Press Release

World Soaring Jamboree

The first ever World Soaring Jamboree (WSJ) is scheduled as a nine (9) day event. It will begin on Saturday May 28 and continue until Sunday June 5. The WSJ will be brought to modellers, the world over, by the following clubs: The Northwest Soaring Society, The Portland Area Soaring Society, The Seattle Area Soaring Society, The Inland Empire Soaring Society, The North American Scale Soaring Association, the Pro-Am Slope Racers Unlimited Association, and the Tri-City Soarers. All of these super clubs are currently preparing to provide soaring enthusiasts with the best soaring event of the 1994 flying season. As with most U.S. events the AMA will sanction it. Additionally, the Richland Chamber of Commerce will co-Sponsor the WSJ, thereby lending it much needed community support that all events of this size need. This level of support assures flyers will have a wonderful time and stay in the Tri-Cities.

WSJ committee members are currently formulating an event for all R/C soaring enthusiasts. The agenda includes events for thermal, slope, and cross country. It will feature contests for novice, intermediate, and expert pilots. These events will include Open class thermal duration, Two meter thermal duration, and Handlaunch. Furthermore, the WSJ will host an F3J contest, an F3B contest, slope racing for Limited, Unlimited models, and Power Slope Scale models. It will host a soaring Fun Fly to include scale and non scale and a Cross Country race will be part of the format for both scale and non scale soarers. Record trials, for those wanting to be added to the record books, is also an integral part of the Jamboree. And lastly, North American Scale Soaring Association tasks can be flown and recognized during the event.

In addition to the soaring events, the World Soaring Jamboree will feature a special guest speaker, a banquet dinner, and a superb evening social. Organizers, likewise, want to offer entrants a chance to participate in a vendor forum and technical seminars. As of this notice, however, the WSJ is still in the planning stages so future updates will finalize the complete agenda and schedule of events. None the less, the WSJ promises to be an opportunity for soaring enthusiasts to participate in a monumental episode in world R/C soaring history.

Interested individuals or clubs may contact the World Soaring Jamboree committee at P.O. Box 4267, W. Richland, WA 99352.

Soaring for 94.
Wil Byers

R/C Soaring DIGEST

July, 1993
Vol. 10, No. 7

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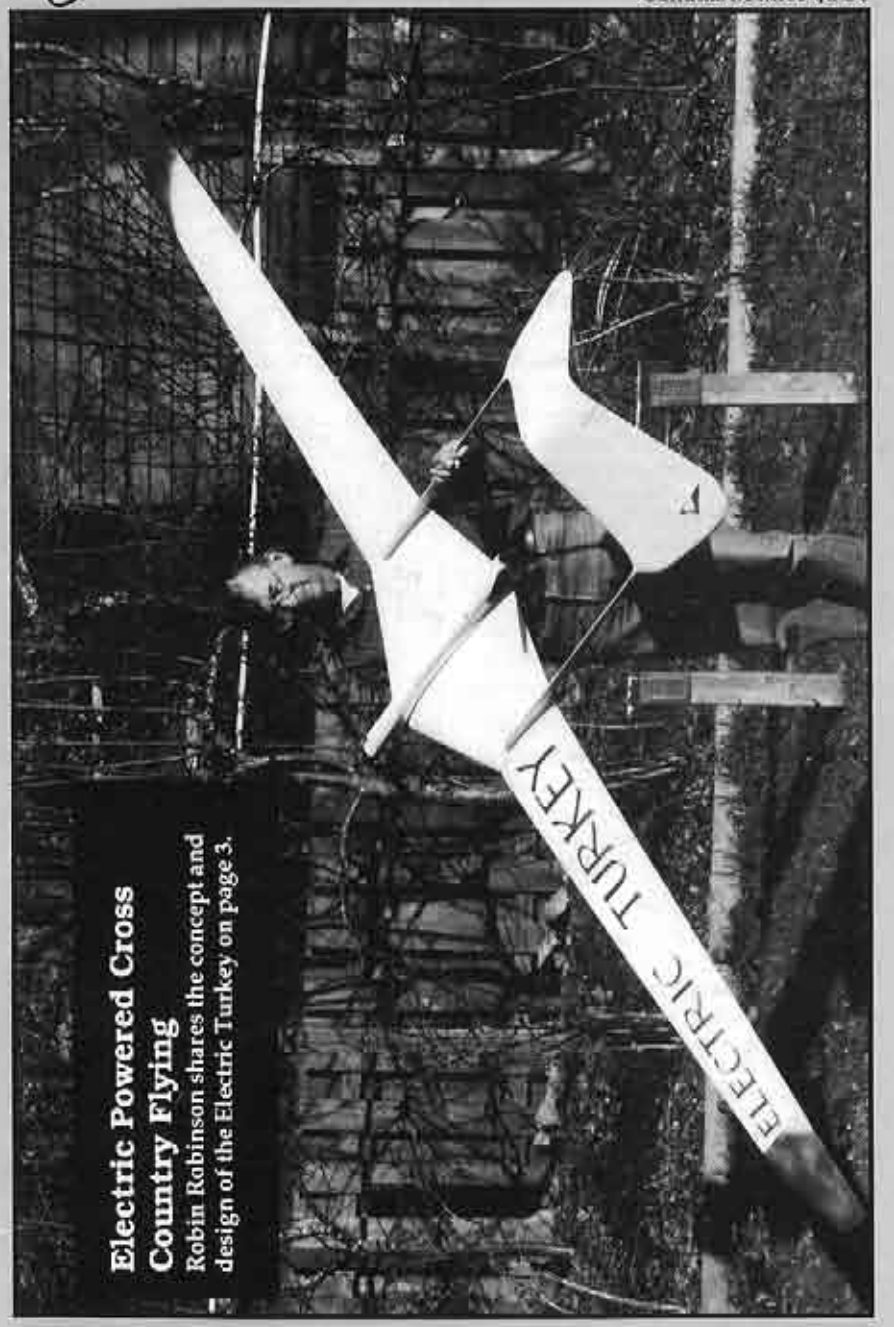
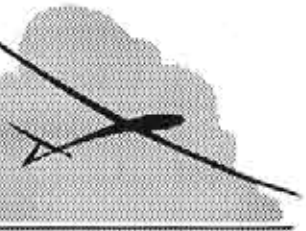


Electric Powered Cross Country Flying

Robin Robinson shares the concept and design of the Electric Turkey on page 3.

R/C Soaring Digest

A publication for the R/C sailplane enthusiast!



Advertiser Index

Table of Contents

Other Sections

Special Interest Groups

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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Feature Columnists

Wil Byers, Mike Bamberg, Gordon Jones
Bill & Bunny Kuhlman (B^2)
Martin Simons, Ed Slegers

Questions About Radios??

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

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

The Soaring Site

This has been an extremely busy month for us. Because of getting ready for Jerry to attend the Mid-South Championships, and the fact that everything I touched, like my computer, got very temperamental, we are running about 1 week behind our normal schedule. One of our cats even decided it was time to chew on one of the photos and, at 22 pounds, he shouldn't be that hungry, mind you; but rescuing photos, trying to reason with my computer and trying to figure out how to get *R/C Soaring Digest* out the door to the printer in a reasonable period of time with everything else that needed to be done has not been easy. So, first of all, we want to apologize because all of you will be getting your copies late.

Our second apology is to Bill & Bunny Kuhlman. Their column is not included in this issue, because of the amount of time I would have needed to get it in there and make sure that it was correct. The third apology, of course, is to those readers who faithfully read their column every month.

Also, there are no New Products included in this issue. All the new ones that arrived have to be typed from scratch. So, no we didn't delete the section, I just didn't have the time to do a lot of typing.

Sectionalization?!?

Yes, this month we have made a few changes that are making it easier to pull *R/C Soaring Digest* together every month. It will save us a lot of time and it should be easier to read, although we will have a bit more white space than usual. (Of course, we have noted that several of you frequently refer to *RCSD* as a book, and most books have white space...) I have been thinking about doing this for some time. We hope you like it. If you feel strongly one way or another, please let

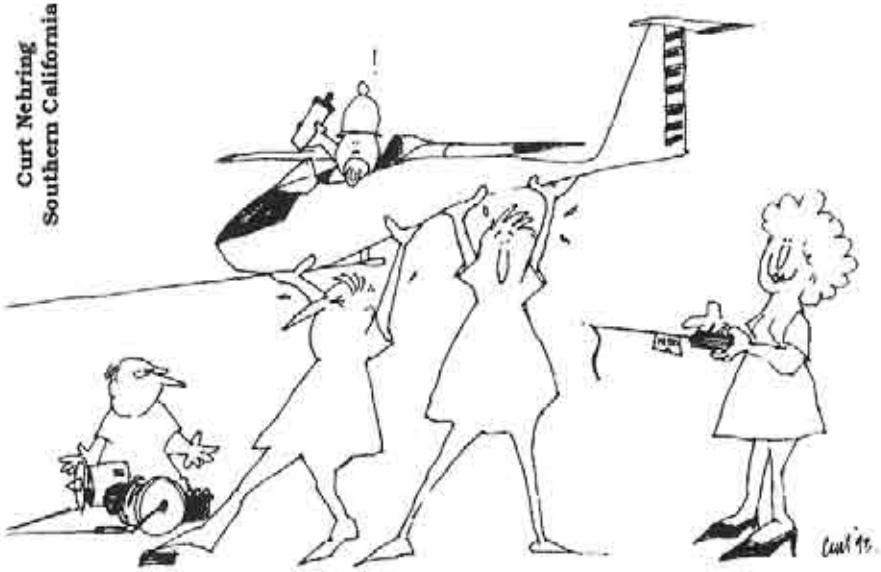
us know. For the most part over the years, ads have always been pretty much to the back, and now they're all together so that whoever or whatever you're looking for is easier to find. It is already easier for me to find things.

Additionally, some of the questions this month had to do with advertising rates and policies of *RCSD*. So, at the beginning of the advertising section you'll find the basic policies and rates which have been extracted from the rate card. If you are thinking about advertising, you still need the full rate card for sizes, etc. For those of you that already have the card, we're making some changes to try to help make it easier to do final ad copy, etc. We'll send out new copies when their done.

The small ad for *RCSD* is also missing from this issue. It has been suggested that it be modified to include the cost of back issues, and I just never found the time to get it done. I will also include information on how to read your labels for expiration date. We mail out one post card size renewal notice and from some calls, believe that a percentage of these are getting lost in the mail. (No, the 22 pounder does not work part time for the postal department!) We'll also include Barry Kurath's name & address as one source for final ad copy. For those of you that subscribe for the first time, we usually send out a back issue order form which says, "We hope you enjoy *RCSD*, but if you are NOT satisfied, please return them for a full refund, no questions asked!" To date, we have never received any back, but remember the same thing is true of your subscription. If you find that *RCSD* is not for you, please let us know and we'll refund your subscription money, no questions asked.

Now what did I forget? Oh, to tell you what kind of a name a 22 pound cat gets labeled with. We affectionately call him T.M. It stands for Tummy Masher. ■

Happy Flying!
Judy



Robin Robinson, PMPY Electric Cross Country

Electric Powered Cross Country Flying

...by Robin Robinson
PMPY Design/Construction Team:
Robin Robinson, Terry Erickson, Ian Brightbill
(This article was sent in by Roger Breedlove, editor of the newsletter for the Northwest Soaring Society, where the article originally appeared.)

July 17th and August 7th, 1993 are dates scheduled for thermal cross country events. In past years, The Portland Area Sailplane Society has allowed a second competitive event to take place while the thermal event is in progress. This is how the electric powered cross country task and competition started in our club. For the last three years, in addition to the many thermal planes entered, there have also been two or three electric powered ships entered as a separate class. Our team has always placed second or third; that is to say, last. These events have always been full of surprises and we have been pleased to just make it all the way around the nine or ten mile course. Most flights we've started haven't completed the course, but we have been lucky a few times.

We decided to get serious and design a plane around parts and equipment available from local suppliers and catalogs. After about six months, the brainstorming condensed to a concept enough to warrant ordering parts and materials.

Building the Plane

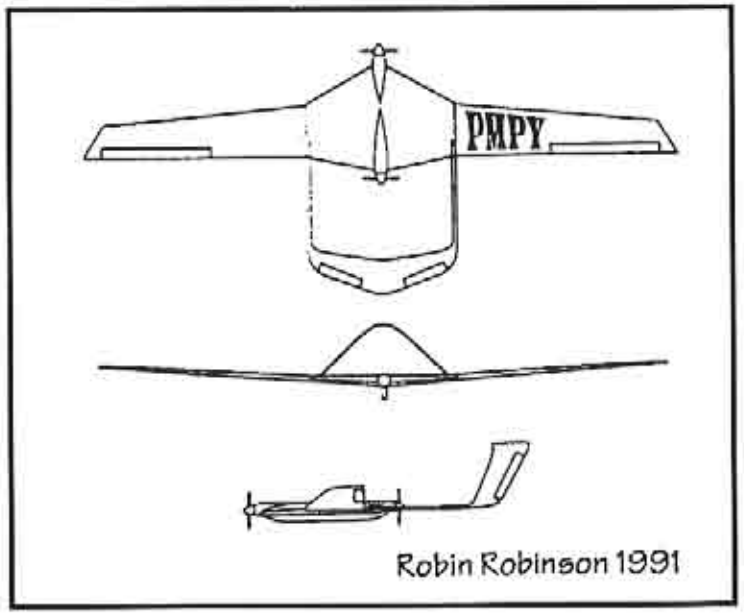
The concept comes together at just over 1200 square inches of wing area at 11 foot span. The total flying weight is 10 lbs. The 40 nicad batteries weigh 6 pounds. The airframe must weigh just less than 3 1/2 lbs.

The motor power requirement is about 800 watts and is filled by two Astro cobalt FAI 15 motors designed for F3E use. These deliver 400 watts each and are for intermittent duty, only. We don't plan on running them longer than 20 or 30 seconds at a time. The mounting arrangement places one motor in pull mode and the other in push mode; both have gear reduction drives and folding props.

Motor batteries are made up of four 10 cell packs. (Cells within each pack are series wired.) All battery packs and both motors are wired in parallel through an Astroflight 205 speed control. We have not found support in writing concerning the parallel use of nicad battery packs.

Barry Kurath, Portland Area Soaring society member launching his Jouster, Harley Michaelis design, on a stinky gas job... successful flight.

Top 10 flyers at the NWSS tourney in September 1992: (1) Erik Eiche, (2) Murray Johnson, (3) Geoff Almvig, (4) Ron Wagner, (5) Fred China, (6) Robin Robinson, (7) Dave Pugh, (8) Forrest Ingraham, (9) Guy Russo, (10) Ian Brightbill.



The Plane (Concept)

Wing Loading	High, about 24 oz./sq. ft.
Airfoil	RG-15
Power	Thrust must equal 1/3 of the craft's total weight
Glide Ratio	Figure on a conservative 20:1
Glide Speed	40 to 50 MPH
Climb Speed (Powered)	About 30 MPH
Rate of Climb	Approx. 1000 ft./min.
Wing Span	132"
Motors	Two Astro cobalt FAI 15's
Battery	Four 10 cell packs
Motor Control	Astroflight 205 speed control

So far, parallel wiring has worked for us. We always store and transport the packs un-plugged. Only when charging and flying are the packs placed into parallel circuit configuration. The flying task of climbing for 30 seconds and gliding for a mile is very easy duty for both batteries and motors. Each 10 cell battery pack is only being asked to deliver about 200 watts for 30 seconds every 2 minutes or so. Also, because of parallel wiring, only the motor speed control is required for power management.

