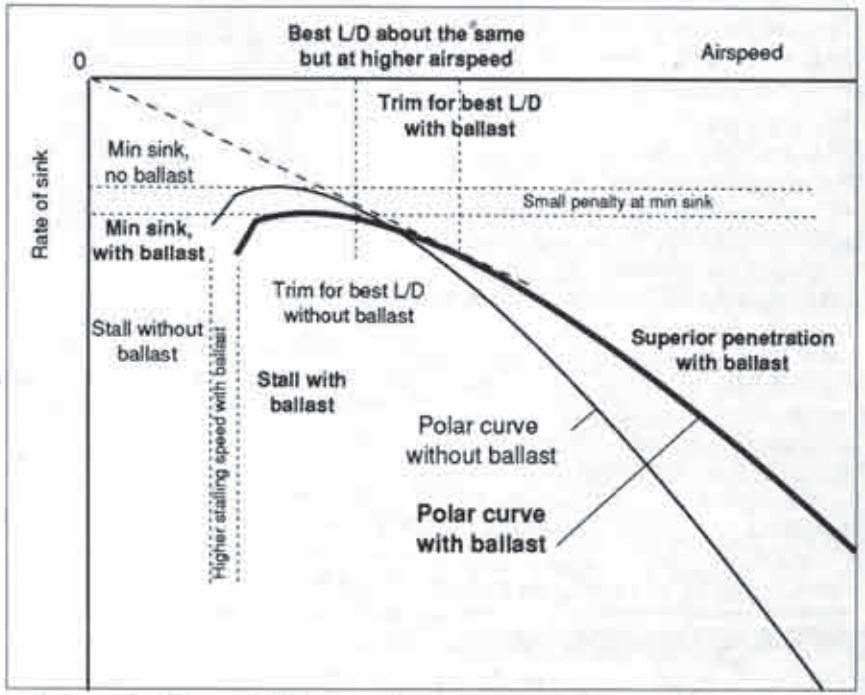
It is not true to say that saving weight is unimportant. As mentioned already, it is important at least to keep the extremities of tail and wing tips, light, for reasons of dynamic stability and manoeuvring. But a few saved fractions of mass here and there, in total, is not going to matter. A good cross country sailplane, built large, with high aspect ratio wings and strong, stiff structure, carrying, maybe, a substantial instrument package and extra powerful servos with large capacity batteries, is going to have a basic wing loading around the 16 ounces per square foot region, or higher. That is before adding ballast.

For this reason alone, it will almost certainly be launched by aero tow, but that is another matter for discussion.

Cross country racing

In a cross country race, it is not enough to make the best glide in terms of height

Figure 16. Sailplane polar with and without ballast



lost, through sinking air. The important thing is the average speed from start to finish line. For this kind of flying, as mentioned above, the MacCready theory was developed about forty years ago. The speeds to fly between thermals come out higher again than those for least height loss.

When, rather than if, suitable electronic instruments are developed, model sailplanes will be able to carry out dolphin soaring for long distances and at average speeds so far considered beyond reach. Pre-planning, good pursuit vehicles and adequate electronic feedback from instruments in the glider, will enable this kind of soaring to develop rapidly. The most vital requirement is to develop the ability to read the sky, recognizing the pattern of the thermals, and learning to follow the lift and avoid the sink.

Where next?

We are, probably, on the brink of a revolution. We may look forward to the time when the leading world championships for model soaring will be cross country distance and speed racing tasks. These would be supreme tests of our pilots abilities, of our instruments and other equipment, and of our aircraft. ■

This concludes the series on "The Cross Country Sailplane". Martin plans to take a bit of a break from writing for a while. If you enjoyed this column and would like to encourage Martin to write on another subject, his address is at the top of this column.

Martin, you have done a super job and we appreciate all of the time and energy you have put into your column since it started in January of 1990. We would like to take a moment and reflect back on Jim Gray's introduction of your column in that issue, over 4 years ago.

"We are pleased to announce that world famous author, pilot and educator, Martin Simons will begin a regular column

each month in *RCSD* titled: "Understanding Thermal Soaring Sailplanes". The material, half of which has already been received, is expected to take up at least a full year's worth of issues."

"Martin Simons is fundamentally a TEACHER and is lecturer at the University of Adelaide (Australia). He has authored the book, "Model Aircraft Aerodynamics", now in its second updated printing, and is a columnist for the Australian model publication, *Airborne*. Additionally, Martin has been a full-scale glider pilot for years, having begun in England some years ago, and has been President of the Gliding Federation of Australia as well as being editor of Australian Gliding — their national soaring publication. Besides all these accomplishments, Martin Simons has designed out and flown many original R/C sailplanes, including his current MARTINI, as well as scale models of well known gliders."

"Perhaps Martin's "magnum opus" in the view of most soaring enthusiasts is "The World's Vintage Sailplanes 1908-45", a magnificant and comprehensive reference work."

"*RCSD* wishes to welcome Martin Simons to its pages with gratitude and appreciation for his excellent — and original — material, seen here for the first time."

Martin has recently retired from the University of Adelaide. He also says, "I am now flying full-sized solo, again, and have accumulated several hours since I last wrote, mostly in the Glasflügel Hornet and hoping to graduate to the Discus soon. I find I am enjoying it again, and seem to have forgotten very little. However, discipline has tightened up a lot in the last few years!" Thanks again, Martin! ■

WRAM 1994

After a record breaking cold, snowy winter here on the East coast, it was nice to go to the WRAM Show to see some new models and new products. Although most shows still have mostly gas powered planes and equipment, it seems to me that each year more sailplanes and electric planes are getting displayed which is very encouraging.

If you have never been to a model show and one should come to your area, try to make it. It's quite an experience to see hundreds of vendors and thousands of modelers all under one roof at the same time. With approximately 165 vendors and two floors of displays it would take more space than is practical to describe it all. The photos are just a few of the many vendors who participated in this year's event, but they are the vendors who pertain to sailplanes and electric sailplanes.

Because of the size of the show I hope I didn't miss anyone. If I did let me know and I'll be glad to pass on any information about your product to the readers. ■

WRAM Show 94

Ed sent in the photos on the WRAM Show and shortly after that we received a video tape from John Clarke, which he took at the show. The video almost made me feel like I was there talking to folks like Ed Slegers, who I have never met in person. The tape is not long, but it covers interviews with folks from 7 sailplane booths. John expects the tape to be short-lived and is offering it at $7.95 which includes S&H. If you are interested, John Clarke's address is 911 Covert Ave., New Hyde Park, NY 11040-5401. *Judy* ■

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Akaflieg Braunschweig's SB13

In one of our first columns (*RCSD*, Vol. 5 No. 9, September 1988) we described the then new SB13. This full sized swept wing tailless sailplane, product of the Technical University of Braunschweig, Akaflieg Braunschweig, had flown just six months prior, and specific information about its construction and performance had not yet appeared. Interest in the SB13 has not declined over the intervening years, and there are at least a few modelers, ourselves included, who have expressed an interest in building a replica.

Akaflieg Braunschweig is one of nine institutions in Germany known as Akademische Fliegergruppe (academic flying group), or simply Akaflieg. The history of these groups can be traced back to the years immediately following World War I and the Versailles Treaty. As powered aircraft were forbidden under the Versailles Treaty, but the desire to design, build and fly aircraft remained, the newly founded Akafliegs concentrated on sailplane development. Because of a similar but wider ban on all aircraft development following WWII, it was not until 1951 that these groups could again be active. Since then, however, they have been both active and productive. Table 1

Table 1

Sailplane	Distinctive Characteristics
fs-24 Phönix	• first sailplane constructed entirely of fiber reinforced plastics
SB10 Schirokko	• first use of carbon fiber in a sailplane • four world records in 1979 • best two place sailplane for over 10 years
fs-29 Teleskop-Flügel	• first and only telescopic wing sailplane
SB11 Antares	• equipped with Wortmann flaps • made entirely of carbon fiber • piloted by Helmut von Reichmann, it won the world championship in 1978, just weeks after its first flight
SB12	• first sailplane with active boundary layer control
Mu28	• fully aerobatic • automatic trailing edge flap • maximum airspeed 250 mph
SB13	• first tailless sailplane to be constructed with modern composite technologies • first use of carbon fiber control rods in an aircraft • development of a process for molding a monolithic curved spar

Akaflieg designations: fs = Stuttgart, SB = Braunschweig, Mu = Munchen

lists just a few of the accomplishments of the Akafliegs. Akaflieg Braunschweig is probably one of the more prolific groups, having designed, constructed and flown several advanced sailplanes, yet it has only about 25 students enrolled at any one time.

The primary goal of the Akafliegs is to synthesize academics, developments in aerodynamics, and new materials to design and build better sailplanes, but a few powered sailplanes and lightplanes have also been produced. Organization centers on the Idaflieg, the Syndicate of German Academic Flying Groups. Guidance, major funding, a number of technical facilities, and much equipment come directly from the DFVLR, the German Aerospace Research Institute. Materials, tools, access to private technical facilities, and additional funding come from the aerospace industry. Students, when not building prototypes, are involved in other activities, as eligibility for flying the group's sailplanes is dependent upon accumulated work hours.

Akaflieg Braunschweig's 1982 decision to build the tailless SB13 was based upon three arguments. First, it was felt recent standard class sailplane performance improvements were due primarily to use of laminar flow airfoils and development of better fuselage aerodynamics. Future performance improvements using tailed planforms were therefore predicted to be relatively small. Second, building a tailless sailplane would be scientifically interesting, as a competitive tailless sailplane had not been built for three decades. Third, it was felt the tailless planform, due to its smaller number of parts, would be more rapidly built than a conventional design.

The third argument turned out to be completely fallacious, as many of the difficulties which would eventuate had never been addressed before, and solutions to these aerodynamic and struc-

tural design problems could not be directly derived from experience with conventional tailed designs.

Sweep back was chosen so the elevator had sufficient leverage, and the wing tip chord was kept relatively large to improve the lift distribution. This large chord allowed sufficient section depth to support vertical fins at the wing ends. The fins were then designed to cover the entire wing tip, providing sufficient area with reasonable height, and acting as winglets to reduce induced drag. A dihedral angle of four degrees was chosen to provide ground clearance for the wing tips during landing.