Because the total airframe weight cannot be over 3 1/2 lbs., we decided not to use a fuselage in the conventional sense. The center wing panel, if enlarged to 22 inches in chord, would be 2" thick and could house radio, motors, batteries, and other equipment. Batteries, speed control, and motors would be conveniently close together for wiring purposes. The booms and inverted "V" tail keep the prop wash from involving the air frame and producing unwanted drag.

The wing center section structure is a layer of carbon fiber 5 oz. weave, 1 layer of kevlar 6 oz. weave, and 1 layer of 6 oz. glass weave. These laminates are placed over a white foam male mold. The mold was first shaped with sheet rock mud and sanded to shape, then covered with wax paper. The composites were laminated in place using West System epoxy and a paint brush. The trailing edge top and bottom laminates were kept from bonding together with a layer of wax paper. After hardening, the assembly was cut through on the vertical centerline with a hacksaw. The mold and wax paper were removed. The left and right wing center sections then received two carbon reinforced spars, a 22" RG-15 center rib and two 10" RG-15 wing root ribs. The trailing edge was epoxied together and the wing center section joined with glass tape and epoxy on the centerline.

The wings are constructed of 1 layer of 3 oz. glass over white foam with massive carbon reinforced spars and 3/8" vertical grain balsa shear webs. Wings are vacuum bagged. The wing planform, dihedral, vertical and horizontal (projected) tail surface areas, tail moment and center of lift, are taken from Eric Lister's "Sailplane Designer's Handbook". It is not too hard to read. We stayed away from the math and looked at the pictures a lot. Flying is next. We will soon learn more. ■

Curt Nebring
Southern California

Jer's Workbench

Foam Cutter

I have been cutting my own foam cores for a number of years now. I started around 1960 when I was flying power. Yes, I did fly power back in the old days of hard tubes and reeds. What I'm trying to say is that foam core wings have been around a long time; they are not something new with the advent of composite construction as we know it today. This month, I want to share a couple of tricks that I have added to my foam cutter that work for me.

I have probably made all of the mistakes that any one person could make in cutting foam. In the beginning it took two people to cut a core, one on each end of the foam block working the cutting bow with one person calling off the numbers. Numbers were marked on the templates so that you could start and finish the cut together. Also, we used a car battery for a power supply. But over the years things got better. To control the weight and better handling of the cutting bow, we would hang the cutting bow on rubber bands from the rafters in the shop. Then, about 20 years ago, while reading a German magazine I discovered the two part template that we are using today. The last big improvement was the hands off foam cutter. The last one that I built when we lived in California was made of steel rods, roller bearings, stops, bells and whistles; you had to have seen it to believe it, but it worked for me. It didn't make the move to Texas, however.

After the move into the new shop here in Texas I was in need of a new foam cutter. George Hollidge of AMAP Mfg. made me a deal that I couldn't refuse. This foam cutter is one of a kind. With its balanced cutting bow and the articulated arm for cutting tapers, it's a snap to use.

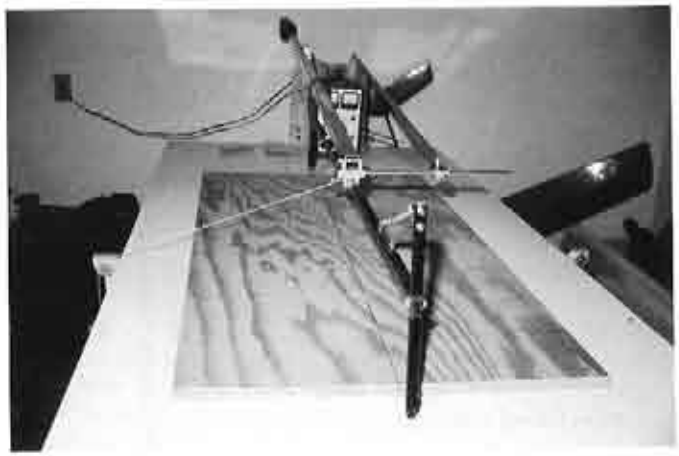
By adjusting the counter weight, I can balance, or unweight the cutting bow so that it rides smoothly over my templates. Adjusting the taper is also very easy to do. There are two adjustments required. Because there is no manual with this unit, I had to work out the adjustments myself, but this was very easy to do once I started playing with the cutter.

First, I had to find the center of my cutting surface and drew a datum line from which to work from. Using the datum line as a reference, I placed the core on the cutting surface. Next, I set the cutting bow on top of the foam core to adjust the articulated arm. The adjustments are quite easy to do. In the center of the cutting bow there is a thumb screw adjustment and the articulated arm itself has a screw adjustment to change its length. It took me about 6 tries to get the taper set on my first core, but after doing several sets of cores I can now do the adjustments in one or two tries.

For my power supply I'm using a EICO-1064S. I picked up this unit used from a TV repair shop. I can adjust the voltage and amps, from 0-20 volts and 0-20 amps, also. Being able to control the heat of the cutting bow is a must, because sometimes I'm working with different kinds of foam: white, blue and sometimes pink. For what it's worth, when I'm cutting a core I set my power supply to 10 volts and 10 amps when cutting white foam; for the blue and pink foam I step up the voltage to 12 volts. Between the cutter and power supply I have a foot on-off switch. Nice thing about using a foot switch is that if I have the wrong setting on the power supply after starting a cut, I can reach over and adjust while cutting. The other night I was cutting a set of cores for a 1/4 scale Super Cub. (The Super Cub has a 16 inch cord.) About half way through the cut the cutting wire was slowing down in its cutting speed, so I reached over and readjusted the voltage because that much foam was too much for the adjustment that I started with.

The AMAP foam cutter will cut a right or left handed taper. Just walk around to the other side of the table and work from there.

I was going to give you a couple of hints or tricks, wasn't I. Well, I have added a couple of things to the AMAP foam cutter that work for me. I added a pedestal to my foam cutting table. This is nothing more than a piece of 2'X4'X3/4" plywood. This is so if I have something laying on the table, hopefully the cutting bow won't hit it and spoil the cut. In the center of the pedestal I drilled a series of holes and inserted nails. The nails were cut to length with the pointed ends up so that they stuck up about 1/16 to 3/32 of an inch. This makes a no slip cutting surface, because you don't want the core to slip in the middle of a cut. This is a bit of extra insurance for myself. That's it for this month. ■



AMAP foam cutter with pedestal

Well, Who Do I blame Now?

... by Tim Whitford
Victoria, Australia

I guess it has happened to most of us at some time or other. Well it really happened to me the other day. A lovely sunny Sunday in April, and nothing much to do except enjoy flying my plane.

Well nothing much else if you don't count an 8:30 am meeting at the Yacht Club, preceding the last race of the season followed by the presentation and BBQ. Due to my superb organizing abilities, somehow or other I was also supposed to be the CD at a Task A thermal comp at the flying club in the afternoon.

I can handle this, I say, when I realize what I have done to myself. Easy! 8:30 meeting, finish at 9:30, leaves me thirty minutes to rig my boat and get out to the start, say an hour for the race, that's 11 o'clock, an hour for the presentation, back home, empty the car, fill it with planes, zap out to the club, and be there by 1 pm. Easy.

Later, thoughts intrude about Mr. Murphy and his ever present laws, so to be on the safe side I rip out to the club on Saturday and post the rules for the comp on the blackboard, and tell them to start without me, just in case.

Sunday morning, and the last race turns out to be a stern chaser. This means that the slowest boats start first and the fast-

est boats start last, and theoretically we all finish together. The first boat gets away at 10 am, and since I enjoy a bit more success at sailing than I do at flying, I get away at 10.42 am. Now I don't know how you feel about this, but I find that giving my opposition 42 minutes start in a one hour race seems a bit excessive! Naturally I don't win this one. I've always considered handicappers the most vindictive people around.

Never mind, the presentation drags on and what with one thing and another I get to the flying field about an hour and a half late.

Everyone is having a great time. Around a dozen glider guiders are launching into a freshening breeze on a bungee. Several rounds have already been flown. Of course they have changed the rules in my absence to suit themselves, but so what?

Since I have only bought my F3B (or whatever it is today?) machine I quickly tear a battery out of my car, attach it to the winch and run out the turnaround. Everything is ready, key in the board, right model memory selected, turn it on, jiggle the controls, let's go!

Hold everything! I've been tricked like this before. Remember the time I sent up a plane with the elevator reversed. That was interesting, and the time the ailerons were reversed. That was disastrous. Put the plane down and check. Left rudder, right rudder, up elevator, down elevator, right aileron, left aileron, dual rates, exponential, coupled rudder on, differential on, crow brakes set up correctly, a little flap for launching, and everything is set. Let's go.

I should at this stage point out that I'm left handed and that the plane, for some inexplicable reason was right handed, as was the bloody transmitter, and the damned winch. Any way, holding the plane in my left hand I stomp on the pedal and tension the line. Good and tight. Wait for a gust. Let her rip. Pedal hard down, it whistles straight up like the slippery little F3Ber it is. Slight deviation to starboard, apply a little left rudder. Nothing happens, so apply a little more, a lot more, give it everything, now give it left aileron. NOTHING BLOODY HAPPENS. Jiggle every stick in every direction. Still nothing happens. At this stage I have released the pedal, but the plane is heading vertically down at a conservatively estimated speed of around Mach 35 or so.

You can tell it was a good one when there is an awe struck silence from the crowd. Usually there is wild applause from the peanut gallery when you crash a plane. Already we had had a standing ovation for one competitor who spot landed his plane up a cows bum on the other side of the fence, and a rousing cheer for another attempting to strain the fence. This one however, stunned them into silence. Slowly, almost warily they made their way over to the impact site. One helpful guy tried to pull the wrecked fuselage out of the ground, but couldn't, he was joined by another, but the two together couldn't budge it. Finally another member with a resemblance to a tractor tried, but he too failed. Someone else dug it out with a shovel. Other helpful people were returning servos, etc. from a circle about thirty feet in diameter. I thanked my lucky stars that no-one was hurt, and that it missed the nearest car by a safe margin.

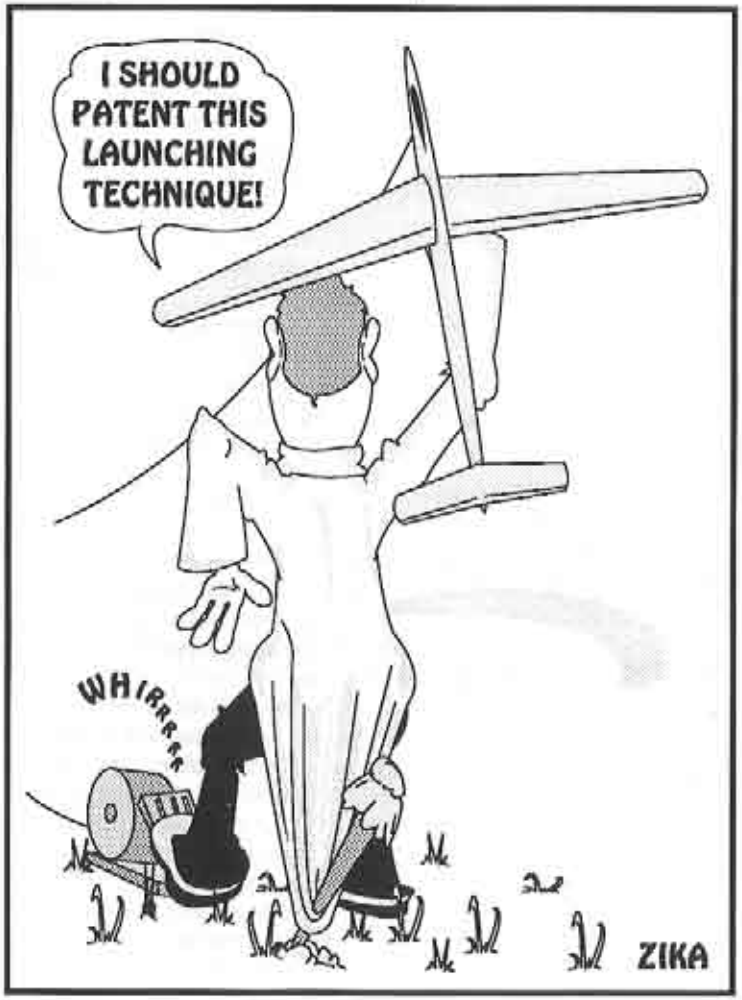
I looked down at the transmitter. The screen was blank. I looked at the switch. It was halfway down. Not definitely clicked into the off position, but enough to turn it off. I guess that somehow, while trying to extricate the aerial from under the winch handle and operate the elevator with my right thumb, I must have brushed against the switch and guess what.

Quickly my mind races through all possible excuses I might get away with. Can't use flat batteries, I've already told someone how I quick charged them on the way up. Can't use frequency clash. I'm the only one flying 633 today. Can't blame the winch. I built it. I might try blaming JR and those bloody right handed folks, but in the end I wander over to the crash site and answer the question on everyone's lips. I accidentally turned the transmitter off.

The response was very interesting. Most people were glad to know that even people like me do those sort of things as well. Now this is only my third year of flying, and I certainly don't think of myself as a good flyer. Maybe moderately capable. But these people gained hope and further commitment by seeing what they believed to be a good pilot making a basic error.

This leads me to formulate a new saying. Well actually to modify an old one. It now goes like this. Only three things in life are certain. Death, taxes, and model plane crashes.

The next night I presented what was left of the fuselage and tailplane, neatly folded and nailed to a piece of veneered chipboard with three inch nails, as a trophy to the eventual winner. ■



Understanding Sailplanes

...By Martin Simons

13 Loch Street, Stepney,
South Australia 5069

Scale Thermals

The weekend of 24th - 25th April 1993 was a lot of fun. The Scale Soaring Association of Australia held its fourth thermal soaring meeting.

The competition was light hearted. There was a great deal of mutual help and encouragement and no squabbling.

The numbers

We had 46 sailplanes, more than ever before, and the standard of entries was a great deal higher all round than in previous years. Perhaps 40 to 50 large scale model sailplanes is the upper limit for a competition of this kind. We are doubtful if we could handle more.

The venue

Swan Hill, where we held the meeting, is a very pleasant town with things to do for families if they do not all want to join in the model flying. There is ample good accommodation. Access is easy from all directions. The town is roughly equidistant from Melbourne and Adelaide. It took the Adelaide group 6 to 6.5 hours to make the journey and a little less for those coming from Melbourne. No entries came from NSW, although the site is on the state border.

The site

The Swan Hill Model Flying Club went out of their way to make us welcome. For a club to surrender their facilities for a whole weekend is extremely generous. The members also provided catering on the field, breakfasts at absolutely minimal price, and friendly guidance for all strangers. Thanks for all these things.

The general area was almost perfect. No trees or other big obstructions were in the way.

The flying field itself was not quite so good. The surface was variable, with rough areas and fences around the margins which had to be avoided. There was not enough room to lay out our (non - standard) winch lines and in that respect it is fortunate only one winch was used. More space, or at least some close mowing and weed flattening, if this is feasible, would be helpful on a future occasion.

Most of us are unused to flying with so many other aircraft around so care was necessary. There was usually just enough space available for landing tugs and sailplanes. When several aircraft were approaching at the same time good sense and discipline was essential, with an excellent safety officer on watch all the time.

There were very few incidents. Few models suffered damage and those that did get broken, so far as we know, were all cases of pilot error. The transmitter pound was well managed and we did not hear of anyone suffering radio interference or failure.

The judging

The static judging occupied the whole of Saturday morning. The judges had to work very hard and they were more rushed than they or we would have wished.

It was very difficult for them to be fair to everyone.

It seems right to have the judging done by people who know real sailplanes. Nonetheless, they need the help of someone who has more experience of judging scale models.

Documentation

The question arises, how seriously is this competition to be taken? We want to preserve the informal, friendly atmosphere. Yet it is a **scale** competition and there are trophies to be won. Nothing destroys a happy atmosphere friendship quicker than feelings of injustice!

If we are going to have just one or two scale sailplane contests in the year, we **must** have **scale sailplanes**.

It will be necessary in future to be stricter about documentation and to give the judges some very clear guidelines. In scale competitions for powered aircraft it is usual to require the contestant to produce an **accurate and authentic three view drawing of the full scale prototype which has been published in some reputable book, journal or other reference independent of the model trade**. Keen scale modellers go to a lot of trouble to get authentic drawings. It is not good enough to rely on the kit manufacturer.

Aero towing

Perhaps the most astonishing thing this year was the nearly complete dominance of aero towing. Perhaps only a dozen launches were done by winch during the weekend. All other launches were by aero tow. Peter Melders estimated afterwards that his tug alone had done 150 tows.

The advent of aero towing has produced many problems. First is the difficulty of finding enough tugs and pilots. The organising committee were not at all sure what would happen. At one stage, a few weeks before the competition, it seemed possible there would be only two tugs available, which would have been disastrous especially if one or both became unserviceable (as one of them did).

At the start of flying on Saturday afternoon ***nine tugs*** lined up. This was far more than the organisers had expected and our worst fears were quelled. Two or three of the nine, however, were not powerful enough to pull the heavier gliders, so they were not used fully. Are we, in future, going to have to ask for bigger, more powerful (and more costly) motors in all tugs? Peter Melders' tug, which was the most effective and reliable, uses a Zenoah G 380 motor and gets the sailplane up to great height in about 30 seconds - or less!

Sometimes there was a considerable queue of sailplanes waiting for tows and not a single tug to serve them. This was especially obvious toward the end of the allotted flying time on Sunday when many sailplanes needed a few extra minutes to make up their time yet had to sit on the ground waiting.

Most tugs were piloted by people who had also brought sailplanes (in some cases several of them). When they wanted to fly in the competition, they had to shut down the tug or at least let someone else handle it. Naturally, they wanted to do their soaring when thermals were present, just when everyone else also wanted to be launched. The 'tuggies' all sacrificed themselves to a greater or lesser degree, in order to help others. It really is too much to expect of them.

Can we, in future, find enough people who will be prepared just to fly tugs, and free the sailplane pilots from this task? Or can we all learn to fly tugs so that no-one has too much of a burden in this respect?

This whole question needs a lot of consideration. In full scale soaring competitions it is not expected that a tug pilot will fly a competing sailplane at all.

Then there is the question of release height. It was not possible to use the electronic height measuring devices as anticipated, simply because hardly any have been manufactured or purchased. Nor was anyone really able to check the release heights from the ground. Since everyone who used the aero tow method followed a roughly similar procedure this probably did not matter very much, but there were some tows that undoubtedly went very much higher than others did.

Some tows that were aborted, with line breaks or tug engine failure, left the dumped sailplane with little chance of getting away and a long wait for a 'relight'.

Perish the thought that we should go

back to winching alone! A lot of thought is needed. Are we going to let the launch height question lapse and let everyone do what they like - including tows to the limits of visibility and long cruises in search of lift? If not this, what? In full scale gliding contests, there is a strict limit on launch heights and launch times.

Radio frequency clashes

One essential in future will be to set aside certain channels for tugs only and make quite sure that there are no clashes between tugs and sailplanes. Despite being advised to do so, hardly anyone brought alternative sets of crystals to permit changes of channel. Changing crystals brings with it the potential for more difficulties, of course. It is easy to forget which frequency is in use.

Fortunately there were not many problems in this area but there is potential for trouble and dispute on the flying field. There were one or two justified grumbles.

Soaring for an hour

According to the rules, the contest director had to nominate the total air time to be accumulated if possible during the weekend by each competing sailplane. The idea was that after static judging everyone would try to score the stated number of minutes, or more, in the air (after release from tow). Any number of launches was permitted.

Thus, if soaring was not achieved at all, a pilot might manage enough short gliding flights to reach the required figure. Thirty, two minute flights would be acceptable. So would two, thirty minute flights! On the other hand, if anyone could do it in one flight, so much the better.

After reaching the given total, flying of a particular model, for fun, could continue with no penalties although not receiving any priority in the launching queue.

A model that did not reach the total time would be penalised by scaling down the final scores.

It was imagined when the rules were being drawn up that most people by Sunday afternoon would have totted up the required figures and would be flying simply for fun.

As it turned out, the time nominated, **one hour,** proved difficult, in retrospect, too much. We really needed another day.

Most required a number of short flights and an occasional longer one, say, three of ten or twelve minutes and five or six glides down through sink or lifeless air. But this necessity for multiple launches placed great strains on the system. The thermals were not there early in great abundance and when they did appear, there were not enough tugs available at short notice.

Anyone who brought more than one model, as several did, was more or less obliged to leave one or two of them on the ground all day on Sunday after the essential qualifying flights. Late on Sunday those who cared were getting rather desperate as tugs dropped out and the close of flying at 3 pm approached.

Maybe the answer for next year will be to nominate a relatively short total time, perhaps twenty or thirty minutes, but to work into the scoring formula a scaling process to take account of the number of flights required to achieve this figure. This needs further thought.

Success

The original basis of this whole competition and even the fundamental aims of the SSAA itself were to encourage the development of **good, practical thermal soaring scale sailplanes.** We have learned, over the last few years, that almost all scale sailplanes will soar well in thermals, even when they have wing loadings and flying speeds that we used to associate only with hill soaring.

Self launching

After all contest flying ended, John Copeland demonstrated his self-launching sailplane with retracting motor, the DG 500 Melan. Shall we, by 1995 or so, nearly all be flying self launching sailplane models in Class 2 at least? Such a development is quite possible. Or do we need to establish a third class?

It is almost sure that self launching will be permitted, even encouraged, next year. If so, while the tug pilot problem may tend to fade, we shall have new problems. After all, a Boeing 747 is only a self launching sailplane! ■

Strictly About Birds

All soarers are eagles, but some are more eagle than others!

...by Martin Simons

One feature of the Swan Hill weekend was the interest shown by the local eagles (Australian little eagle, Hieraaeteus morphnoides). A few appeared on Saturday, sometimes sharing thermals with the models and flying closely over the launching area and pits, studying the big wooden and glass birds on the ground. These few scouts must have passed the word to their friends. On Sunday at one stage there were twenty eagles over the field, some in thermals with the models, some low above us, and they stayed almost all afternoon. It was not clear who was helping whom. The models would sometimes show the eagles where the lift was, and sometimes we followed their lead. Obviously everyone was having a fine time! When we began to pack up and go home, they did too.

More birds, and one fewer

Since Swan Hill, the author, with other club members, attended a Scale Day at a local power flying club. We demonstrated aero towing, which seems to have created a good impression and aroused a lot of interest. (Our friend and fellow club member Mal Pring also demonstrated an **electric powered ducted fan** model, which is performing very well indeed.)

At one time there were an unbelievable 40 eagles soaring overhead. We have never seen anything like it before. It must be a good year for eagles! There were also huge swarms of seagulls which formed a sky-darkening cloud over the salt works on the coast nearby, fortunately not immediately over the flying field.

Even so, a gull was badly chopped up by a scale model Harvard. The Harvard didn't look very pretty afterwards either, although the pilot managed to land it without further damage. The bird's body crashed through the canopy and the horrid remains filled most of the rear fuselage.

Faster than a speeding bullet

Some tales deserve to be true, even if they aren't.

When jet aeroplanes began colliding with birds in flight, Rolls Royce in England built a special cannon which would shoot a dead chicken at an aeroplane. The damage done after impact was astonishing.

The following story appears in the May '93 issue of the British magazine, *Radio Modeller*, in the column written by one calling himself Roland Graunchet.

British Rail are working on a new high speed train. They wanted to see what would happen if it hit a large bird, so they borrowed the Rolls Royce cannon and fired a chicken at their newest, high tech, highly expensive locomotive.

The 'oven ready' chicken punched a round hole through the armoured glass windscreen, continued down the full length of the huge diesel engine, destroying all in its path, shot out the back of the loco and through the wall of the shed it was standing in.

"Your cannon is bloody powerful!" said the BR executive to RR, describing the catastrophe.

"Did you thaw the chicken first?" ■

JR X-388S

...by Mike Stump
President of the League of Silent Flight
607 Washington St., Cadillac, MI 49601
(616) 775-7445

Front of the new X-388S Transmitter from JR. Switches for mixes and pre-sets are optimized for sailplane use.

Improving on the JR X-347 which has become known as an excellent value for a programmable R/C system JR introduces a new multi-mode R/C system with transmitter layouts designed and labeled for your choice of primary use (Sailplanes, Heli, or Aircraft). The X-388S name is descriptive of its capabilities featuring 3 modes, 8 channels, and an 8 model memory. This system will transmit on JR's new PCM-S, FM, and PCM Z (older JR PCM). Software has been improved and upgraded from the X-347 to include the following features:

- Launch and Reflex pre-sets. Full trailing edge without the need for any modifications.
- Full TE variable camber
- Complete landing mode with Crow
- Ability to assign any of four switch points for all mix functions
- High rate ail./rudder mix for Landing and Launch and the ability to automatically reduce this mix with reflex.
- Trim offset memory
- Choice of flap switches between pot 6 (knob) or switch & trim (preferred)

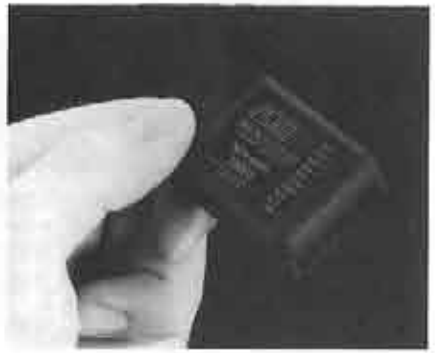
With these features and the increase in programmable open mixes to 6 the X-388S can give you maximum programming versatility for your $. Included in the software are flap/ail., ail./flap, flap/elev., and elev./flap mixes Other basic features similar to the X-347 are:

- Dual Rates and Expo.
- Model name
- V-Tail
- Countdown Timer/Stopwatch
- Programmable trainer system (the best available)
- Electronic sub-trims and end point adjustment
- Servo reversing on all 8 channels
- Fail safe

The transmitter case for the X-388S is pretty much identical to the X-347. It is light compared to many other computer radios at 2 lb. 2 oz. and has contours to fit the hand very well. These contours along the side and back give the transmitter a kind of balanced feeling. The catch phrase for the X-388S and other JR radios is "FEEL THE DIFFERENCE". When you pick one up or have an opportunity to fly with one you'll experience the total feel. The stick assemblies are adjustable in tension and length as well so you can customize them to your own taste.

Set up to operate flaps using the "switch & trim" function, it operates much like my personal set-up in the X-347 with the pre-sets determined with the three position switch above the left stick and both landing and camber (variable full TE) from the left (throttle) stick. All three pots were inhibited so as not to inadvertently move any control surfaces. I have discovered however that in certain mix functions these pots can be active trims while being inhibited in the standard flying configuration.

The upper left corner of the X-388S Tx is the location for key function switches. The 3-position switch directly above the left stick is for the Launch and Reflex Pre-sets. The switch near the front on the top changes the "mix SP" function from camber to landing mode.



The 649S receiver. This uses the new S-PCM and is extremely compact for a 9-channel receiver. At only 1 ounce in weight it is the smallest and lightest 9-channel receiver made.

The X-388S is available in both PCM & FM versions with the differences being the receiver and price. The PCM receiver included with the system is JR's new 649S. This 9 channel receiver is compact and light weighing in at on 1 ounce. Dimensions are 1.42" x 2.0" x .63" (WxLxH). For you technical types the 649S offers 1024 resolution for ultra precision. Needless to say **there is no smaller or lighter 9 channel receiver (PCM or FM) available from any manufacturer.** The receiver supplied with the FM system is the 529 9 channel FM receiver.

An important thing to note about JR receivers is that the more economical (read lower priced) receivers are as selective in today's critical RF environment as the most expensive. You can have as much confidence in the RF link of a MAX-4 system as with a X-388S or PCM-10S.

The X-388S glider system comes with 2 JR-341 micro servos. They offer a very durable gear train with an output gear that is massive for this size servo extending well down into the servo case. The gear train is all nylon versus the metal gear trains used by other manufacturers for micro "in the wing" type servos. Don't let the nylon gear train fool you. It is virtually indestructible and is in large part responsible for the excellent centering, and tightness around center that the 341 is becoming known for. At a weight of .63 ounce it is also a true lightweight. Torque (31.9 oz/in) is adequate for flap or aileron applications in most common high performance sailplanes used for contests today. Regardless of what radio system you are using, if you are mounting servos in the wing the JR 341 servo is worth checking out.

With the versatility of the X-388S as a multi-mode radio system JR's packaging was redesigned (initially with the X-347). The system comes in one box containing three separate packages containing the transmitter, flight pack (servos, switch, cables, misc. hardware, and square rx battery), and RF pack (receiver & tx module). With this packaging system JR is seldom "out of stock" on any option or frequency. Also enclosed is a new and redesigned instruction book with instructions for all three model types included. It is large and well illustrated totaling

186 pages including space for your personal notes at the end. The glider instructions are in the middle (pages 67 to 128) section and have been much improved from the X-347 manual. The sequence of instructions and some explanations have been redone.

A key addition has been what I will refer to as application instructions. JR has devoted the end of each aircraft type section to descriptions of how an aircraft is actually set up with programming sequences for most important mix functions. These were written by people familiar with computer applications to each specific model type and should prove to be most helpful for the first time computer radio user and those new to the X-388S. Included in the application instructions for gliders are wing servo suggested set-up diagrams and a sample data sheet with values from an existing sailplane set-up. An empty data sheet is also supplied. It is a good idea to photo copy these and store them in a handy location for future reference.

The application instructions include, along with basic set-up and mixing the programming sequence for full trailing edge launch and reflex pre-sets. These presets include an automatic elevator trim adjustment for each and an automatic adjustment of the ail./rudder mix (high mix rate for launch and reduced for reflex) for each.

The next sequence involves setting the sailplane up for both landing mode (variable flap up to 90 degrees) including optional crow (spoilerons) with automatic elevator compensation, and full span variable trailing edge camber. Both of these functions are run from the left (throttle, assuming your tx is Mode I) stick through the "mix SP" function. This is the same landing/camber set-up used by many top pilots using the X-347. Following these application instructions acquaints the user with the relationships of various programming features of the

The back side of the X-388S has a lot to do with the overall feel and balance of this radio with a contour that allows the hand to cradle the TX naturally. Pick one up and you'll understand why JR invites you to "FEEL THE DIFFERENCE". The RF module is at the top center.