The laminar flow airfoil sections for the SB13 had to be designed for good stalling characteristics, high lift, minimal pitching moment, and a resistance to air flow disruption resulting from debris on the leading edge. Modern laminar flow airfoils, fairly easily designed utilizing modern computer software, seemed to be tending toward all of these characteristics, and so designing the new airfoils did not present any major difficulties. The HQ 34N/14.83 was chosen for the wing root, and the HQ 36K/15.12 was chosen for the outboard portions of the wing where the ailerons and elevators are situated. Both of these sections are shown in Figure 1. The HQ 36K/15.12 features a down turned trailing edge. This relieves the otherwise incessant download on the control system caused by the airfoil's reflexed camber line. Once the HQ 34N/14.83 and HQ 36K/15.12 were shown to be equivalent to other modern laminar flow airfoils in all performance dimensions, Akaflieg Braunschweig felt it was possible to build a tailless sailplane with better performance than any existing standard class glider. (A condensed version of the rules for the standard class is provided at the end of this column.)

A 1/3 scale model of the initial design was built and flown, but two problems immediately arose. The model would enter a spin when stalled, then spin in the opposite direction when recovery was

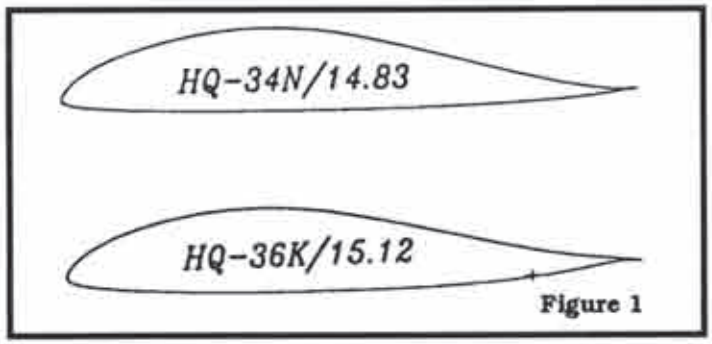

Figure 1

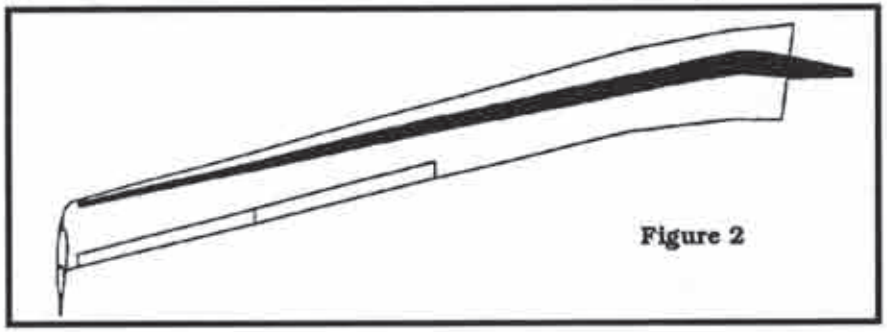
Figure 2

attempted, and severe flutter was in evidence even at low speed. While the airfoil chosen for the model was responsible for the stall-spin characteristics, the flutter problem was not so easily identified. It was only after computer modeling by Messerschmitt-Bölkow-Blohm that the sources of the problems were identified and specific changes to the spar structure could be recommended. That structural change involved reducing the sweep angle of the main spar at the wing root. The graceful curve of the inner portion of the SB13 wing was a direct result of integrating the redesigned spar with the chosen airfoils and the overall wing sweep needed for stability.

This was the first time construction of a spar of this type was to be attempted, and Akaflieg Braunschweig was forced to invent a method of creating a one piece complex curved structure of laminated unidirectional rovings and bidirectional fabrics. Inadvertent mishandling which could damage the materials had to be avoided and the entire spar had to be fabricated in less than five hours to assure proper matrix formation. Following fabrication of a portion of one spar as a preliminary exercise, both full length monolithic spars were molded successfully. An overhead view of the SB13's spar system is depicted in Figure 2.

Testing of the completed wing structure included loading it to 13g (7.5g expected load with a safety factor of 1.725). The wing was eventually loaded to 16.5g without failure. Testing concluded, construction of the remaining portions of the primary structure was rapidly completed. The control system, however, which is quite intricate, took longer to construct and install than expected. Carbon fiber rods were used in this application, another first for the aviation industry.

The resulting aircraft was then tested for resonance frequencies to determine the speed at which flutter would occur. Data and computer modeling showed flutter occurring above 270 km/h (168 mph), a speed which is significantly higher than the SB13's 210 km/h (131 mph) maximum.

The first flight of the SB13 took place on 18 March 1988. Aerotow was employed, with a nose attachment point. Launched from a height of 3000 feet, it became the first tailless sailplane to be built with modern advanced composite technologies.

Flight testing showed only one major problem. Flight performance improved as the CG was moved back, but at extreme rearward position the SB13 would easily enter a spin – spins were sometimes induced by turbulence alone. Tuft studies carried out under conditions of higher stability showed cross span flow at the leading edge which precipitated stalling of the outer wing. Flow fences were installed on each wing at the leading edge and in line with the aileron root. This entirely solved the abrupt stall problem and dramatically improved the flying characteristics in all regimes. At last report, there were five pilots rated for the SB13.

The glide ratio of the SB13 is reported to be at least 42:1, with one source reporting 43.5:1. This is an excellent value for a standard class sailplane. Table 2 provides the glide ratio and maximum speed for a number of well known standard class sailplanes. Although its maximum speed is lower than most modern standard class ships, its thermaling ability is said to be significantly better than that of conventional tailed sailplanes. Minimum sink is reported to be an extremely low 0.5 m/sec, and stands in contrast to rates of about 0.6 m/sec for tailed ships of its class.

Since a 1/3 scale model of the SB13 has already been constructed using relatively conventional construction techniques, modelers should not be easily dissuaded from constructing a large scale replica of

Table 2

Year of First Flight	Builder and Nomenclature	Glide Ratio @ mph	Max. Speed, mph	Min. Sink ft/sec @ mph
(1988)	Akaflieg Braunschweig SB13	43 @ ??	131	1.74 @ ??
(1979)	Akaflieg Aachen FVA-20	35 @ 56	155	1.97 @ 42
(1978)	Grob G-104 Speed Astir II	41 @ 74	168	1.97 @ 47
(1977)	Bölkow Phoebus B3	39 @ 58	124	2.00 @ 51
(1977)	Glaser-Dirks DG-200	42 @ 68	168	1.80 @ 45
(1977)	Schleicher ASW 20	42 @ 60	168	1.97 @ 45
(1976)	ISF Mistral-C	37 @ 58	155	2.17 @ 43
(1976)	Schempp-Hirth Mini-Nimbus HS-7	42 @ 62	155	1.87 @ 50
(1975)	Schleicher ASW 19	38 @ 65	152	2.13 @ 45
(1974)	Grob G-102 Astir CS	38 @ 65	155	1.97 @ 47
(1974)	Glaser-Dirks DG-100	39 @ 65	161	1.94. @ 46
(1969)	Schempp-Hirth Standard Cirrus (Cirrus 75)	36 @ 53	137	1.87 @ 44
(1968)	Schleicher ASW 15B	36 @ 55	137	2.00 @ 48
(1967)	Glasflügel H 301 Libelle	39 @ 59	155	1.80 @ 46
(1938)	DFS Meise	25 @ 42	136	2.20 @ 37

their own. A 4-view of the SB13, based on information and drawings found in various issues of the *TWITT Newsletter* and in *Silent Flight*, is provided in Figure 3; dimensions and other data are listed in Table 3.

Use of the new EH airfoils is recommended, as these sections have a near zero pitching moment and good lift and stall characteristics. The thickness of the EH 3/12 compares favorably with that of the sections used on the full size SB13 and affords the height needed for a stiff, torsionally rigid spar along with plenty of room for servos and control linkages entirely within the wing structure. Wing construction will pose some challenges, but no insurmountable difficulties. The curve of the wings is really the result of connecting three straight sections, sort of a highly modified Scheumann planform. A torsionally rigid spar reinforced with carbon fiber is a necessity, but otherwise a wing structure using normal "foam core and fiberglass skin" construction methods should work well.

Control hookup should, of course, match the original, with interconnected ailerons and elevators, differential rudder function, and spoilers. (The SB13 control system will be examined in detail in a future column.) Set aside an additional channel for retracting and extending the landing gear.

The SB13 is a truly beautiful machine which very much deserves to be accurately modeled. We'd appreciate hearing from *RCSD* readers who tackle this scale project.

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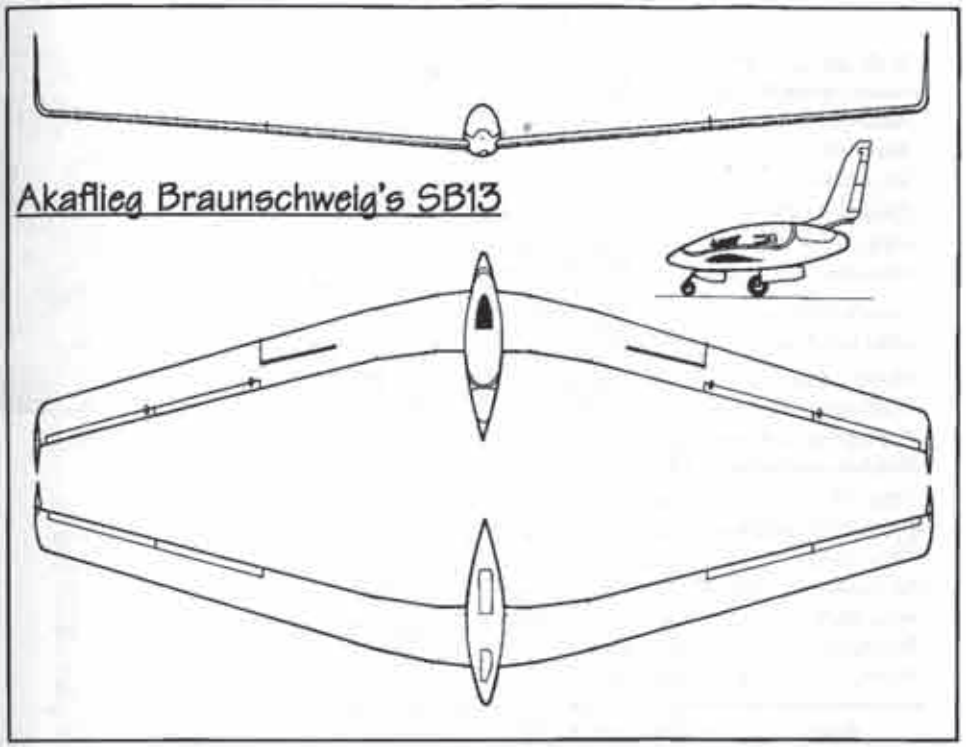