X-388S making further programming and addition of special mixes simpler. In further experience programming the X-388S I have added an increased ail./rudder mix for landing mode using the landing/camber switch for this additional mix.

In learning to program the X-388S it is important to become familiar with recognizing and properly using the offsets that are present in many of the mix functions. These offsets determine the control surface neutral point when a mix function is applied. In many cases it is left at a value of "0" (when the control stick or pot is centered for neutral), while in the Landing/Camber "sp mix" function the wing surfaces are neutral with the left stick at the top or bottom. You must set the offset as per the instructions on page 124 of the glider section.

The last part of the instructions deals with additional mix functions sometimes used with thermal sailplanes which may

The "sp mix" is the key to easily programming both the landing and camber functions with two completely different mix settings for Ail., Flap, & Elev. available at the flick of a switch.

The selection "FLAP SW & T" is accessed through the model set-up mode. Choosing this option allows the 3-position switch to drive the flaps for Reflex and Launch Pre-sets. The 3 external pots on the transmitter then become various wing trim functions. (I inhibit these so as not to inadvertently move anything.)

be used in other less conventional wing types or configurations such as Flaperons and an elevator/flap mix.

Not mentioned initially when I discussed various transmitter features was the ability to set up the transmitter for a variety of wing types. The model function mode (where you select each separate model program) is where you can specify wing type. In the glider mode a V-tail option can be selected as well as options for single or dual flap outputs. Accessing the Acro (airplane) set-up allows you to choose a Delta (elevon) wing configuration as well. Initial pricing from dealers already selling the X-388S indicates that this system will sell for $50-$75 above the X-347. At this price point both the X-388S and it's predecessor (X-347), which will continue to be available bring an excellent value in features and performance for those in the market for a computer sailplane radio system.

X-347 Program Update

What follows is an aide in providing applications for the mixes available with the X-347. The instructions are based on the X-347 TX without the "Glider Mod." available through JR's Service Center. This modification was made available to allow the pilot to program launch (camber) and reflex pre-sets into the three-position switch above the left stick. This switch is referred to in the instructions as the Flap Mixing Switch. Through experimenting Troy Lawicki and myself have found that the existing software in the X-347 allows the user to achieve this without having to have the TX modified.

In addition I will describe here how to achieve and use adjustable trailing edge camber along the entire wing and how to add automatic Hi-Rate Ail./Rud mix for increased rudder throw in the landing mode. Before I get into the programming there are some basic ground rules for

mechanical set-up that make achieving these goals much easier.

1) mount all servos in the wings with the output shaft facing toward the tip and with the shaft positioned toward the trailing edge.

2) at neutral position the aileron servo arms should be angle forward 20-30 degrees to allow for more up than down mechanically, the flap arms should be angled back slightly or vertical. This mechanical set-up should be the same for each wing as symmetry here helps later on. I use Dubro #106 (4" threaded rod with kwik link) for all control surface connections on the wing.

3) I do not use the Differential Program in the radio. I set my differential by adjusting the total surface throw in the TRAVEL ADJ. portion. If you did a good job with the mechanical set-up your values for the opposing control surfaces will be similar.

These ground rules make the coming programming steps much simpler to adjust and fine tune for your personal style and design requirements. In establishing locations for the programmable mixes move the Ail./. Mix (2-4) from mix D to either B or C. Mix A & D are the only open programmable mix channels that allow you to use the three-position Flap Mix Switch as an on-off switch. A & D will be for the Launch and Reflex pre-sets. Because Mix D does not have an off-set, it will only deflect one surface. If you are flying an airfoil that benefits greatly in using reflex use Mix A for Reflex and Mix D for Launch using flaps only. If having full trailing edge camber for launch is more important, use Mix A for Launch. You can still get full trailing edge reflex with this set-up by using your trim tab on the left stick (this will be explained as we set up camber/landing control programs).

Before we get in to programming the mixes it helps to have the basic set-up installed with all controls moving in the proper direction and throws, including aileron differential (remember to use the travel adjustments for this) set to approximate values. The only mix that should be programmed right now should be your Ail./Rud. mix. (I use mix C for this)

The first functions we will program are for full trailing edge adjustable camber and the landing set-up. Both of these functions will be run on the left stick (Spoiler in instruction diagram) using the mode switch at the top left of the Tx (referred to as the Butterfly Crow Mix Switch in the diagram-I will refer to this as mode switch: pos. 0 or pos. 1).

We begin with the programming for landing. Put the mode switch in Position 1 (toward rear of Tx). Move through the menu with your program mode key up or down until the display reads "**mixSP**". The left stick should be where you want it for neutral flaps. I have the stick at the bottom to keep the trim active as the trim will not work with the stick at the top. (This can be reversed by JR Service Americas if you prefer to have the stick at the top with an active trim) The trim tab should be at the center detente. This dead center position has a very definite feel and can easily be found without having to look at the Tx.

Landing Mode

Now use the channel key to move the display until it reads "mixSPOI" with the word "offset" below. Making sure that the stick is in the proper position and the trim tab is centered, push the clear/store key to the far right of the Tx face. This stores the neutral point or offset for this entire mixing function. The offset should be the same with the mode switch in both pos. 0 & pos. 1.

Making sure now that the mode switch remains in position #1, use the channel select key to move to "mixSP:F. 1" on a new Tx it should show a value of 0 at this time. Move the stick to what should be full down flap position and use the data enter keys to adjust the mix value to give 90-degrees of throw or the amount you desire. You can fine tune the symmetry of throw as the flaps come down by adjusting the total throw for each flap (Travel Adjust). Staying in pos. 1 press the cannel key and move to "mixSP:A. 1" and adjust the crow position (if used). Move now to "mixSP:E. 1" to program the electronic elevator compensation. 30-35% down elevator is generally a good starting point here.

For automatic Hi-Ail./Rud. mix in landing mode use the UP key to move to programmable mix B. Set the Channels to "2-4" as in your regular Ail./Rud. couple. and select "BTF1" (landing position) for the switch. You will have to set the mix value for each Ail. travel direction, use +30% as a starting point. The goal here is to get maximum rudder throw through the Ail./Rud. coupling while in landing mode. Leave the offset for Mix B at 0.

Camber Mode

We now change to pos. 0 on the mode switch and adjust camber along the entire trailing edge. "mixSP:F. 0" is the starting point and with the left stick at the maximum throw position adjust the mix value to the desired camber amount, this value will be considerably less than the flap value for landing. Use the channel key to move now to "mixSP:A. 0" to adjust the aileron value for camber. You may have to fine tune the downward travel adjustment for each aileron to keep a straight line across the trailing edge during camber. Use the "mixSP:E. 0" to dial in any kind of elevator trim change if you wish.

Before going any further set Pot 5, Pot 7, and the Flap Pot all on "INH". This inactivates the three pots on the top of the Tx during normal flying. Using this basic set-up through the "mixSP" allows you full Variable Camber Control and the standard Hi-Point landing program. If you've followed the above set-up instructions and left the trim tab for the left stick centered, this also allows a very effective full trailing edge Reflex by moving the trim tab in the up-flap direction. Keep the mode switch in pos. 0. 2-3 degrees of camber can be obtained.

Pre-Sets for Reflex & Launch

The 3 position Flap Mixing Switch above the left stick is used here. In this example I am using Open Mix A for full TE Reflex and Mix D for the launch pre-set using flaps only. To effectively use this mix to move ailerons and flaps together move through the modes to "mix FL - A" and set to + or - 100% (whichever creates the proper travel direction for the Ail.) Leave the flap off-set and all other offsets at 0.

Using the mode-up key on the Tx face go to mix A, use the channel key to move to "CH 1 - 1" and using the data keys to the right set the mix at 6 - 6. Use the Channel key to move to "SW ON" and with the data keys set to "EL - F", now with the channel key move to "mix A6 6 0", using the data enter key (with the flap mix switch in the top position (E-F), adjust the value to the proper amount of reflex. You can also incorporate the Elev.-Flap mix which is turned on with switch to make the wing TE droop with up elevator as in speed run turns.

Mix D will be the launch pre-set using flaps only. Using the same procedure as in the Reflex pre-set set the mix at "6 - 6" and the value to the appropriate amount. The pre-set will be turned on using the down position (Fl. - E) on the three position switch. If you experiment you will notice that with the pre-set turned on you can use the pots on the transmitter that you have deactivated to adjust the pre-sets when they are turned on. These pots only work when the three position switch is in a pre-set and they will return to being inactive with the with the flap mix switch centered. If you wish them to be off at all times set the mixes to "1 - 6". All values should work the same as be-

fore but all adjustments to the presets will have to be done by programming.

I hope this information sheds some light on extracting more capabilities from the X-347 and makes programming this radio easier than it has been. I'm continuing to learn more about what this radio can do the more I use it. Feel free to call or write with questions or ideas. ■

LSF President Mike Stump and wife, Sue, at Toledo Show.

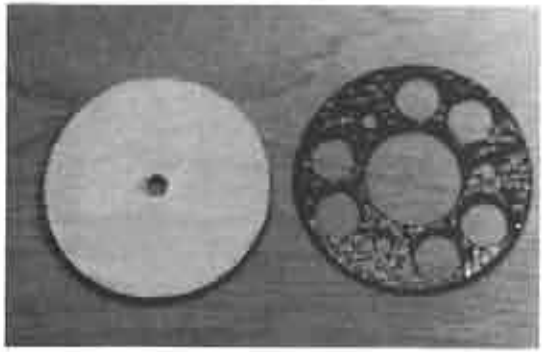
Building Light

Awhile back, I wrote a brief note on the importance of building light. Since then, I have received many phone calls about building light; the questions covered areas that were not covered in my original article. One of the questions I would ask is, "How much does your plane weigh?" The answers at times were shocking. It seems that a lot of people are building very heavy. So, to answer those people who want to build light, I will go into a little more detail.

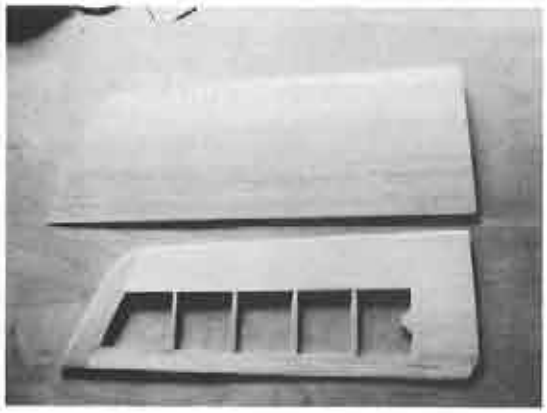
You can get by with a few extra ounces in a non-powered glider and still have a good flying plane, but with an electric a few ounces saved will make a big difference. One thing to remember in building very light is that you will be building for function and not form. The end result will be a very light plane, but unfortunately, not a very pretty plane.

With most of the kits coming with presheeted wings, it is hard to save weight here. About the only thing you can do is to cap off the ailerons with balsa wood instead of bass wood and hollow out the wing tips. To get a really light wing, the only thing to do is to sheet your own. Select your obechi carefully. Yes, some obechi is heavier than others. Another thing you can do is to use the technique I learned a few years ago from Mark Allen that has now become the standard in the wing sheeting business. This technique is to add micro balloons to the epoxy. First, this prevents bleed through and second, it does not soak into the wood as much which means you've used less epoxy, which saves weight. I also take a piece of plastic and make a V-notch every 1/8th inch and use this to apply the epoxy to the wing skin. This will give you a bead of epoxy every 1/8th inch instead of covering the complete surface. This will also save some weight. I then cap off the aileron with balsa wood and hollow out the wing tips. All I do to protect the wood is to use two coats of clear polyurethane. It's not pretty, but it's light. Use tape for hinges. Cut out for the servos exactly the size of the servo to make a press fit into the wing. Then, tape the servos in place. Make control horns out of 1/16th plywood. I use 1/16th threaded control rod with a Z-bend at the servo and a metal Sullivan link at the

(R) Modified motor from Kirk Massey, (L) stock motor



(L) Plywood stock motor mount, (R) fiberglass modified



(Top) Stock stab, (bottom) built-up stab

control horn. To save a little more weight, I also cut off the ears of the servo; I do not use any servo extensions. I just plug directly into the receiver.

The stabs that come with some of the kits are also pre-sheeted obechi over foam. To save weight, just put these aside and build a set of built-up stabs and rudder. Then, cover using plastic film.

The fuselage is next. There is not much you can do except to sand off any excess material. Use only enough wood for the wing hold down bolts to thread into. Any excess wood is only going to be excess weight. I usually do not use the stock motor mount. Instead, I use a lightened motor mount made out of carbon fiber or fiberglass. Also, I do not paint the fuselage. I just leave it bare. Told you it was not going to be pretty.

You can also save some weight by getting Kirk Massey of New Creations RC to modify an Astro motor to look like the one in the picture. You get a weight savings of about 1.5 ounces, which is a lot. Plus, you get the added benefit of better cooling. Kirk also adjusts the timing for the ultimate in performance. Kirk has some really neat, high performance equipment. I also use an RCD micro receiver. Again, to save some weight, you can remove the case. I use Sanyo 1000 ma batteries that I custom make into a pack. (See *RCSD*, June 1993.) If you do make your own pack, just be careful with the solder. It's heavy. I normally do not like to use a controller with B.E.C. but because all this work is being done to keep things as light as possible, and especially for contest flying where you only need to fly for seven minutes, a B.E.C. is the only way to go. I also hard wire every-

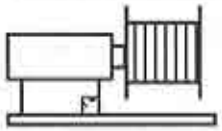
thing I can. (Hard wiring is soldering direct to the component which eliminates the weight of the connector and the resistance of the connector.

A few other tricks are to drill a few holes into the spinner back plate, use a small prop adapter, get a thin aluminum prop nut, use only bolts long enough to do the job and make wires as short as possible. (Copper wire is heavy.)

What you get for all the extra work is a light but strong, good flying electric airplane. An example would be the Falcon 550E. I've talked to people that have built this plane and their weights have been anywhere from 41 - 50 ounces. The 550E that I have just finished weighs 36 ounces. The difference of a few ounces in an electric plane will make all the difference in the world. You may not want to go to all this extra work, but try some of the suggestions and I think you will be very happy with the results.

New Creations RC, P.O. Box 496, Willis, TX 77378; (409) 856-4630

Good Flying!!! ■



Winch Line ...by Gordon Jones

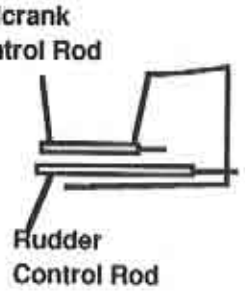
Gordon Jones, 214 Sunflower Drive, Garland, Texas 75041; (214) 840-8116 After 5:00 P.M. CST

Control Rod Installation

I have been wandering around some basic skills with short cuts and general information that can be used for building stabs and other goodies of late. This month I want to touch on an important and necessary evil: installing control rods/cables. When I first started flying we used balsa and metal rods to make our control rods. This progressed to a new invention that was simple and easy to install, but had a slight problem with temperature: Nyrods. The folks at Sullivan, the maker of Nyrod, finally started offering an option of metal cable for use in control actuation. This was a vast improvement over Nyrod and if installed correctly provides a very good method of actuation. Today several sources of 1/16" (and smaller) music wire with an outer shell are available and this has led to more exact control rods for the "high tech/full function" ships many are flying today.