Figure 3

Table 3

Dimension	Magnitude
span	15 meters, 49.2 ft.
wing area	11.6 m^2, 124.8 ft^2
aspect ratio	19.4:1
wing twist, total	-1.5 degrees
dihedral	4 degrees
winglet height	1.25 meters, 4.1 ft.
fuselage length	3.02 meters, 9.91 ft.
empty weight	300 kg, 660 lbs.
control surfaces	aileron and elevator, with mixing, and differential rudders
maximum speed	210 km/h, 131 mph
landing gear	2 wheel tandem, retractable
best glide ratio	43.5 to 1
parachute recovery system	vacuum bagged, ballistic extraction, 20 Kg (44 lbs.), 1.35 ft^3

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Welch, Ann. *The Complete Soaring Guide*. London: A & C Black Ltd., 1986.

Basic Rules for Standard Class Sailplanes

1. 15 meter span maximum. Devices for increasing lift, i.e. flaps, are prohibited.

2. Air brakes are mandatory, but they cannot increase lift or improve performance.

3. The landing gear may be either fixed or retractable. The main wheel must be at least 300 mm in diameter and have a width of at least 100 mm.

4. Jettisonable water ballast is permissible. ■

Special Report on the International Slope Races at Torrey Pines

...by Dale Willoughby
Moffat, Colorado

At the Torrey Pines Gliderport on Saturday, 1 May, about 30 fans (with speed in their blood) gathered for the annual International Slope Race.

The weather was near perfect. Gentle breezes started about 10:30 AM, producing a steady flow of cool air from the Pacific ocean, causing a call for "volunteers" and, amidst the hustle and bustle, the red, orange, blue and white signal lights (3000 candle power) were set up at each end of the course, the frequencies sorted out, the pilots' briefing held, and by noon the first heat of four pilots launched their sailplanes.

Apparently every competitor knew the rules. "Basic AMA" said the contest director, Steve Condon, but the most time consuming discussion centered around the model passing the turn flag. The CD said that the sailplane must pass the signal light, make the 180° turn, and only then could the signal judge press his button to light the turn signal indicating the completion of that lap.

A few of those pre-registered failed to show up, but the flight list was filled with late arrivals with a final count of 33

The flying took its toll. Merrill Farmer's YUKON was really totaled, but recovered from the cliff side, when it collided with John Snider's NOVA. It survived though somewhat bruised.

Two of the most spectacular mid-airs occurred between Steve Condon's F3B Eagle and Jerry Bridgeman's MURPHY. Steve recovered control 150 feet from the beach with the right wing broken in half. With outstanding skill, he flew the EAGLE (with variable dihedral) back to the top and landed amidst rousing cheers of appreciation by the crowd! Jerry kept flying to win that heat and later the fly-off for first place on Sunday.

Much to the delight of both pilots and volunteers, John Christianson, a new Torrey Pines member for about a year,

Top 3 winners at ISR Torrey Pines
(L - R) Jerry Bridgeman - 1st, Thomas Pils - 2nd, Gavin Botha - 3rd
Photo credit: Mike Lee/ Coyote PMI San Diego

Well fed helpers pictured here at the end of two days of flying competition. Photo credit: Mike Lee/Coyote PMI San Diego

fed the noon meal, GRATIS! The menu for both days was tuna salad sandwiches, pasta and shrimp, potato chips, smoked yellow fin tuna, pickles, too house cookies galore, apples, oranges, soda pop of all kinds, and red licorice sticks. John owns the Point Loma Seafood Restaurant and was so busy feeding that he didn't fly either day. Also, the Condon family "cleaned out the Nabisco closet" and brought boxes of all kinds of their products. All for free.

One policy that I believe needs review for future contests is the awarding of the prizes among the volunteers. They only had to work two hours for one ticket. There were plenty of prizes, but I saw one person win 5 prizes while some of those who probably worked longer hours won nothing. It would seem to be much fairer if, once a volunteer won, that they put their second ticket back into the hopper until all those eligible had a prize. Then if there were any left, the drawing could continue for a second prize.

This writer is not complaining! I won a neat slope racer by C.R. Aircraft Models, designed and kitted by Charlie Richardson, named EXCEL. I worked around 6 hours helping Doug Huggard at the transmitter holding area. He faired better by winning the Airtronics 4 channel radio and sailplane kit.

While the event was labeled International Slope Races (ISR), a better name might be Interstate Slope Races, as all the contestants were from California, except Tim Neja who was from Scottsdale, Arizona. ■

Spinning Yarns at the Cheese Factory

Novato, California
...by Doug Skjerseth
Windsor, California

Yes, we do have a lot of fun flying at the Factory! You becha! If you haven't been out in awhile, well you're missing the best thing ever. We still start out by preaching to the cows not to leave the organic frisbees because getting servos in a cow pie can be difficult, not to mention launching one. After the zoom, a cow pie can travel over 110 mph. We've learned how to fly them; turn right, hit the crow, push down the flaps (apologize to the crow), and head for the spot. By this time, everyone at the landing site has put on fowl feather gear, goggles, and jumped into the trenches. We also have the 12 gauge shotguns at the ready to prevent any missed landings.

The trick is to see the pie overhead, and wait until it has passed, or you'll be like Larry, barred from coming home after flying until he's gone through a car wash a couple of times without the car.

I told you we had fun out at the Factory. Ya, I guess some changes have been made regarding the cows, and we had to make room for the baby elephants, too.

Flying baby elephant pies are tricky too, but we'll help you over it. It requires a stronger stab with dual flops.

I had a few words with Bill a few weeks ago. It started when Bill got his wings ruffled. Something about where to set up the winches. First, I hit Bill in the big toe; then Bill landed an upper cut to the chin, a full Nelson, a head lock, a chop, chop... When the ambulance showed up, it was all over. Well, maybe it didn't happen that way, but it sounded good. Love ya, Bill.

Charley has a new build 'im up himself from a Courtland's molded fuselage, 2 meter thermal ship with slope hopes. He's got it sweet spotted (no cows) and flies it like an 880 or even his 12 foot Special Charley Ship. Speaking of his 12 foot self built green streamlined machine, one day last year, he was making what looked like a hat landing. Ya, this 90 oz. 12 foot thing is coming right at him, and his brain goes to freeze frame. No switch on the transmitter for stop, so the only thing to do was lie down on his back as the hook hit his nose and teeth, slipped over his belly, and tipped his hat. That's no way for a dentist to floss.

Larry is flying an 880 Falcon type ship with as much skill as always, except when his battery almost caused a 3 alarm fire. Good thing the Hicks Valley fire station was close. With 400 cubic yards of foam on a sailplane, it made us think the cows had a bag of marshmallows the night before.

But unless you've seen his flying wing, you haven't seen anything. His first few launches were like a super sonic flying leaf. Flip. Flip. Flipper. Flop. Zoom. Whiz bang. And this was just getting it out of the car. Then, he launched it. It waved bye-bye; then up, up, pop, zoom. (This is fun, like a comic book.) It looped once, maybe twice, until it went in and out of control. We all hit the ground, then Larry. Once all of us stopped giving tips, he took over and trimmed it. It flies just like a cow pie, with dual flops. Well, he was hooking thermals and flying very well, but we still headed for the shelter when it launched.

Rolf's flying his 6th Sagitta, and is building 17 other sailplanes. Genesis, Renegade, an 11 oz. in. living room hand launch, 4 power planes, a space shuttle, and a hot air balloon launching unit are all being built at once. Just going into his building room is like a frog squeezing through the intestines of a blue tipped buzzard without being digested. More birds than you can count. You should have seen his super zoom launch of that Sagitta 900. It popped off at 120 mph, popped a wing pin, the wing spun, the 900 did a lomchulock or some such thing, rolled, looped, and gyro-rotated with one wing whirling like a helicopter. Well, you can't even find the crater where it hit as a redwood groove of trees have hidden the hole by now. I don't know how he does it; the 900 is back to perfection without a trace of that cow that was imbedded in it. ERRR, it still smells a little funny, though.

Les Anderson is back. Ya, Les, the in your pocket landing wizard of about 17 years ago, and still whizzing. He always landed his sailplanes in his right hip pocket. I think he used some heat seeking magnets or something. That's why he always has his hands in his pockets when he flies.

Phil's been coming out with his F3B G7WZ-44 supersonic, 620 mph, low flying, slick, super, zippo master, faster than a floater, 80-45750-8000 airfoil, band powered, strato, hand launch flier (glider? sailplane?) thing. Err? He wound up the winch to 10,000 rpm's, placed 1800 G's and 600 psi's on the line, and let "ER" fly. Like the Enterprise going into blurrrrr speed, that thing went out of sight. The winch, that is, popped out of the ground and sling-shotted down the field, passing through trees, flushed out four nudists, and came to rest 2 miles away after punching holes through the Cheese Factory's 6 walls... Well, almost. Once in the air, an F-14 Tomcat came in out of the sun at mock 3, and locked on Phil's plane. So, Phil gave a click of down and outran the sidewinders. Only four inches off the ground, the vortex suction of Phil's "thing plane" caused Don and his electric modified Monterey, 7 rabbits, Bugs Bunny, 2 ground squirrels, a sick skunk, and a drunk snake to be sucked up off the field and flutter in its vapor trail. I still don't know how Don got his Monterey out of the way in time. I think Don clicked his teeth together three times and said, "There's no place like the Cheese Factory." It reappeared.

Courtland, Charley, and I were out on King's birthday. The winds were 600 mph and from the south. They had their 2 meter, 660's, and I had the Sagitta and the 880 Falcon. I'm still learning the Falcon and 347 JR. I push the stick down and the flaps go down; I push to the right and the thing in the back moves the other lever switch on except on Fridays, 6 button on the side goes to the left and the landing gear goes down, 7th switch from the right is pulled down and bomb bay doors open, and the red switch is for the injection seat. Ya, I got it! Charley has been giving me some help and, after 400 hours of trying to get it, I'm going to launch into the breast of the mother of all winds.

Well, Court and Charley went up and had a wonderful flight and landed just a few feet away from the spot we cemented to the ground. You know. The one we got from the D-Day Invasion. I keep telling myself, "They taught me good. They taught me good." Dave up in Santa Rosa had fine tuned me in the week before, so I figured that with all the help that I'd do good. And, and, I did it! Ya, I even found a shear wave and was going up even in downwind turns. I did do it. Even the spot landings didn't require a back pack and water supply. Eat your heart out, Hugo!

You know, that's what it is all about. Just a wonderful bunch of guys helping each other and having fun, thrills, and developing wonderful lies to swap, when we get old and gray. ■

The French Cheese Factory is 9 miles west of Novato, California; AMA Charter 137. It is a great place to fly and the cheese is indeed fabulous! I miss all the good times I had there, and I appreciate the time that Doug took, weaving his yarn about cows, elephants, wings and things. If you get up to that part of California, which is just north of San Francisco, look up the folks. At least two names are listed in the Special Resource section. If there is anyone out or there is a contest scheduled, you should have a great time, as I always did. Thanks, Doug. Jerry ■

About the WSJ

The World Soaring Jamboree is an event, we think, that all R/C soaring enthusiasts will not want to miss. It is scheduled as a festival of FUN! And, the WSJ definitely promises to be a world class R/C soaring event.

Leading the agenda is an opportunity for you to participate in the special guest speaker program. This year's guest speakers are the famous airfoil designer and aeronautical engineer, **Professor Dr. Richard Eppler**. Prof. Eppler will give a speech at the Battelle NW Auditorium on the history of aviation as seen from his special vantage point. He will also provide entrants with a lecture/experiment presentation at the WSJ headquarters on "Induced Drag." **Professor Dr. Michael Selig** will be in attendance also and will give a presentation on Low-Speed airfoil design and wind tunnel testing. His presentation will introduce modellers to the work he has done in this area and the research project he is embarking on at the University of Illinois at Urbana-Champaign. And then **World F3B Champion and aeronautical engineer Mr. Joe Wurts** is presenting his special insights into the world of R/C Cross-Country soaring with a presentation about this very unique facet of the hobby.

Dr. Eppler's, Dr. Selig's, and Joe Wurts' presentations are reason enough to attend. However, the reason most of you will want to participate is, the flying events. The events include formats for thermal, slope and cross country flying. Specifically the Jamboree includes the following classes for thermal soaring: Open, Standard, Two Meter, F3J, F3B, F3H X-Country, Hand-Launch, and Scale. In addition, there are formats for slope competition. The slope classes include Novice, 60 Inch, and Unlimited racing. Along with the formalized competition, organizers are offering the novice and fun flyer a chance to participate, by providing Novice, Thermal, and Slope Fun-Fly days. There is even a day dedicated to the Power Scale Enthusiast. Also, Record Trials and North American Scale Soaring Association tasks are an integral part of the Jamboree. Now, if all the above weren't enough to attract modellers the world over, the WSJ is hosting a banquet and merchandise raffle, a special social evening that includes a wine tasting, and a vendor forum.

In order to provide a world class event, organizers have worked vigorously. As a result, the thermal events are located at a 450 acre sod farm, while the slope soaring events are scheduled to take place at either Eagle Butte or Kiona Butte. X-Country flyers have not been overlooked either with their flying taking place over miles of terrain that is open and unobstructed, offering the opportunity, should it arise, to land a X-country model off field without incident. Organizers have even arranged to have club winches available for all events including F3B. They also arranged with the FCC to accommodate international transmitter frequencies during this **ten** (10) day festival of soaring.

The Tri-Cities offers R/C and full scale pilots some of the best soaring in the world, with cumulus clouds that street for miles, and afford soaring aircraft rates of climb seldom found anywhere else in the world. And, soarers should know that the region is blessed with superb slope sites offering great lift with landing zones of grass. Suffice it to say, the Tri-Cities area of Washington State is a FUN place to visit. It is without a doubt a great place for any R/C soaring pilot visit in 1994.

Wil Byers

Promotions Director & Event Coordinator

1994

WORLD SOARING JAMBOREE

1994 WORLD SOARING JAMBOREE

Pre Registration Form

&

EVENT SCHEDULE

MAY 28 - JUNE 6, 1994

Make Checks Payable to World Soaring Jamboree

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AMA # _____ ARE YOU AN AMA JR? (YES)____ (NO)____

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DATE	EVENT	COST	PAID
MAY 28	SLOPE SCALE FUN FLY	$10	
MAY 28	THERMAL NOVICE DAY	$10	
MAY 28 & 29	THERMAL UNLIMITED	$30	
MAY 29	EVENING BANQUET - SELIG	$25	
MAY 29	SLOPE FUN FLY	$10	
MAY 30	SLOPE RACE NOVICE	$10	
MAY 30	TWO METER THERMAL	$20	
MAY 31	UNLIMITED SLOPE RACING	$20	
JUNE 1	STANDARD THERMAL	$20	
JUNE 1	JOE WURTS PRESENTATION	$02	
JUNE 2	60 INCH SLOPE RACING	$20	
JUNE 2	F3H CROSS COUNTRY	$20	
JUNE 2	SCALE JUDGING - EVENING	$02	
JUNE 3	F3J THERMAL	$20	
JUNE 4	SCALE THERMAL	$20	
JUNE 4	THERMAL HAND LAUNCH	$20	
JUNE 4	DR. EPPLER & EVENING SOCIAL	$15	
JUNE 5	P.S.S. SLOPE FUN FLY	$10	
JUNE 5 & 6	F3B THERMAL	$30	
JUNE 1-5	VENDOR FORUM	N/C	
JUNE 1-5	RECORD TRIALS	$10	
	TOTAL AMOUNT ENCLOSED ---------->		

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802 GEORGE WASHINGTON WAY
Richland, WA 99352
1-800-547-8010
1-509-946-7611

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1-800-222-2244
1-509-946-4661

NENDELS MOTOR INN
615 Jadwin Ave
Richland, WA 99352
1-800-547-0106
1-509-943-4611

SILVER CLOUD INN
7901 W. Quinalt Ave
Kennewick, WA 99336
1-509-735-6100
1-800-551-7207

CAVANAUGH'S INN
1101 N. Columbia Center Blvd
Kennewick, WA 99336
1-509-783-0611
1-800-THE-INNS

SUPER 8 MOTEL
626 N Columbia Cntr Blvd
Kennewick, WA 99336
1-509-736-6888
1-800-800-8000

QUALITY INN
435 Clover Island
Kennewick, WA 99336
1-509-586-0541
1-800-628-7458

BALI HI MOTEL
1201 George Washington Way
Richland, WA 99352
1-509-943-3101

COLUMBIA CENTER DUNES
1751 Fowler
Richland, WA 99352
1-509-783-8181

DON'T FORGET TO TELL THE HOTEL or TRAVEL AGENCY THAT YOU ARE MAKING RESERVATIONS FOR THE WORLD SOARING JAMBOREE!

COMMUNITY INFORMATION/MATERIALS

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RICHLAND, WA 99352
1-509-946-1651

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P.O. BOX 2241
TRI-CITIES, WA 99302-2241
1-509-735-8486

DISCOUNTED TRAVEL & RENTAL CAR RESERVATIONS

COLUMBIA BASIN TRAVEL
1733 GEORGE WASHINGTON WAY
RICHLAND, WA 99352
Kim Travis
1-800-356-6694 or 1-509-943-4686

HERTZ CAR RENTAL
3601 N. 20TH STREET
PASCO, WA 99301
Penny Fine
1-509-547-1091

CREATIVE TRAVEL
1422 JADWIN AVE.
RICHLAND, WA 99352

1-800-735-0211s

COLUMBIA PARK CAMPGROUND
6601 Columbia Dr. SE
Kennewick, WA 99336 (1-509-783-3711)

U.S. ARMY CORPS OF ENGINEER PARKS
Ice Harbor Project
Rt. 6 Box 693, Pasco, WA 99301 (1-509-547-7781)

Behind the Scenes at the WSJ

...by Judy Slates

There is a lot going on behind the scenes at the WSJ. An event of this size, needless to say, requires many dedicated contest directors, helpers, and support. What's up? What are some of the key happenings to date?

A 4 page pre-registration package was mailed to 800. It included an overview of the event, a pre-registration form, and hotel/motel reservation and other discounted travel information. Due to requests for additional information, the pre-registration form is included in the issue. If you have any questions, the event registrar is Charlie Harris, and he can be reached at (206) 641-4492.

Everyone who pre-registers will be mailed a copy of the WSJ Official Program. The Program is 32 pages, 8 1/2" X11", and will be available on April 1. It contains the procedure for registration, the rules and regulations for **each** sailplane event, the contest director for the event which includes an address and phone number, and a map of the area with detailed instructions on how to get to each location. Additionally, it includes points of interest for those interested in seeing the sights. Sufficient copies of the Program have been made so that last minute entrants and spectators will be able to obtain copies from the registrar.

The official sponsors for the WSJ are The Richland Chamber of Commerce, JR Radio, Slegers International, and the following clubs: Mid-Columbia Soarers, Moses Lake R/C Modelers, Seattle Area Soaring Society, Portland Area Soaring Society, Oakalla Hawks RC Gliding Club, Albuquerque Soaring Association, Inland Empire Soaring Society, and North American Scale Soaring Association.

As of this writing, there are already 16 supporting sponsors donating to the raffle, and the hobby shop sponsor, Hi TecHobbys, will be at the site for those needing repair materials, etc.

The evening vendor show is informal. After a day of flying, just show up at the pool area of the Tower Inn, relax, and exchange sailplane stories.