There are a couple of things to remember when installing control rods/cables; one the control mechanism should be a straight as possible between the servo and the control surface, and secondly to insure that there is no binding. With these two prerequisites in mind select the location of the servo tray. The servo tray must hold the servos in a location that makes them accessible to the control rods/cables and easy to install and remove the servos. After selecting the tray location select a line between the servo tray and the control surface. If the line is unobstructed a solid wire pushrod would provide a better pushrod as it would have less slop when operating the control surface. If the line is obstructed and bends are required a metal cable pushrod is in order.

Generally speaking you should try to set up each airplane in the same manner so that the installation is very quick, and at the same time allows you to quickly program a computer radio (you can usually copy another plane with minor modification). Usually the control rod for the bellcrank runs from the servo tray angling down to the top of the fuselage. Be sure to allow enough room for the coupler and clevis when hooked up to the control horn. With these things in mind, mark the end point of the control rod run in the fuselage. Measure the cable and cut a section that is a little on the long side. Sand the end of the outer tube so that the epoxy will adhere it to the fuselage. Start by gluing the end of the control cable into the fuselage at the control surface end. Use a piece of music wire to insure the end of the tube run is straight while the glue dries even if you are going to use metal cable.



It is important to adhere the outer tube to the side of the fuselage at more than the front and rear points of the control rod run. There are many ways to do this with one of the favorites of late being to cut several pieces of foam with holes for the control tubes. To cut the foam bulkheads measure the outside of the fuselage about an inch further down the fuselage from the point of intended bulkhead. This will give you an approximate size of the bulkhead and then you can "match" the shape of the fuselage at the bulkhead location. Mark this shape on the foam and either run it through the bandsaw (my favorite tool) or cut it our with an X-Acto knife or razor blade. Make a couple of cutouts for the control rod tubes on either side of the bulkheads and one for the antenna tube on the bottom. All this cutting and so forth does not have to be precise but the bulkheads do have to fit the inside of the fuselage. Epoxy these in place in the fuselage by pushing them into the fuselage with the tubes running through the foam bulkheads. Next epoxy the tubes in place through the foam bulkheads. This is an easy solution to the problem and one that is easily accomplished.

Adhering the front end of the tubes is the same as the rear as far as the procedure is concerned, but try to be sure that you get the tubes at the same height as the servo output arm when sitting in the servo tray. This will alleviate binding and make a smoother control run with less work for the servo and less battery drain in the process.

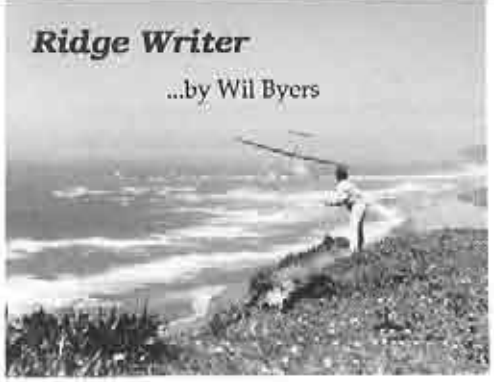
Another option is to dribble epoxy down the control tubes while holding the tubes next to the fuselage sides. While this is satisfactory for using metal cable it is possible to induce a binding in music wire rods so be careful if you use this method.

When adding the cable or music wire rod ends use solder links and clevises at the servo end with a good solder joint. At the control end I have found that a coupler with 1/16" music wire using a "Z" bend with a tight hole in the bellcrank and rudder control horn. This helps to cut down on slop and provides a sturdy set of controls that will withstand some hard flying. Be sure to use lock nuts on the threaded couplers at the servo end to steady the controls even more. Remember sloppy controls make for a sloppy flying airplane.

If you have any good ideas for ways to do things better lets us know; ideas should be shared by all. ■

Ridge Writer

...by Wil Byers



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

Foam Models

Del Brengman of San Jose, California sent some pictures and short letter the other day. In it, Del explained how he and a few local slopers are going about having a whole lot of FUN!

Del tells us that he and his fellow flyers have built models entirely of foam. These models are reinforced only with packing tape and in some cases have a bit of spruce reinforcement where absolutely necessary. The foam flyers are quick to assemble and can apparently be in the air in only a few hours. Del has built both conventional designs and his favorite of all designs, the canard. I am not sure what Del and his friends are using for airfoils, nor do I have any specifications; however, the models appear to be small with spans of less than 48 inches and are using semi-symmetrical airfoils.

The whole idea behind Del's model creations is just about having a good time at the slope, as he explains it. Del says these models are fun to fly combat with. The object or task for their rather informal combat flying sessions is having the last model flying. This, according to Del, is the fun part because their foam gliders are extremely durable and will withstand a pretty good center punch and keep right on flying. Also, because they are all foam models and don't weigh a great deal they don't have a lot of energy when they hit another one. And, their impact is reduced because they aren't traveling extremely fast. They are just fun to fly and to do a little "Bogey Hunting" with.

The models built by Del are quite colorful. The builders have covered them in colored packing tape which comes in a multitude of different shades as well as colors. Also, for the fun of it they have added special markings to the models which designate their status, or (something), on the hill. The special markings are in the form of removable tattoos that are the rage with kids currently. The tattoos are applied just like a decal and they come in a number of styles. So, you can see the emphasis is on fun, even to the extent of adorning the models.

If you should want to contact Del about his airplanes and the fun they are having with them his address is: Del Brengman, 6054 Emlyn Ct., San Jose, CA 95123; (408) 629-1325.

Del's move into the Foamy Fun format is kind of a breath of fresh air in a model environment that is now emphasizing high tech super ships. This doesn't suppose that this kind of model or flying is for everyone, but it does make the assumption that sloping can be different things for different people. And, it briskly points out how inexpensive the hobby can be for one wanting to participate, but on a limited budget. Lastly, the Foamy format center punches **FUN** and hones on the "Bogey" of camaraderie. You may want to try it, **"Just for the FUN OF IT!"**

Slope Events - Where are they?

I'm going to jump on my soap box this month for a little bit (I carry one with me as any of my friends will tell you). After my gravitational increase over winter it may be difficult though, but I would like to try anyway.

We slopers need more events to challenge our flying skills, to bring us together as flyers and sports people (notice the gender neutrality), to interest new flyers and beginners, and to help us learn

Del Brengman holding his Canard design - foam design slope racer.

more about the hobby! You ask, "How is all this possible via events, contests, fun flys, rallies, or jamborees?" The answer is really quite simple. Events bring flyers of like interests together for the single purpose of exploring the hobby/sport. That togetherness, spawns competition of one form or another.

Yes, **COMPETITION!!!** A friend of mine once said, "Fun Flys are filled with competition." I laughed at the time, thinking he was somewhat pretentious in his belief that every event was about competition. However, over the past few years he has proven to be right and I have abandoned my foolish esoteric belief that if the event wasn't a competition there wouldn't be any competition. On the other hand, there has been this sudden realization, for me, that events do generate competition and that competition is good for the hobby.

Let's elaborate. Competitions can get brutal right? Right! Nonetheless, whether the event is called a Fun Fly or a contest it is about some form of competition. The form of the competition may be very subtle. It can be as simple as flyers wanting to be their best. And being the best as a modeller, craftsman, event director, or flyer is competition. Right? Modellers are coming together to have fun, fly, learn, and most of all **COMPETE**. To find ways to be better than they were before entering the event.

So, why aren't more slope flyers flying in some type of organized format? Sure it is great to head to the slope and fly by one's self or with a couple of buddies, however, I contend that if the hobby is to grow in all directions it needs more organized events. Those events will further the hobby in one form or fashion. And that furtherance may be for your benefit as well as the blossoming champion yet to be realized.

Think about organizing a slope soaring event in your area. If you are a contest director all the better. If not just put together a list of people you would like to invite and drop them a line. If the event is successful you will have made a difference to those who attend. I can tell you from many past experiences that you will certainly further your knowledge of the hobby.

In closing, if you or your club are planning an event be sure and contact the site owner for permission to host the event. That owner may have not minded one or two flyers using the site on any particular occasion, but he may very well care if 40 or 50 flyers show up unannounced. Also, event entrants, you may want to cut the C.D. a whole lot of slack if it is his/her first attempt at organizing a particular event/contest. Being a C.D. is a difficult task at its best.

For those wishing to become a C.D. contact the Academy of Model Aviation for the proper entry forms. ■

(L-R) Phil Crandon, Garry Jordan, Ian Avery, John Haren, David Morgan, Bill Millgate, Peter Pine All the recipients (to date) of the Bruce Mitchell Memorial Award.

(F - R) David Vels is preparing his father's ASK 18 for flight. Phil Crandon with his foot on the winch switch ready to launch his Sweitzer. Bill Millgate is holding the fin of the Slingsby T53B while David Morgan, with Tx, prepares to launch.

Armidale Sailplane Expo

...by Bruce Abell
Cessnock, NSW, Australia

Well, the Armidale Sailplane Expo for 1993 has been and gone and with 48 starters, it was another great weekend! Also the Saturday, which was for 7 cell electric (each round is a 5 minute flight with motor run time subtracted), F3B Speed and Scale, saw some extra — a lot of the 48 thermal glider competitors entered one or more of the Saturday events - entries.

Unfortunately, the weather on Saturday and Sunday was fairly windy with winds up to 10 - 12 M.P.H., but this didn't seem to deter the entrants, although one F3B model was totaled.

Scale Glider saw 5 entries and launching was R.O.G. by means of standard 200 metre winch. Phil Crandon's beautiful "Sweitzer" took first with Martin Vels' "ASK 18" second and David Morgan's "Slingsby T46" third. Next year, the organizers hope to launch by aero-tow.

F3B Speed was taken out by Evan Bengston with Gary Jordon second and Peter Abell third.

The weather on Sunday for the start of the second day Open Thermal Glider event was, like Saturday, windy with thermals sparse and turbulent. It was, of course, tailor made for "lead-sled" style of models that could firstly get that extra height off the launch with a good "zoom" and then penetrate to find and work the

Phil Crandon's Sweitzer on finals.

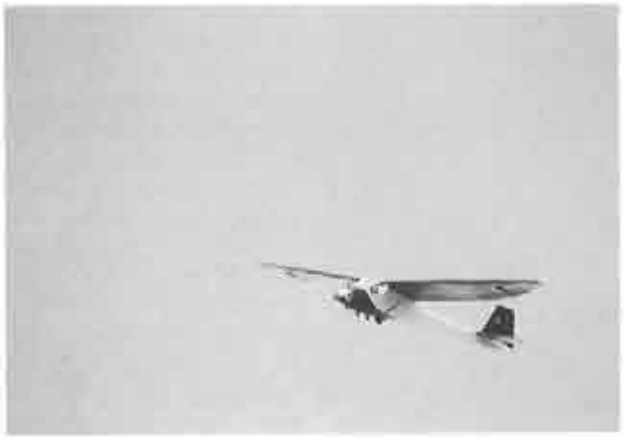
thermals, which were very narrow below around 700 feet. This left the lighter models at a disadvantage as, even if they did find a thermal, they couldn't work it for long and still be able to get back to the landing spot.

The end of the first day saw four rounds completed and, as expected, the top placings were filled by the heavier, faster birds.

Sunday night it rained all night! However, the weather

Cockpit detail on Bill Millgate's Slingsby T53B.

Martin Vels' ASK 18 on finals.



David Morgan's Slingsby T46 on approach.

Cockpit of Dave Morgan's Slingsby T46.

broke around 6:30 A.M. and, when flying commenced at 9:30 A.M., the skies had started to clear and the wind had dropped to zero! The day looked like being tailor-made for the "floaters"!!! This did prove to be the case for round 5 with at least one of the top pilots from the previous day losing 2 places when a "floater" beat him in his heat by over 400 points. (Group scoring is used here with the heat winner getting 1000 points and all others in the heat scoring: score divided by winner's score times 1000.) So the day looked like causing a few upsets.

Unfortunately, it was not to be!

The rain came back just after the start of round 6 and the contest was declared at 5 rounds and the final placings were: 1st - Evan Bengston (3954), 2nd - David Vels (3902), 3rd - Peter Abell (3874).

2 Metre was run concurrently with the Open Class and the eventual placings in this class, after the scores were separated were: 1st - Jeff Irvin (3544), 2nd - Carl Strautins (3098) - Junior, 3rd - Chris Graham (2998) - Junior. Carl Strautins also received the Best Junior award which was a years subscription to *RCSD*.

This year, the Bruce Mitchell Memorial Award went to David Morgan who, along with Peter Pine, has been an organiser of the Armidale Sailplane Expo ever since it started 13 years ago! He's a first class modeller and flier, too! ■

Concept

David

From Across the Pond

...by Graham Woods
Hertfordshire, England

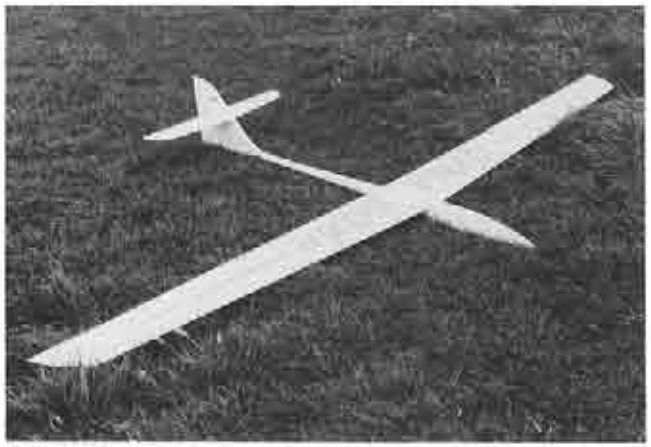
When my brother, Dave Woods, traveled over for the Tri-City races the other year, he visited Jerry Slates and came away with a few fuselages. He brought back a Zen, a Special Edition and Smoothie.

He made an F3F model from the Special Edition (*RCSD* October 1991). I've just finished a sport model using the Zen.

The Smoothie is a rather pleasing looking fuselage reinforced with Spectra, but Dave calls this model a 'Concept'. It was built as an aerobatic and fast flying sport machine, and is shown here on Ivinghoe Beacon's (30 miles

Graham launching

Crow Brakes



Zen fuselage

north of London) west face on a gloomy day zapping up and down the slope.

The 8 foot model features a fully flapped HQ 1/9 root section tapering to a Ritz 1/10 at the tip and 9% symmetrical, molded glass/Rohacell/glass sailplane. The 200 gsm carbon cloth wings (vacuumed onto blue foam cores) have four Futaba S9601 coreless motor servos operating ailerons and flaps.

Multiplex 3030 radio provides for mixing 'everything with everything', so there are just ailerons or full flapperons, then elevator coupled snap-flaps for square maneuvers, positive flap for thermalling and reflex flap for fast cruising and butterfly. The butterfly or crow flaps are arranged to come in progressively on the throttle stick so that landing is controlled with elevator and varying the amount of the butterfly. With practice, you can 'land on a sixpence' as we say, whatever the wind strength.

Now that Jerry's had his new shop built in the yard and sorted out his garage, I'm sure he's ready to make a few fuzzes for your winter building project.