You can't pre-register for the record trials unless you know the cost, as the cost varies dependent upon the event. The CD is Gary Anderson and he can be reached at 875 Maple Drive, Goldendale, Washington 98620; (509) 773-5257.

During his stay, Dr. Eppler plans to attend an informal get together at the airport on full-size.

About the sites? Wil says, "We will be mowing all the landing zones at the slopes next weekend and one week prior to the event. So, the landing zones should be very model friendly. Additionally, the sod farm owner will have enough room to park a minimum of 150 cars. He will also have the flying field mowed three times during the week long event. And he will be watering the field each night, of course, to keep it from dying. The water will be great for both eliminating any dust and to help generate thermals, as it evaporates from the grass in the early morning. The farmer tells us that the field will be like a golf course when the event date arrives. You might make note that the sod farm is really 3000 acres, but there is only 450 acres of it planted in sod. However, other low growing crops surround the field."

"Also at the sod farm we will have 14 winches set up with eight winches active. If a winch breaks down we will simply move to the next winch and its associated landing circle. This should help the contest run smooth. Gary McVay and I both bought brand new BAT winches this morning from Bob Harman. These winches are the BEST and we will be loaning them to the WSJ for the duration of the event. Also, Bob plans to bring a couple himself and Mike Mellor will be letting us use his."

You haven't pre-registered yet but intend to attend? The pre-registration deadline is May 15, but remember that only a limited number of flyers can be excepted for each event. The following notice appeared in *SASS Update*, the newsletter for the Seattle Area Soaring Society, Waid Reynolds, editor, "Only a limited number of flyers will be accepted for the Unlimited and 60-inch slope racing events. These events will fill up very rapidly! It's first come, first served. Get your entry in EARLY! ...Be sure you indicate the events you want to fly, and the primary and alternate radio channels for each event."

The Seattle Club is busy "Warmin' Up", as well, and Waid's editorial column contains two more items of interest.

"WSJ Slope Race Training Session: Yes, you've seen it before. There will be a training session

for all potential race officials at 60 Acres on March 12th beginning at 9 AM. If there is any possibility that you may be able to help out at the WSJ slope races, please plan on attending this session. It is extremely important we know in advance how to do our jobs so that we are not learning the hard way at WSJ."

All the clubs involved are obviously working really hard to make the WSJ a special event. We know this is not easy, and wish to thank everyone for their efforts on behalf of all those that will be in attendance! (Waid, we also saw the note where you referred to RCSD as "our favorite magazine". Flattery will get you everywhere! Thanks!)

"Columbia Park Campground: The Columbia Park Campground in Kennewick opens April 1. That is when they officially start taking reservations. But don't let that stop you from sending them in right away... The campground has electricity and water at the sites, and it has a dump station. The nightly fee is $9. One night's fee is required to reserve a space. Make checks out to the City of Kennewick." *The correct address and phone number are included under the reservation listing in this issue.*

WSJ shirts and hats will be available at the event.

The Richland Chamber of Commerce is putting some things together with the local radio stations and a couple of restaurants to give the flyers recognition and to provide meal discounts. Additionally, they will have some of the local service organizations providing food at the sites for spectators and competitors.

In regards to coverage, Wil also says, "We might want entrants to know that every U.S.A. magazine I have talked to including *Silent Flight*, England, will be covering the event." (1/2 page ads appear in *MA, RCM & MAN* in the May issues.)

Who's coming from *RCSD*? Jer will be there for the whole time. The other definites as of this writing are Wil Byers (naturally), Mike Bamberg (one of the CD's), Gordon Jones, Ed Slegers, and Bill Kuhlman.

How does Joe do it? It seems that Joe Wurts has registered for every thermal event including F3J and F3B. He has also registered for unlimited slope racing, hand launch and cross country. Rumor has it on good authority that records may indeed be broken at this event! Steve Neu from San Diego has already pre-registered, too!

Who's going? Well, as you can see, the World is invited. But until many are able to firm up their schedules, we're not exactly sure who will be there. The three from Texas are Barry Kennedy (who will be driving up with Jer), and Fred Mallett. David Garwood dropped us a note from New York saying he hoped to see us there. Jack Sile, England, will be the CD for F3J. Others are expected from Australia, England (two pre-registrations already include Robin Sleight and Rod Pots), Canada, and Germany. Many IMSF folks are coming from Utah according Bob Harman who will be there. Other large contingents are expected from Oregon, Washington, Northern California, and Southern California.

Want to share a ride up or a room? We may be able to help out. Just give us a call and we'll start a list so we can put you in touch with others. Days are the best time to call.

If you plan to go, if nothing else, reserve your room now! A soccer group is waiting impatiently in the wings, and they want those rooms! ■

The Santa Clarita Soaring Association
1st Annual SCSA California Double Cross
RC Sailplane 446 Cross Country

A unique Cross Country meet at one of the best sites around! This contest will emphasize having fun. If you have never flown Cross Country come on out and give it a try; if you're experienced take a shot at the (former) world's best.

Traditional California Valley 26 mile course and a 16 mile course
California Valley
June 11 & 12, 1994
Cost: $25 per team

Entries are limited only by number of frequencies. Contest is AMA sanctioned. Model weight limit is 11 pounds. Models will be weighed. Compliance with vehicle code and all other applicable laws required. 55 mph speed limit. Each team to supply their own launching equip. 9:00 AM pilots meeting Sat. & Sun., 9:30 AM course open Sat. & Sun. Course closes 5:00 PM Sat. & 3:00 PM Sun. Cards and markers will be issued to teams. Cards will require punching at major corners on courses. Punches will be affixed to posts on the course. Team Markers (supplied) will be set out by teams when the course is not completed. Contest official will drive course after closing, official odometer reading will be taken during retrieval of team markers. A starting/finish official will be used to spot glider to verify and document course entry and completion times. Only one glider per team on course at any time. Either course can be run at any time. No limit on number of attempts. Scale Entries welcome and will compete on 16 mile course only. Ribbon for 1st place scale.

Newcomers to the sport of cross country flying are encouraged to attend. All types of sailplanes are welcome. Do not be intimidated by the open class cross country ships because you can choose to fly the short course only.

Pre-registration due date May 7, 1994

Scoring: Best time for each completed course normalized to 1000 pts. Best distance used if courses are not completed.

Awards: 4 Ribbons per team will be given for 1st, 2nd, and 3rd place for long course, 1st, 2nd, and 3rd, for short course, and 1st, 2nd, and 3rd place overall based on combined short and long course scores.

Lodging: California Valley Motel. Camping adjacent to Motel, and at contest site. No hook-ups.

BBQ/Dinner: Saturday evening (approx. 8:00 pm) at California Valley Restaurant across street from motel. Cost for meal is $9.95 for adults and kids 12 and under $5.95. This has traditionally been a super meal.

Additional volunteers needed & welcome.

Contact Keven Anderson at 27059 Littlefield Dr., Valencia CA 91354, (805) 296-5126 or the Contest Director, Dean Clark, (805) 255-2106.

Los Banos Slope Scale Soar-In

SPONSORED BY

South Bay Soaring Society in cooperation with NASSA

MODERN ▪ VINTAGE ▪ POWER SLOPE SCALE

FUN-FLY
April 23 and 24, 1994

- No Scale Documentation Required
- Winches will be Provided
- Aero Towing Available
- Awards for Best Sailplane and Best P.S.S.
- Nearby Hotels and Motels

At Los Banos Reservoir, Los Banos, California

Event Director: Lynsel Miller (408) 275-6403
Call for reservations and information packet

$10 Advance Registration Fee - $15 on Site Registration

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 - Thirty five dollars for a six hour plus Composite Technician lesson includes lunch! Two people minimum, please. 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: SLOPETECH, Southern California; (714) 525-7932, 2400 - 8-N-1

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

BBS: Tehachapi Mountain Bird's Nest, California; (805) 822-5434, 14.4 - 8-N-1

Contacts & Soaring Groups

Arizona - Southern Arizona Glider Enthusiasts, Bill Melcher (contact), 14260 N. Silwind Way, Tucson, Arizona 85737 U.S.A., (602) 325-2729. 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.

England (BARCS & European contests), Jack Sile (Editor), 21 Bures Close, Stowmarket, Suffolk, IP14 2PL, England, Tele. # 0449-675190.

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.

Maine - DownEast Soaring Club (Northern New England area), Steve Savoie (Contact), RR#3 Box 569, Gorham ME 04038 U.S.A., (207) 929-6639.

Maryland - Baltimore Area Soaring Society, Bill Cavanaugh (President), 1428 Park Ave., Baltimore, Maryland 21217 U.S.A., (410) 523-0778.

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

Nevada - Las Vegas Soaring Club, Jeff Burg (President), 853 Shrubbery Lane, Las Vegas, Nevada 89110 U.S.A., (702) 459-8100.

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) 271-5334.

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.

NASSA
North American Scale Soaring Association

The North American Scale Soaring Association is an organization of scale soaring enthusiasts dedicated to the furtherance and enjoyment of scale soaring in North America. Membership dues are $10.00 a year, and provide for sponsorship of NASSA Scale Fun Flys & Rallies, and for the implementation of a National Scale Building and Soaring Achievement Program. Join NASSA and join a network of scale soaring enthusiasts that influence the direction of scale sailplanes in North America. Please provide your address, phone #, and AMA #, and we will send you a membership card and membership roster. A bi-monthly column keeping NASSA members up to date is included in *RCSD*, with additional information available periodically direct from NASSA. Help promote and support the continuation of scale soaring by sending $10.00 to: NASSA, P.O. Box 4267, W. Richland, WA 99352.

The Vintage Sailplane Association

Soaring from the past and into the future! The VSA is dedicated to the preservation and flying of vintage and classic sailplanes. Members include modelers, historians, collectors, soaring veterans, and enthusiasts from around the world. Vintage sailplane meets are held each year. VSA publishes the quarterly BUNGEE CORD newsletter. Sample issue: $1.00. Membership is $15.00 per year. For more information, write to the:

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

F3B/USA • F3F/USA
RC Sailplane Technical Journal

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

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

T.W.I.T.T.
(The Wing Is The Thing)

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

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

LSF

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

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

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

You are invited to join the
NATIONAL SOARING SOCIETY

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

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

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*.

Fling Thing

...from Future Flight

The Fling Thing is a smaller version of the Thermal Thing. It features computer designed aerodynamics to deliver beautiful performance and handling. With a wing area of 340 sq. in. and a weight of just 14 oz., the light wing loading gives great launches and easy climbs on light lift. The 56.5 in. wing span makes the Fling Thing AMA hand launch legal and also easy to transport.

The all wood, Fast-Build™ construction minimizes the time from box to flying, so if you've built at least one model before, the Fling Thing should be a breeze to assemble and fly. It can be flown by hand launch, high-start, gas or electric. The kit comes with all hardware and a value pricing of $21.95. Kits are available from hobby shops, retail outlets and direct from Future Flight. For more information, contact: Future Flight, 1256 Prescott Ave., Sunnyvale, CA 94089; (408) 735-8260. ■

Precision Industrial Models & Patterns

...from E.S. Designs and Models

We are manufacturing a line of wood skinned wing and tail parts in various stages of completion from basic kits to our top of the line beautifully finished products.

We have developed a new type of hard mold skin pressing procedure, which results in greater fidelity of the airfoil and overall accuracy. This process also results in better bonded skins, stronger and lighter parts.

The top of the line wings and tails feature:

- Composite spar, wing rod carrier system and root rib installed.
- Composite molded L.E. installed and completely finished.
- C.F. reinforced completely finished T.E., hinge line parts cut, faced and beveled.
- Anti-flutter C.F. torsional reinforcement.
- Servo wells routed out with servo cover mounting rails installed under the skin.
- FG servo covers with control rod fairing or laminated ply and bass wood type available.
- Performance oriented wing planforms with RG 14A - 1.4/7.0 and 15 airfoils for slope and thermal flying. More wing planforms and airfoils available soon.

For more information and prices, please send a self addressed stamped envelope to E.S. Designs and Models, 510 West 9460 South, Sandy, Utah 84070; Ed's phone/FAX is (801) 567-9542, or Bob's phone is (801) 571-6406. ■

E-Z Retriever

...from Innovative Product Design

For those not familiar with the E-Z Retriever, it is built like an open faced spinning reel with a stationary line spool and a rotating ball assembly. The bale winds the line back onto the spool just as it came off. It therefore produces absolutely no line twist. It is even possible to use monofilament line which produces less line drag than braided line and allows for a higher launch. The retriever also features variable drive which provides a high gear ratio to get the line quickly into the air, and a low ratio to give more pulling power on the ground. The shift is accomplished by moving a lever on the front of the cabinet. The retriever is operated by depressing a single foot switch which is on a 10 foot cord. (No hands are required.) By placing the switch next to the winch switch, it is easy to make solo retrieves.

First among the changes made to the "Model 32" was making the bale assembly much stronger. The bale arm is now laser cut from 7 gauge steel and houses a ball bearing line guide roller. The bale wire attachment is also much stronger. A large skirt was added to the back side of the line spool to reduce the chance of the line getting behind the spool as it occasionally would do. The bale hook was moved to keep it out of trouble and a plate was added to the line guide eyelet to allow it to hold better in soft soil. Also the motor was moved farther from the retriever mechanism to eliminate the possibility of interference between the bale and the motor pulley. For more information, contact Jim Harger at Innovative Product Design, 1911 Wolcott Drive, Columbia, MO 65202-1904; (314) 443-6708. ■

Big Birdy

...from Just Plane Fun Models

The Big Birdy is a standard class sailplane kit which was very popular in the 70's and 80's and is now back in production. When the Big Birdy was first being manufactured, it boasted of having the largest wing area (1045 sq. in.) for its type of sailplane kit in the industry. Today, it is being manufactured from the original drawings of its designer, Buzz Waltz, and has been re-engineered to meet today's launching and flying standards.

The kit parts are machine cut to size to assure a perfect fit and a short construction time. The wing is built in two sections which are joined together by a 1/4" diameter steel wing rod that slips into a brass tube that is built into the 1/8"x3/8" spruce I-beam spar, which is sheer webbed by 1/8" balsa to the wing tip. All pieces of the kit can be built right on the clear, easy to read, full size plans; a clear and precise instruction manual is provided with step-by-step directions.

The Big Birdy can be flown by either using a 2 channel radio for the rudder operation of a 3 channel radio for the addition of spoilers. The radio compartment is large enough to house any standard size servos, receiver, and battery pack.

The Big Birdy is for the beginning, entry level flyer as well as the experienced sailplane pilot who wants to take a break from the fast pace of high tech carbon fiber/fiberglass.

For kit and dealer information, contact: Just Plane Fun Models, 3390 Paseo Barbara, Palm Springs, CA 92262; (619) 327-1775. ■

Custom Cores

...from RA Cores

RA Cores of Southbridge, Massachusetts is proud to announce the introduction of their new fully computerized foam cutting capability. This custom designed cutter is capable of cutting one piece panels up to 56" wide for you glider types, 27" chords for giant scale types, and up to 6" thick foam (soon to be upgraded to 12"). This new cutter is completely template free and cuts with an accuracy of greater than .001" (2016 steps per inch on the X axis and 5600 steps per inch on the Y axis). Gone are the templates that took so long to create and align, and gone is the laborious setup/alignment time for one of a kind custom orders. Multiple taper glider wings will have aligned cores beds allowing for one piece sheeting, if desired. Pattern and power wings with true incidence. We expect to turn custom orders around within a week of receipt (foam greater than 4" thick is not normally stocked and may take a bit longer).

For custom wing designers and manufacturers, we can scan and digitize your paper templates or you can provide data points for the desired airfoil. Our native format is floating point X/Y values with the leading edge at 0, normalized to 1.0 (pretty much the stock coordinates provided in such publications as *SoarTech*). We can allow for sheeting of various thicknesses.

We appreciate the patience of our customers during this startup time and apologize for the delays it caused. We feel that the improvement in quality this process has brought was worth the effort. The unexpected always happens and Murphy was my full-time assistant.

Please address inquiries to: RA Cores, P.O. Box 863, Southbridge, MA 01550 or (508) 765-9998. ■

ASW-17, Orlice, Ornith & Stiletto RG-15

...from Viking Models, U.S.A.
Jerry Slates

1/5 Scale ASW-17

At last, after many requests, my 1/5 scale ASW-17 is back into production. I have made a new mold and also added a canopy tray to this beautiful model. The wing span is 135 inches with a modified Eppler airfoil; the fuselage is 49 inches long. Controls required are: rudder, elevator, ailerons and flaps. For that little extra you can add spoilers and a retractable wheel.

The semi-kit includes: epoxy fiberglass fuselage, epoxy fiberglass canopy tray, clear canopy, and a drawing. The price is $85.00, plus $10.00 shipping.

1/5 Scale Orlice

The Orlice is a new scale fuselage, and is a bit different with its V-tail. The wing span is 135 inches with an E-392 airfoil, and the fuselage is 49 inches long. The controls required are rudder and elevator mixing on its V-tail and ailerons. For a little extra, spoilers and a fixed mono-wheel can be added.

The semi-kit: includes: epoxy fiberglass fuselage, epoxy fiberglass canopy tray, clear canopy, and drawing. The price is $75.00, plus $10.00 shipping.

1/5 Scale Ornith

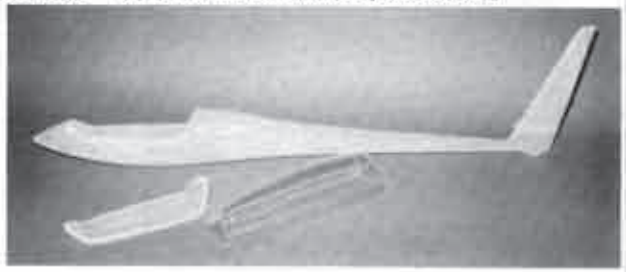
The Ornith has very pleasing lines for the scale builder. The fuselage has a molded wheel fairing and added support in the fin to support its T-tail. The fuselage is 49 inches long, wing span is 142 inches using an E392 airfoil, and the controls required are rudder, elevator, ailerons and spoilers.

The semi-kit includes an epoxy fiberglass fuselage, epoxy fiberglass canopy tray, clear canopy, and a drawing. The price is $85.00, plus $10.00 shipping.

Stiletto RG-15

If you're looking for a generic fuselage to design that next slope racer or contest thermal glider, take a good look at the Stiletto RG-15. The fuselage is 49 inches long with a 10 inch RG-15 profile molded into the fuselage, and weighs approximately 8.5 oz. This fuselage is laid up using multiple layers of S-fiberglass and Kevlar, and is very strong. The price is $75.00, plus $10.00 shipping.

Please come see my line of Generic and Scale fuselages at the WSJ; look for the Viking Models, USA sign. Jerry Slates, Viking Models, U.S.A., 2 Broadmoor Way, Wylie, TX 75098; (214) 442-3910 or FAX (214) 442-5258. ■