Zen

I just finished this one; it has an HQ 1/9 section and comes in rathr heavy at just over 6 lb. The wing area is almost exactly 6 sq. ft. giving it a hefty loading of just over 16 oz./sq. ft. for sport and F3F. (It is a bit too heavy for aerobatics proper.) 140 gsm UD carbon plus 105 gsm silk glass vacuumed onto pink foam (ozone friendly!) wings and a substantial I-shaped spar. Four 9601 wing servos again, elevator servo 9101, rudder servo 3501, 5 x 700 maHr AA size cells for power pack. Variable camber wing at 25% chord. Ailerons, positive and negative flap, coupled elevator flap, butterfly on switch using Robbe (Futaba) FC18 radio. Hope to try some Dyna-soaring with it on the slope. ■

Wings

...by Bernard Henwood
219, Highcliffe Road
High Storrs, Sheffield
South Yorkshire S11 7LQ England

(Thanks go to Bernard for sending in the article, although it has taken us a while to include it in the pages of *RCSD*, and to the Sheffield folks!)

Competition flying fosters the development of both flying and model building techniques and the process is aided by the free exchange of information which is such a notable and healthy feature of competition thermal soaring. The wing construction methods currently used by the Sheffield thermal soaring team are an example of this. The glass skinning which we use originated, as far as I know, with the control line team race set, while Sean Bannister introduced the idea of the tubular aluminum spar on his original Algebra 2m. Sean's ideas were then adopted, modified and introduced to Sheffield by Adrian Barker from York. My own contribution was the introduction of metal spar fittings to fully integrate the spar into the wing joiner system, while Alan Cooper identified the best specification for the aluminum tube and located a source of supply. We have been happily refining and improving the ideas ever since and in doing so have set a Sheffield stamp on the development of thermal soarers and made a distinct impression on the result lists.

Competition thermal soaring requires light, but rugged models which use relatively thin, high aspect ratio wings. They need to be capable of being towed hard and being heavily ballasted to operate over a wide speed range. They also need to be simple and quick to build using basic modelling techniques and facilities, and should be easy to repair. The wing building system that has been developed satisfies these criteria quite effectively and may be useful for relatively small slope soarers as well as large thermal soarers.

The use of the tubular spar provides a jigging system for construction and, if you accept the disadvantage of a joiner bent to give dihedral, an accurately aligned means of joining the wing. It also provides a convenient receptacle for ballast. Tubes of different diameters, or more tubes, may be added to increase wing strength, or alter the disposition of ballast within the wing. It is easy to drill a hole in balsa with a bit if sharpened tube!

On the 100" Stiletto, I use two 1/2" diameter spar tubes in each wing. The main spar is 24" long and extends to the dihedral break. It takes a 7/16" diameter mild steel or high tensile aluminum wing joiner and is only used for ballast if particularly high loadings are required. The second tube is 12" long and is used for first stage ballasting. Both tubes are linked together by four 1.5 to 2.0mm high tensile aluminum plates: one at each end of the 12" tube, one just inboard of the end of the wing joiner, and one half way between this and the outboard plate to ensure that both tubes bend together under load. (Yes, we do bend them!) The 1/4" vertical grain balsa webbing runs between the tube and out to the dihedral break. The tip panel has no spar but is simply webbed with 1/8" medium hard balsa. Wing skinning 1/16" sheet should be between 15/20 gms per 36"x4" sheet.

The 136"/145" Stiletto is similarly constructed but uses 36" and 20" long spar tubes with 1/8" balsa webbing to the end of the 20" tube, from which point the webbing is stepped down to 1/4" at the dihedral break. The mainspar is reinforced where the sub spar tube ends with an 8" tight fitting dowel. This is inserted so that its centre coincides with the end of the 20" tube (an idea of Alan's).

Rib spacing is 1" in all cases with SP113 being used to bond the aluminum tubes and plates to the woodwork. The rear tube is arranged to run at 90 degrees to the root rib, centrally through the ribs, and on the CG position estimated at 33% chord. If the spar tube is used to take the wing joiner, the metal plates simply link the two tubes and support the tube wall where it is subjected to loads from the joiner. The joiner itself should be barreled slightly for approx. 1/2" at each end and the corners radiused. Our joiners extend between 3 1/2" and 4" into each wing. If separate dowel tubes are used, then the root and spar plates should be extended to fit round these and the dowel tubes need to be placed either side of the spar so that there are no twisting loads on the plates. Obviously, the holes for the dowel tubes will need to be positioned so that the required dihedral is achieved.

The metal plates are not difficult to make and my method of drilling the large diameter holes is illustrated with the methods of wing construction. The hardest part for many modellers will probably be the change of building habits. Weights to aim for are 20 to 22 ozs. for a set of 100" wings and 36 to 40 ozs. for a set of 144" wings, and this can be achieved.

The drawings illustrate some variation on the theme of tubular spars as well as the system I currently use, and an outline of the method of construction.

Finally, a warning! If you do adopt this method of wing construction, the entire aeroplane needs to be consistent with the wing. Fuselage, fin, rudder, tailplane and control systems all need to be capable of operating reliably when flown at the speeds and in the manner the wing makes possible. 3/16" sheet balsa tailplanes pierced with lightening holes and covered with film are definitely out!

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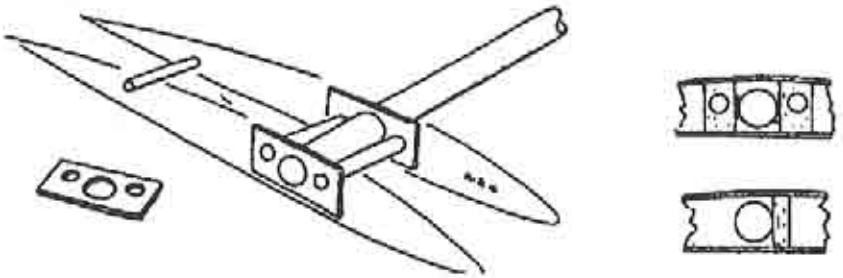
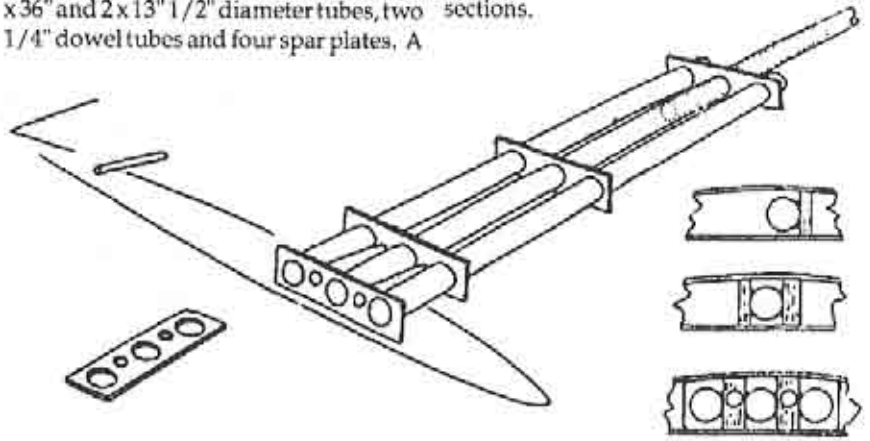
1 The first Stiletto 100" spar/joiner system using a single 26" x 1/2" O.D. spar tube and two 1/4" joining dowels. The spar plates are identical, with the holes for the dowel tube off centre, dihedral is obtained by inverting the outboard plate. Very strong, but spreads ballast too far across the span if used on larger models. Sections show typical root and third span configuration. 1/2" webbing at the root steps down to single 1/4" web at the dihedral break and 1/8" webbing in the tip panel.



2 To give increased strength and better disposition of the ballast, I used this spar system on my 145" Stiletto. The wing balanced between 1/4 and 1/3 span from the root and 3 lb. of ballast could be carried within 12" of the model's centreline. The spar system comprised 1 x 36" and 2 x 13" 1/2" diameter tubes, two 1/4" dowel tubes and four spar plates. A hardwood dowel had to be inserted in the main spar to cater for the sharp stress rise at the end of the ballast tubes. This dowel is shown by the dashed line on the drawing. The webbing stepped down from two 1/2" at the root to a single 1/4" at the dihedral break as indicated in the sections.



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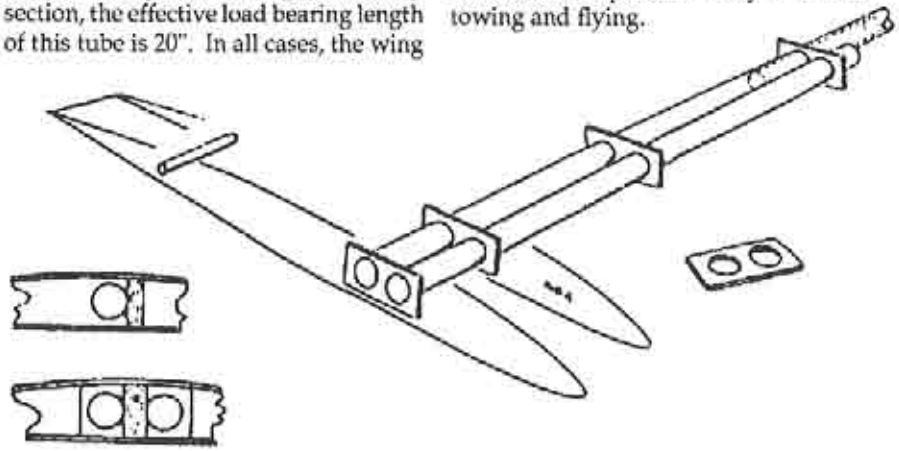
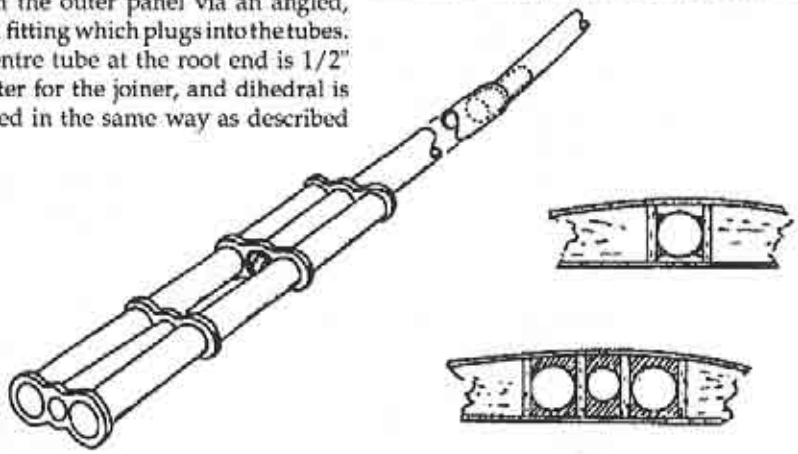
3 Recent models in the Stiletto series use this twin tube spar system. the 100" Stiletto uses 12" and 24" tubes and the 145" Stiletto uses 20" and 36" tubes, all 1/2" diameter. The 158" Stiletto uses 5/8" tube with the main tube being 40" long. The secondary tube extends into the airbrake bay where it is cut away to allow ballast loading. Discounting the cut away section, the effective load bearing length of this tube is 20". In all cases, the wing joiner fits into the longer tube. As the spar is not balanced about the joiner, bending loads on the wing generate twisting forces in the spar system. However, this system was chosen as a deliberate compromise in the direction of simplicity, and the twisting forces must be well within limits, as there have been no problems with it despite some very strenuous towing and flying.

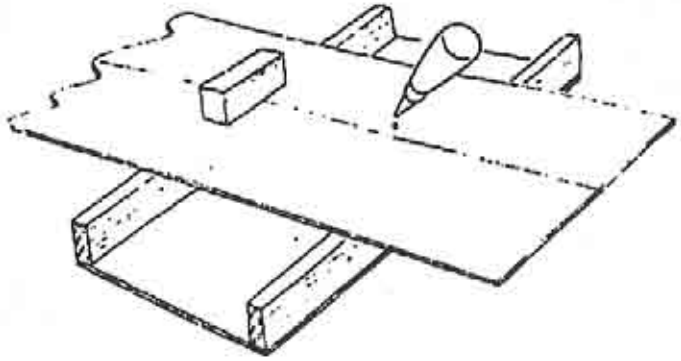


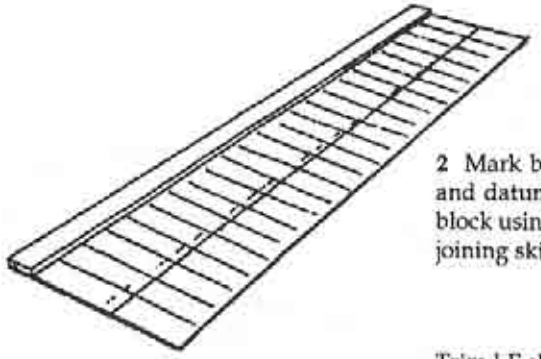
4 The 158" 10 sq. ft. Hatchetman spar system. This uses 5/8" diameter tube in the inner panel and extends into a 1/2" tube in the outer panel via an angled, turned fitting which plugs into the tubes. The centre tube at the root end is 1/2" diameter for the joiner, and dihedral is obtained in the same way as described for the first 100" Stiletto. All the inner panel tubes are boxed in 1/8" webbing and filled with epoxy/micro balloon mix.



Construction

1 Butt joint the wing skin by first tacking with cyano, then running cyano along the full length. I use the arrangement shown to avoid sticking the skins to the building board.

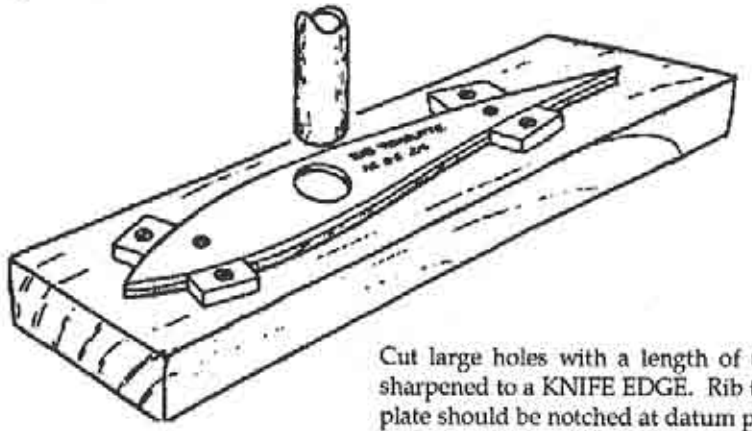




2 Mark bottom skins with rib stations and datum line to locate ribs. Add TE block using the same method as for butt joining skins.

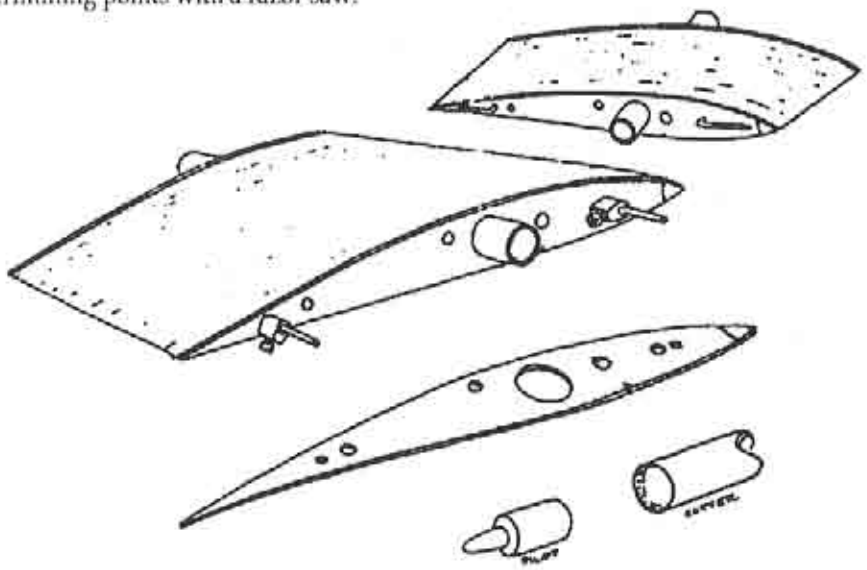
Trim LE slightly over size.

3 Cut rib blanks, then drill holes for incidence pegs/joiners, airbrake torque rod tube, ballast tube and mainspar as required in a simple jig. The ballast tube hole may simply be a pilot hole to be enlarged later.

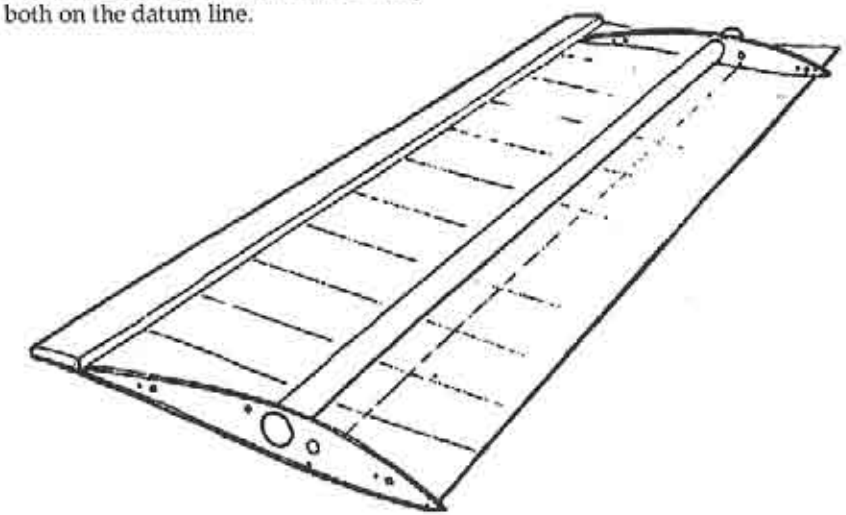


Cut large holes with a length of tube sharpened to a KNIFE EDGE. Rib template should be notched at datum point and LE trimming point.

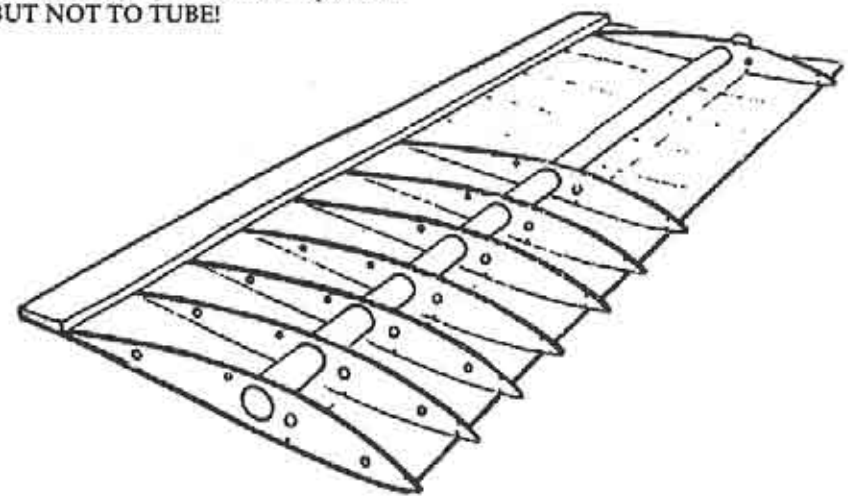
4 Assemble ribs on a length of spar tube, sand to profile and mark datum and LE trimming points with a razor saw.



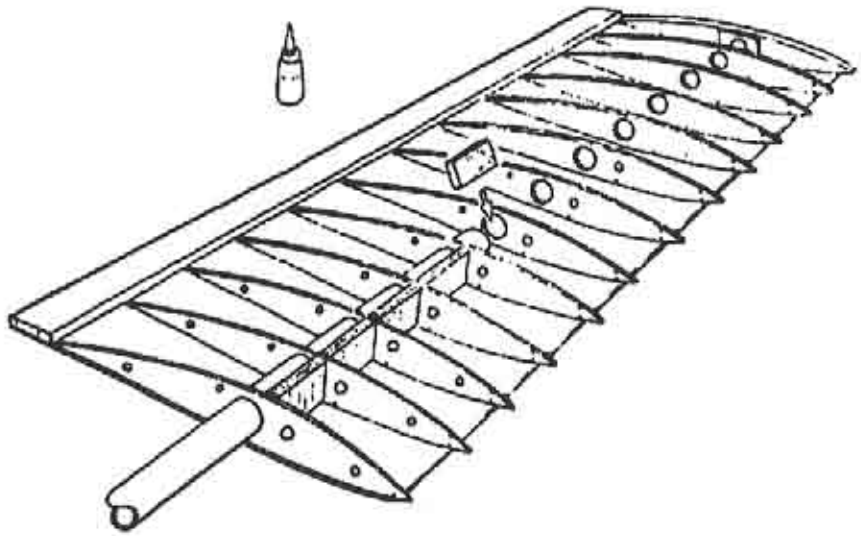
5 Cyano root rib and next rib in from dihedral break to bottom skin, locating both on the datum line.



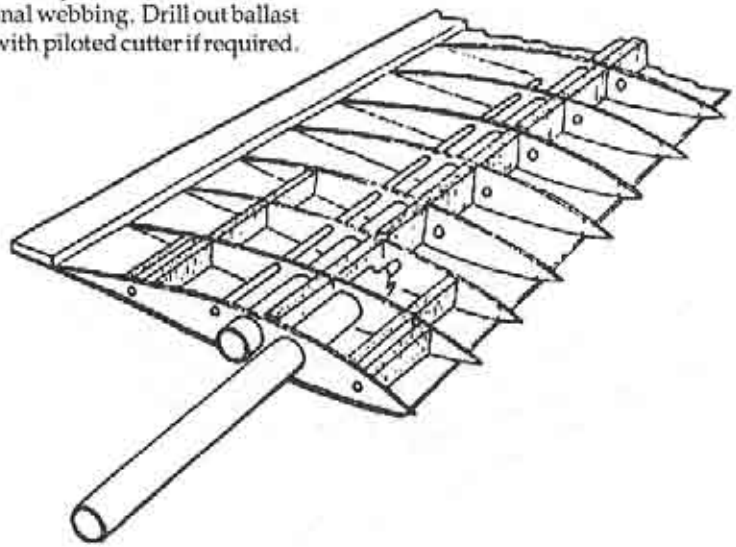
6 Insert spar tube through root rib, load rib pack onto tube and pass tube through outboard rib. Cyano all ribs in position, **BUT NOT TO TUBE!**



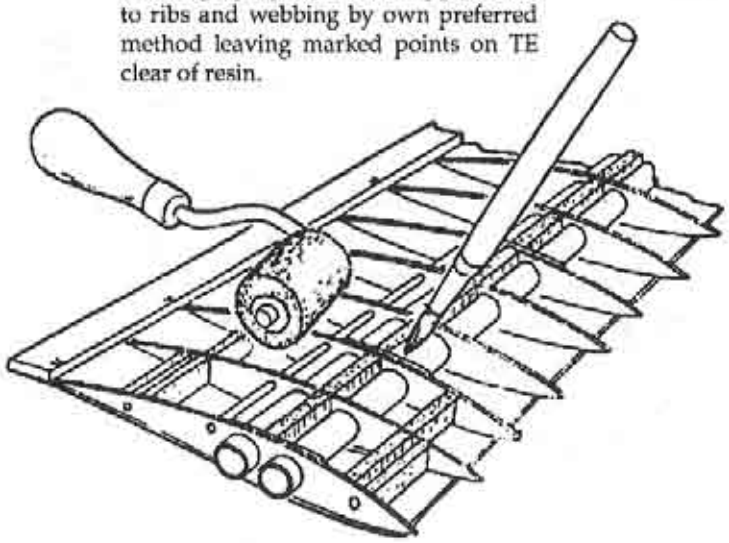
7 Fit webbing, locate with spar tube, withdraw the tube and cyano webbing in place. Make and fit 1/4" hard rib at dihedral break.



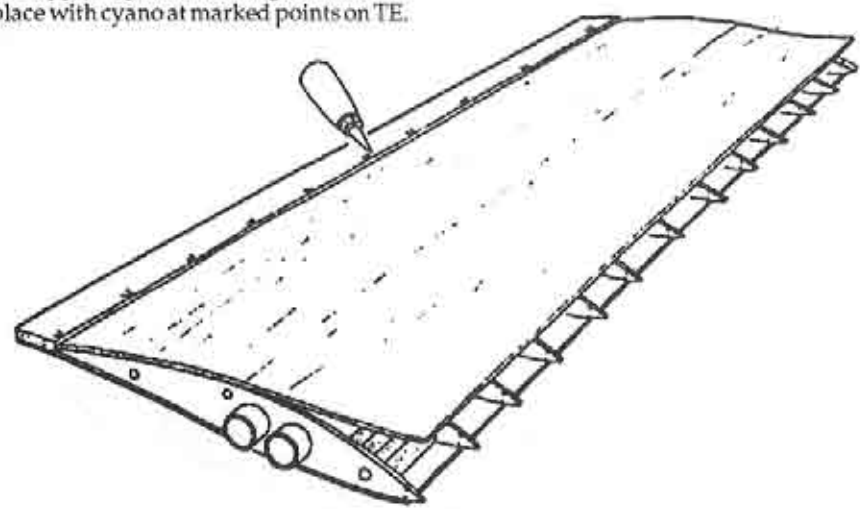
8 Fit airbrake tube and incidence peg/ joiner tubes into pre-drilled holes. Add any additional webbing. Drill out ballast tube holes with piloted cutter if required.



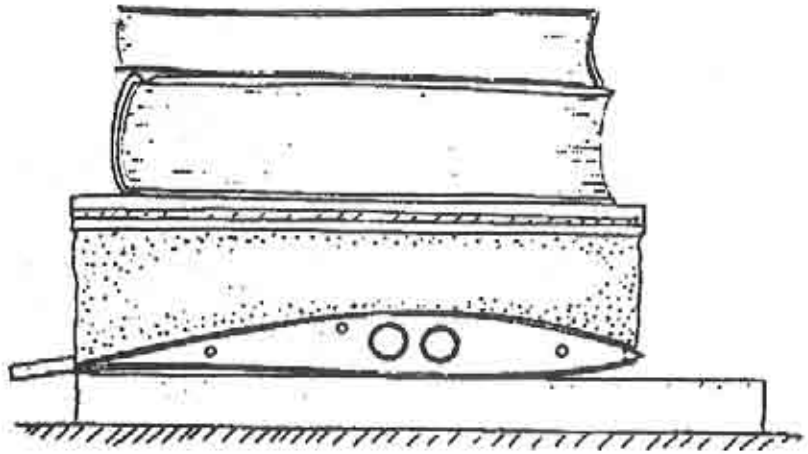
9 Insert metal plates, spar and ballast tube into wing and fix with SP113 making sure the joint between the spar and webbing is properly coated. Apply SP113 to ribs and webbing by own preferred method leaving marked points on TE clear of resin.



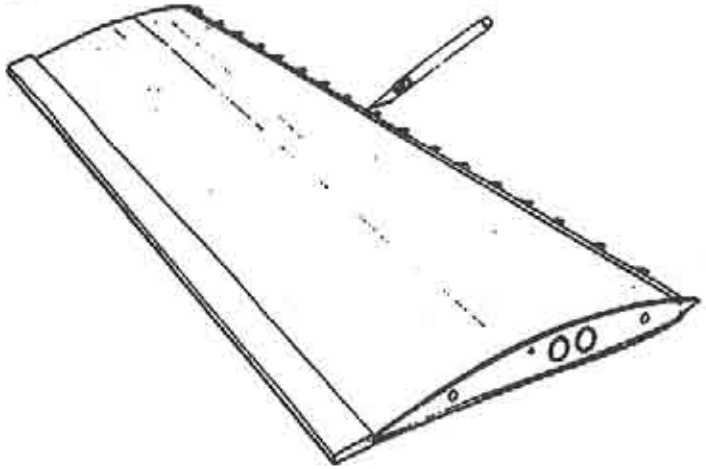
10 Apply top skin to wing and tack in place with cyano at marked points on TE.



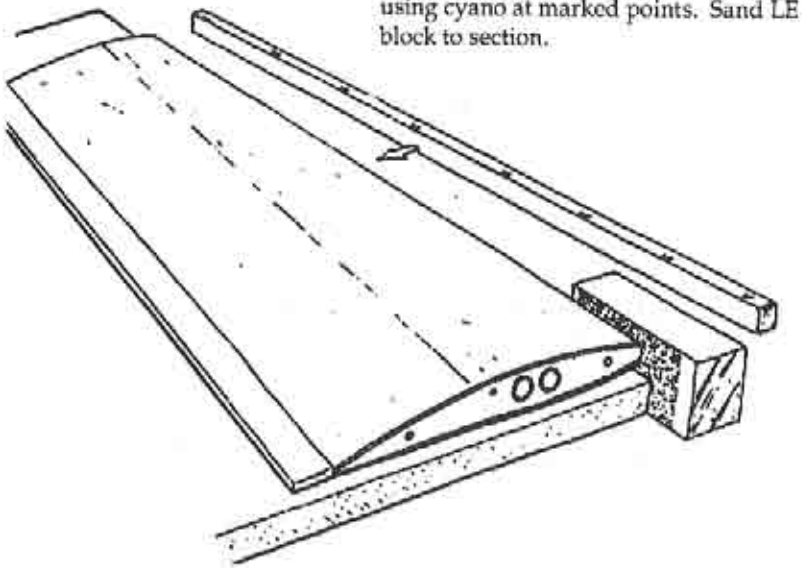
11 Place wing on accurately flat and solid building board, with TE block overhanging. Place 2" to 3" soft foam block on wing, board on top of foam and load with weights until the skin conforms to the rib section completely.



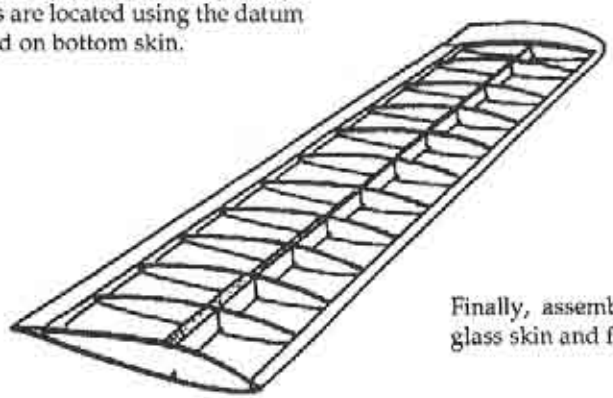
12 When dry, remove weights, mark top and bottom skins for trimming between trimming marks on rib LE. Trim roughly with sharp knife.