ASW-17

Orlice

Ornith

Stiletto RG-15

Schedule of Special Events

Date	Event	Location	Contact
Apr 23-24	Slope Scale Soar-In Fun Fly	Los Banos, CA	Lynsel Miller, (408) 275-6403
Apr 23-24	DUST Scale Soaring Fiesta	Indio, CA	Buzz Waltz, (619) 327-1775
May 14	Mid-South Warm Up	Huntsville, AL	Lars Ericsson, (205) 859-0255
May 14-15	Masters of Soaring	Covina, CA	Pete Olsen, (909) 597-2095
May 14-15	SVSS Spring Fling	Davis, CA	Joan Nolte, (916) 966-0857
May 20-22	Fun Flying & Combat	Wichita, KS	Pat McCleave, (316) 721-5647
May 21-22	Renewed CVRC	Visalia, CA	Ed Hipp, (209) 625-2352
May 21-22	CSR International	Davenport, CA	John Dvorak, (408) 259-4205
May 21	SASS Novice Classic	Seattle, WA	Sherman Knight, (206) 455-2345
May 29-30	Radio Glide	Oxford, England	Jack Sile, 0449-675190
May 30	1.5m Hi-Start Contest	Lancaster, PA	Frank Wren, (717) 397-9032
May 30	Hand Launch	Poway, CA	Bill West, (619) 222-5296
May 28-June 6	World Soaring Jamboree	Richland, WA	Wil Byers, (509) 627-5224
June 4	Hand Launch	Poway, CA	Bill West, (619) 222-5296
June 11-12	XC Race - SCSA California Double-Cross	California Valley, CA	Keven Anderson, (805) 296-5126
June 11-12	Nebraska Soaring Open	Lincoln, NE	Loren Blinde, (402) 467-4765
June 11-12	BASS 2nd Annual HL & 2m	Baltimore, MD	Frank Weston, (410) 974-0968
June 18	Ohio Cup Thermal A&C	Dayton, OH	Jim Martin, (513) 376-9046
June 19	Ohio Cup Thermal B&D	Dayton, OH	Jerry Shape, (513) 843-5085
June 18-19	WRCC Spring Fling	Wichita, KS	Pat McCleave, (316) 721-5647
June 25-26	Flatland Open	Hillsdale, KS	Ed Kempf, (913) 780-5543
June 23-26	Mid-South Championships	Memphis, TN	Bob Sowder, (901) 757-5536
June 26	SASS Novice Classic	Seattle, WA	Sherman Knight, (206) 455-2345
July 9	10th Annual HL (A)	Dayton, OH	Gale Leach, (513) 429-2543
July 10	Open B&D	Dayton, OH	Bob Massman, (513) 382-4612
July 16-17	COGG XC "Dash for Cash"	Cookstown, Ont. Canada	Jack Nunn, (705) 728-4467
July 16-24	AMA NATS	Lubbock, TX	AMA
July 23-24	Inter Glide F3J	Birmingham, England	Jack Sile, 0449-675190
Aug. 6-13	LSF Nationals	Muncie, IN	Mike Stump, (616) 775-7445
Aug. 6	Hand Launch	Poway, CA	Bill West, (619) 222-5296
Aug. 8 (eve.)	1.5m Mini Hi-Start	Muncie, IN	Ray Hayes. (810) 781-7018
Aug. 13-14 & Aug. 20-21	Holland Glide	Amsterdam/ Amay Belgium	Jack Sile, 0449-675190
Sept. 10-11	F3J - Germany - Heerieden, Bavaria		Jack Sile, 0449-675190
Sept. 17-18	SIG/EISS Glider Contest At the Antique Airfield	Blakesburg, IA	Jim Porter, (800) 524-7805
Sept. 24	SASS Novice Classic	Seattle, WA	Sherman Knight, (206) 455-2345
Sept. 24-25	TNT	Austin, TX	George Parks, (512) 443-7029
Sept. 25 & Oct. 2	2m Postal - Details Coming - Everywhere		Steen Hoej Rasmussen
Oct. 1-2	21th Annual CVRC Fall Soaring Festival	Visalia, CA	Phil Hill, (209) 686-8867
Oct. 9	SASS Novice Classic	Seattle, WA	Sherman Knight, (206) 455-2345
Dec. 3	Hand Launch	Poway, CA	Bill West, (619) 222-5296

June 23 - 24

CROSS COUNTRY

Awards: 1st - 4th place
Junior/Senior/Open - Combined

June 24

HAND-LAUNCH GLIDER

Awards: 1st - 3rd place
Junior/Senior - Combined
& 1st - 3rd place, Open

June 25 - 26

UNLIMITED SAILPLANE

Awards: 1st - 5th place both days
Novice, Sportsman, Expert
& 1st - 3rd place both days, Junior

Due to the popularity of this contest, pre-registration is required by June 1, 1994. For complete information, write to Mike Kelly, 273 Sanga Road, Cordova, TN 38018, (901) 756-9410.

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Personal ads are run for one month and are then deleted automatically. However, if you have items that might be hard to sell, you may run the ad for two months consecutively.

For Sale - Business

MINI HI START KIT designed especially for 1-1/2 meter (hand launch). Thirty feet of 1/8 tubing stretches four times relaxed length for gentle launches. Two day glow colored tow lines, 120' and 150', use separately or together. $29.95 + $4.00 shipping. Sky Bench Aerotech, 58030 Cyrenus Lane, Washington, MI 48094; (313) 781-7018.

SPECTRUM OPEN CLASS SAILPLANE - ATF, ready for paint, covering and radio installation. $599.00. Will build open, 2-meter, slope and electric sailplanes. Please call Tom's Custom Building Service with inquiries, (612) 944-6246, 9:00 am - 8:00 pm CST.

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

RONZ PLANZ offers model CAD documentation customized to your requirements. Modeler with 39 years of experience offers services to document anything model related. Precise and reasonably priced. Contact: Ron West, P.O. Box 14424, Huntsville, AL 35803; FAX/Ph (205) 883-8729.

JOUSTER FIBERGLASS FUSELAGES available from American Craftsman. 3 meter. Harley has seen and commended. Made of fiberglass, epoxy and kevlar. Extremely strong, average weight 14 oz. $90.00 plus S&H. Call Bill Iurato @ (201) 327-2476 or Jack Strehl @ (914) 357-4013.

60" WIDE FIBERGLASS CLOTH. We still have some left! This is 3 oz/yd^2 bidirectional material which easily conforms to compound curves. We've reduced the price by 25% — now just $3.00 per linear yard postage paid. B^2 Streamlines, P.O. Box 976, Otalla, WA 98359-0976.

For Sale - Personal

Sonic 100, built w/wing servos... $350.00; Sonic 2M with w/wing servos... $300.00; two S3021 glass bagged wings, 1 plug-in and 1 bolt-on three piece... $125.00 ea; Falcon 880 fuse & sheeted wing... $200.00; Banshee fuse & sheeted wing and stab... $225.00; Genesis, built w/new 141 wing servos... $650.00; Raven, built 3+ meter wingspan... $550.00. Gordon Jones (214) 271-5334 after 5 pm, Texas.

Airtronics LEGEND, RTF... $350.00; 2m DUCK, modified planform, S-3021 foil... $300.00; Micro-SPIRIT hand launch... $75.00. NIB KITS: MARIAH... $125.00; Dodgson CAMANO 100... $150.00; Dodgson TODI... $150.00; Dodgson MAESTRO III... $150.00. Misc.: Airtronics 7 ch module transmitter with ATRCS 3.0... $350.00, Tx module and 2 receivers on ch 26, extra battery negotiable; Ace DIGIPACE... $60.00. All prices include shipping except Micro-SPIRIT. Jim Thomas (206) 488-2524, Washington.

SAGITTA 2m, test flown, flies great, standard kit but w/glassed fuse & solid fin, RTF, all gear in (Airtronics)... $200.00. Leigh Hodgdon (415) 858-3582 (day), (408) 243-7250 (eve), N. Calif.

"REACTION" F3B ship, used in last team selections, RG-15, T-tail, similar to COMET 89T, excellent condition, includes Becker wing servos, 1200 mah battery pack, Airtronics wiring harness... $575.00. Lenny Keer (303) 737-2165, Colorado.

Futaba, 9VAP transmitter including 700m1 SR battery pack with RF module... $250.00 OR without module... $190.00; Ace Thermic Sniffer... $85.00. Herb Rindfleisch, 425 Hazel Dr., Berea, OH 44017; (216) 243-9240.

Airtronics Vision VS8SP PCM, brand new, ATRCS version 3.0... $595.00; Falco 180, ARF kit... $75.00; Super CHEETAH, built, never flown... $100.00; Airtronics SAGITTA 600 kit, NIB... $45.00; Dynaflite WANDERER kit, NIB... $25.00; Great Planes ELECTRA kit, NIB... $35.00; Airtronics ADANTE, two sets of wings... $105.00; Airtronics OLY II kit, NIB... $45.00; Dynaflite APOGEE kit, NIB... $45.00; PANTERA 121... $125.00. Mike Stephenson (918) 445-3002, Oklahoma.

Airtronics Infinity 660, NIB, bench set up only, channel 36, PCM, 5 102 servos, moving up to a Vision; Dodgson WINDSONG, NIB, pre-built fuse by R. Dodgson, no time to build, first $200.00 takes it. Steve Savoie (207) 929-6639, Maine.

FALCON 880, 3021 airfoil, 60 oz. weight, 6th place at AMA NATS & LSF, never crashed, good condition... $400.00 + shipping; MARIAH 2m kit, complete w/carbon boom... $200.00. Tom Williams (405) 741-8016, OK.

NIB Graupner spoilers 10", cost $35.00... sell $20.00; NIB Graupner spoilers 15", cost $40.00... sell $25.00; NIB Multiplex spoilers 14", cost $40.00... sell $25.00. Plus $2.50 shipping. SAGITTA XC, good condition... $250.00 + shipping. David (801) 364-7761, Utah.

110" span Original Design all composite glider with glass/kevlar fuse, glass/carbon/Spectra wings, weighs 67 oz. for a 10.3 oz. wing loading... $350.00 w/o servos or $500.00 w/6 servos wired for JR. Pat McCleave (316) 721-5647 eve & weekends, Kansas.

Robbe ASW-27, 3.5m, HQ3-14, optional flaps, NIB... $525.00; Fiber Glas Flügel DG-600, 3.6m, HQ3-14, moulded glass beauty, flaps included, NIB... $700.00; Simprop SAGITTA 2.2m, speed/aerobatic NACA 2R112 root, NACA 0010 tip, NIB... $250.00; VS Sailplanes Vmax+ glass fuse, E374, 7.5%, NIB... $100.00; Airtronics servos, NIB: 94738... $40.00 ea., 94141... $30.00 ea. Bob (619) 753-8146 Calif.

Airtronics module radio, 7sp... $95.00; Larry Hargrave JAGUAR, 72", built and flown... $50.00. Mark Foster (213) 257-4573, after 5:30 PM, SO. CALIF.

Airtronics Champion Series transmitter, ch 14, gold stickered. Includes flap/elevator, flaperon mixing modules, extra transmitter RF board, & charger (no receiver or servos)... asking $75.00, includes shipping. Chuck (201) 584-3117 eve., New Jersey.

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How To Read Your Label for Expiration

214 1ST 94/01

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

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"The AVION"

(ah-V_YOHNG)

Fuselage

The **AVION** *is a small lightweight epoxy glass sailplane fuselage. The* **AVION Professional** *is reinforced full length both sides with 1.7 oz. kevlar and features carbon tow molded into the canopy saddle and wing saddle areas for longlasting strength. The* **AVION** *can be used as an optional glass fuselage for a number of popular built-up fuselages, outdated glass fuselages or your own new handlaunch or slope sailplane design.*

Specifications: Length w/ rudder: 35.5"; Width at widest point: 1.3"; Weight: 3.5 oz.. The AVION features a molded fin. The AVION accomodates bolt-on wings with a 7"-8" root chord between 59"-72" length.

Capacity: Up to 3 micro servos; micro receiver; up to 600 mah battery; switch harness.

AVION Professional price is $65.00(US.)
AVION Standard price is $55.00(US.)
Price includes a fiberglass canopy and CAD drawings showing the emmpanage and fuselage construction and the electro-mechanical control system.

WRIGHT MANUFACTURING CO.
P.O. Box 3281 / Bellevue, Wa. / 98009

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"Another Wright Manufactured Product"

Liberty

Liberty is a generic two-meter thermal or slope fuselage. Liberty is the second in a series of generic sailplane fuselages from Wright Mfg. Co. with specifications necessary to support a two-meter plug-in wing. Liberty Plus is reinforced with kevlar and carbon fiber in specific stress areas for longlasting strength.

Liberty Plus: $75.00 (US)
Liberty Standard: $65.00 (US)

Available from:
SLEGERS INTERNATIONAL
201-366-0880 (9:30am-5:30pm EST)
and

Specifications: Length: 40 inches; weight: 6oz.; width at widest point: 2" molded fin; full flying removeable stabilizer; accomodates 2-meter plug in wings with a 9-10" root chord up to 84" long.

Capacity: Up to 4 standard servos; standard receiver; up to 1200 mah battery power; switch harness.

Includes: Molded glass canopy.

WRIGHT MANUFACTURING CO.
P.O. Box 3281 / Bellevue, Wa. / 98009

206-821-1258

"Another Wright Manufactured Product"

Spartacus

open-class competition

Spartacus is an open-class thermal duration competition sailplane fuselage. Spartacus combines the beauty of our popular AVION in an open-class configuration. Spartacus Competitor is reinforced in high stress areas with carbon tow and kevlar tape. Spartacus is designed to accomodate an SD7037 airfoil with a 10" root chord.

Spartacus Competitor: $90.00 (US)

Available from:
SLEGERS INTERNATIONAL
201-366-0880 (9:30am-6:30pm EST)
and

Specifications: Length: 53 inches; weight: 11oz.; width at widest point: 2.5"; molded fin; accomodates open-class plug in wings using an SD7037 airfoil with a 10" root chord.

Capacity: Up to 6 standard servos; standard 8-channel receiver; up to 1200 mah battery power; switch harness.

Includes: Molded canopy.

WRIGHT MANUFACTURING CO.
P.O. Box 3281 / Bellevue, Wa. / 98009

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BANSHEE

Winner of more National Championships since 1992 than any other design!

Banshee is a very forgiving design equally at home in the hands of the intermediate or advanced soaring pilot.

Kit Features - Pre-sheeted wings & stabs, high quality Kevlar reinforced fiberglass fuse & canopy, all hardware, detailed building and flying instructions, ailerons and flaps pre-cut. 80% complete out of the box.

1st Place 2-Meter, 1st Place Standard
3rd Place Unlimited, Best Overall Performance
Highest Point Score Any Class

GENESIS

The Genesis is a fast building, state-of-the-art, composite moulded sailplane, with carbon fiber wing joiners designed for maximum thermal duration flying.

GENESIS Specifications

Wing

Planform:	**True Parabolic**
Airfoil:	**SD-7037**
Span:	**113 In.**
Area:	**855 Sq. In.**
Wing Loading:	**11.7 Oz./Sq. Ft.**
Aspect Ratio:	**14.2:1**

Stab

Airfoil:	**SD-8020**
Span:	**23 In.**
Area:	**84 Sq. In.**

★ VISA ★ MASTERCARD ★ AMERICAN EXPRESS ★ DISCOVER ★

RAIDER

Unlimited Class Racer

Raider Racer $399.95

Thermal Raider $419.95

Raider Racer

Specs

- Span: 96"
- Airfoil: RG-15
- Aspect Ratio: 11.5
- Surface Area: 900 sq. in.
- Wing Loading: 14-15oz. sq.ft.
- Control: Full House

A Highly Prefabricated Plane Requiring Little Assembly

The Raider is the latest roaring masterpiece from designer Charlie Richardson. This plane is a direct and more potent descendent of the incredibly successful and thoroughly fast "Renegade" slope racer. Charlie has succeeded in designing a multi-purpose Unlimited Class Slope Racer or Thermal Duration plane that has an outrageous L/D, fast acceleration, hands-off high speed stability, agile turning ability, and a super strong structure. The ability to "Plug-In" different wing sets allows the Raider to be transformed from a fast racer to a floater thermal duration plane.

Everything on the Raider has been optimized for fast acceleration, high energy turning, Dismalling, mid-air survivability, and fast ballast adjustment. The Raider's modular design allows for plug-in replacement of any damaged parts. Flaps come down a full 90 degrees so it can be landed in small areas with high wing loadings. For those who don't need to wipe out the competition, the Raider is the best big speed machine around and just loves to spank out in thermals.

The Thermal Raider has more span, area, and aspect ratio than the Racer version. The Raider is designed to take the stresses of zoom launches and hard spot landings. Even with such a light wing loading the Thermal Raider retains the fantastic speed range and smooth handling of the Racer.

Thermal Raider

Specs

- Span: 104"
- Airfoil: RG-15
- Aspect Ratio: 12.5
- Surface Area: 970 sq. in.
- Wing Loading: 10-11oz. sq.ft.
- Control: Full House

Features

- High Quality Molded Epoxy/Fiberglass/Kevlar Fuselage With Slip On Nose Cone
- Vacuum-Bagged RG-15 Composite Wings Featuring Blue Foam Cores Skinned With Carbon Fiber And Glass
- Pre-cut And Hinged Ailerons And Flaps
- Servo Bays Pre-Cut
- Bolt-On Modular Tail Surfaces With Bagged Glass Stab
- Optional 1000 mah Battery Pack And Replacement Parts

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60" Span Class Slope Racer

ARF Kit $269.95

RENEGADE

The Renegade is the new "Bad Boy" on the Slopes of California, winning everything in the new 60" span racing class. The RG-15 airfoil gives the Renegade a blistering speed range and the ability to carry a massive ballast load if needed. Its flaperon system cranks the plane through high-G pylon turns with little energy loss. Don't let Renegade's bad attitude scare you off because it is very stable at all speeds and has remarkable light lift and thermaling ability. This rugged plane gives you big plane speed at a small plane price.

Highly Prefabricated Requiring Little Assembly

- High Quality Molded Epoxy/Fiberglass/Kevlar Fuselage With Slip On Nose Cone - Installed Elevator Cable
- Vacuum-Bagged RG-15 Composite Wings Featuring Blue Foam Cores Skinned With Carbon Fiber And Glass
- Pre-cut And Hinged Ailerons
- Bolt-On Wing And Tail Surfaces - Optional Ballast Kit

Renegade sweeps 60" Class and gets SECOND Overall in Unlimited Class Slope Racing At '93 Torrey Pines Speed Week

The Contender is designed for those who desire the ultimate in speed and aerobatics, featuring three channel control with wingerons, elevator, and full flying rudder. Contender's long tail moment and stabilizer design give it hands-off stability even at extreme speeds. The airfoil and wing design allows for an incredible speed range with the ability to turn or climb sharply with unmatched energy retention. Wings are constructed with blue foam cores, Carbon Fiber, and plywood wing skins and spars. The fuselage is designed with a large ballast compartment over the C.G. where up to 20 ounces of ballast can be placed for high lift conditions or slope racing. At the standard flying weight of 50 ounces, the Contender is very fast and will fly great in winds averaging as low as 5-7 m.p.h.

Specifications

- High Speed 2 Meter Aerobatic Slope Plane
- Transition Modified S3016 Airfoil
- Wing Area 420 Sq. inches
- Flying Weight (unballasted) 50 ounces
- Wing Loading 17.0 to 24.0 oz. per sq. ft.
- Three Channel: Wingeron, Rudder, Elevator

Features

- Machine Cut Balsa, Spruce, And Plywood
- Quality Blue Foam Cores And Carbon Fiber
- Wingeron Linkages And Control Cables
- Hardened Steel Wing Rod
- Complete Hardware Package
- Rolled Plans And Detailed Instructions

The Ultimate Aerobatic Speed Machine

FiberGlass/Kevlar Body Now Available !

CONTENDER

Wood Kit $109.95

Glass Body Kit $169.95 -- Composite ARF $289.95

Climmax Takes 1st Place At 10th Riverside I.S.S. And Fall T.P.G. Hand Launch Contests

High Performance 60" Span Hand Launch Thermal Glider

CLIMMAX

Kit List Price $59.95

RTC Price $159.95

The Climmax is designed for Hand launch Thermal Competition and slope and thermal sport flying. The outstanding SD-7037 airfoil has been modified to prevent tip stalling and enhance upwind penetration in breezy conditions. Its clean aerodynamic profile allows for maximum altitude hand launches and it's high-aspect ratio flying rudder gives Climmax the ability to make tight, flat turns in small thermals. Climmax is also excellent for minimum-lift slope sites where only the lightest planes will stay aloft. An outstanding speed range and tight turning ability make Climmax a fun choice for light lift slope aerobatics such as snap rolls and loops.

Specifications

- Airfoil: SD-7037
- Wing Area: 400 sq. in. Wing Loading 5.0-6.0 oz. per sq.ft.
- Two Channel: Rudder, Elevator
- Flying Weight 14-18.5 oz.
- Machine Cut Balsa, Spruce, And Plywood
- Quality Feather-Edge Foam Wing Cores
- Bolt-On Wing
- Full Size Rolled Plans- Detailed Instruction Book
- Standard or Micro Compatible

High Performance C.R. Aircraft Sailplanes

- California Residents Tax 7.75%
- Shipping & Handling $5.00

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