13 Carefully sand flat to trimming line as shown. spread SP113 thinly on LE except at marked points and tack in place using cyano at marked points. Sand LE block to section.

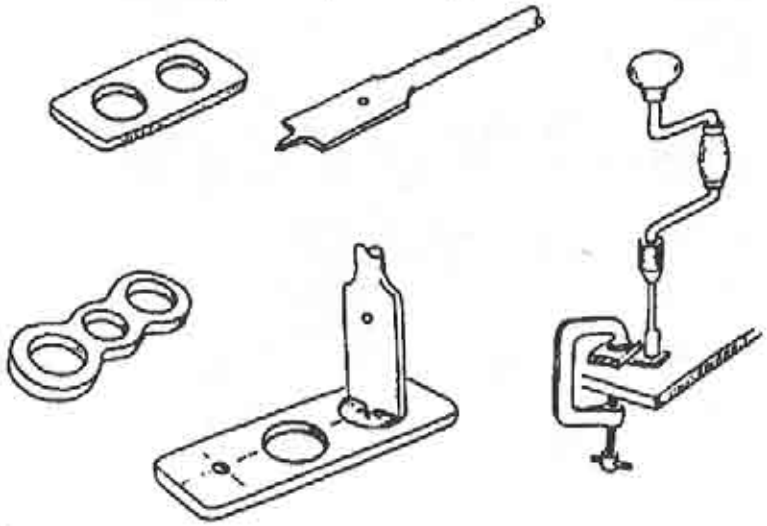


14 Construct tip panel similarly except that all ribs are located using the datum line marked on bottom skin.



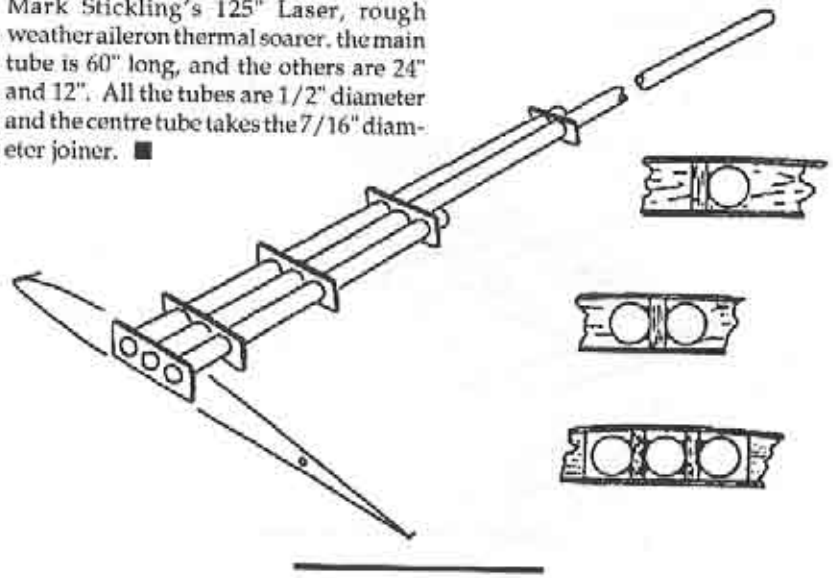
Finally, assemble panels, glass skin and fly.

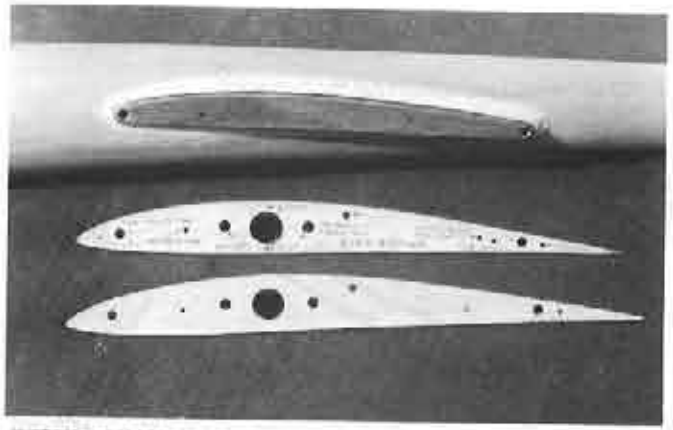
15 I first drill my metal spar fittings with a 2.5/3 mm pilot hole and then use an appropriately sized flat bit in a carpenter's brace. The plates must be clamped down securely to a flat piece of scrap timber.



Stop Press

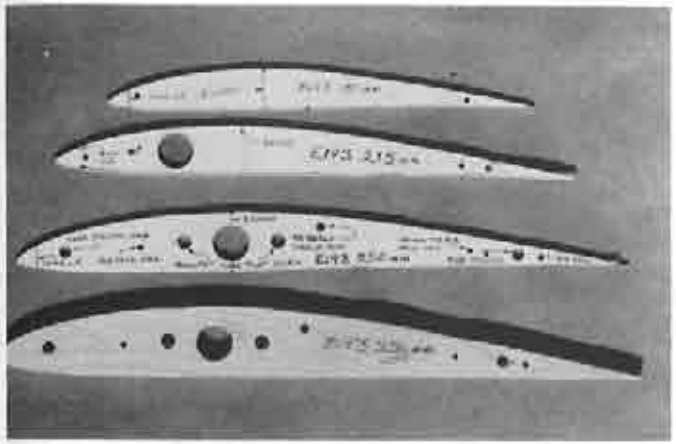
The triple spar tube system, as used on Mark Stickling's 125" Laser, rough weather aileron thermal soarer. the main tube is 60" long, and the others are 24" and 12". All the tubes are 1/2" diameter and the centre tube takes the 7/16" diameter joiner. ■



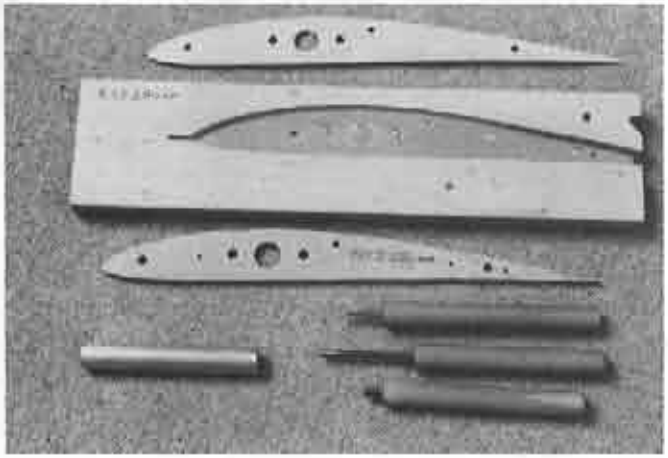


Plug showing wing root and jigging holes.

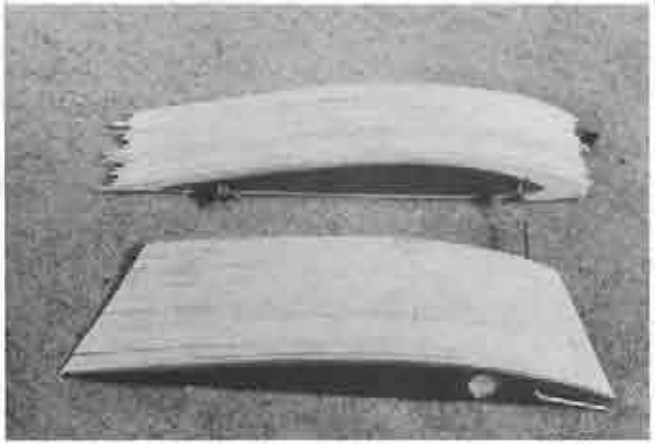
Spar plates



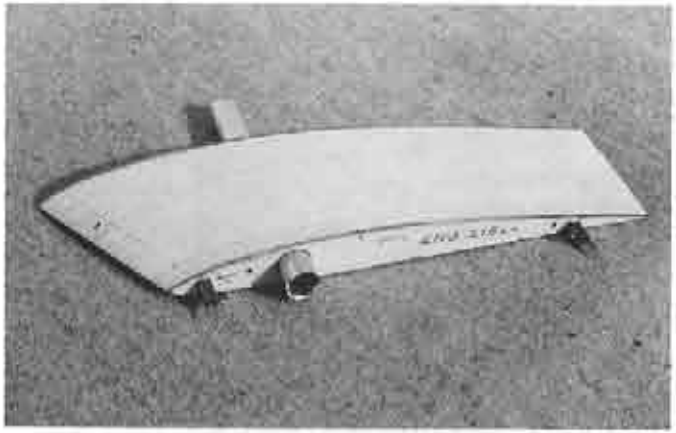
Rib cutting template (bottom) and rib pack templates



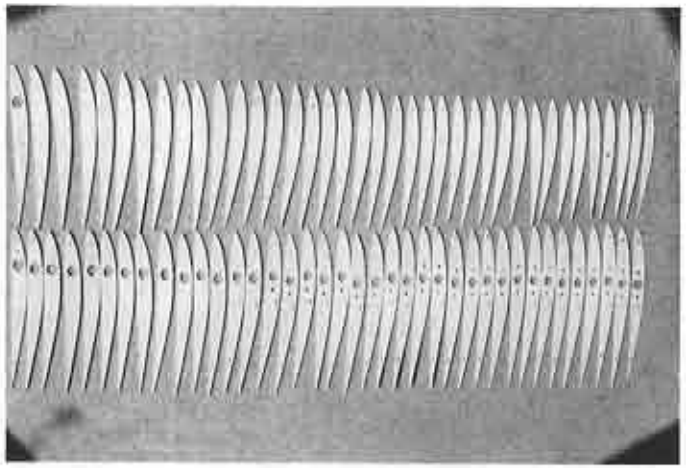
Rib drilling jig & hole cutting tubes
A/ Balsa blank drops into jig
B/ Ply rib locates over balsa rib
C/ Balsa rib drilled through ply rib template using sharpened tubes



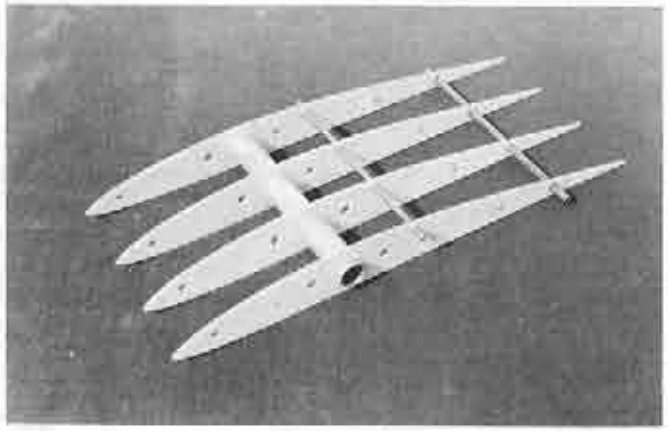
Tip rib pack before and after sanding



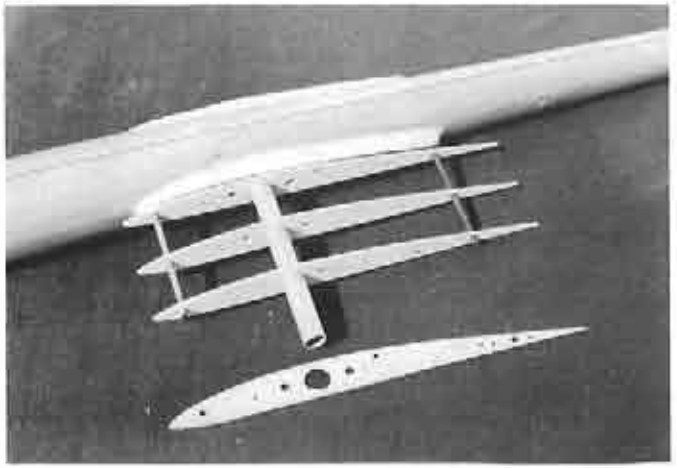
Inner panel showing ribs indexed on a short length of 1/2" tube



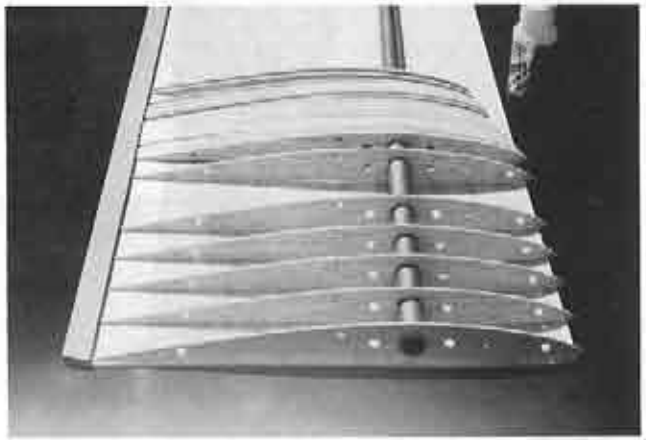
A complete set of ribs for one side of a twelve foot Stiletto



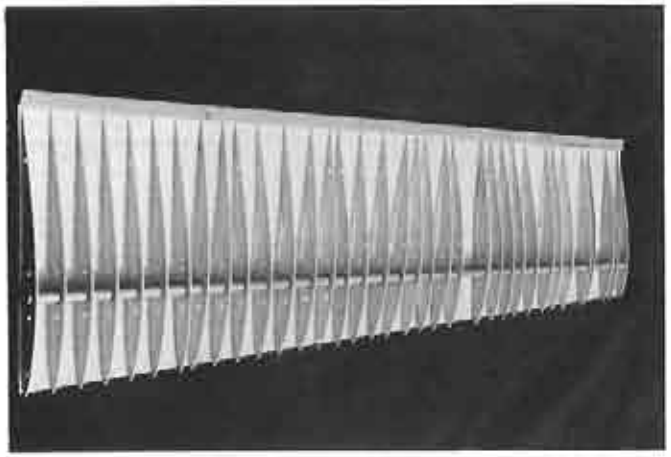
This shows how the wing spar tube and jigging holes 'tool' the wing production and give accurate alignment of all the parts.



This shows how the jigged method of building the wing relates to the jigging holes in the fuselage.

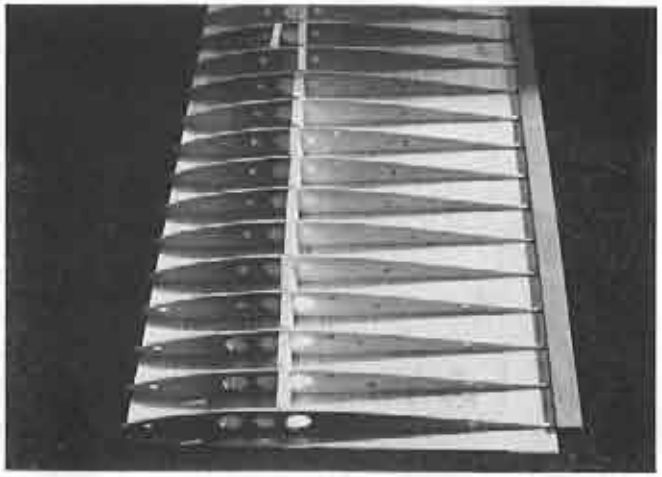


The root and tip ribs are glued in place on the bottom skin and the ribs threaded onto the spar tube.

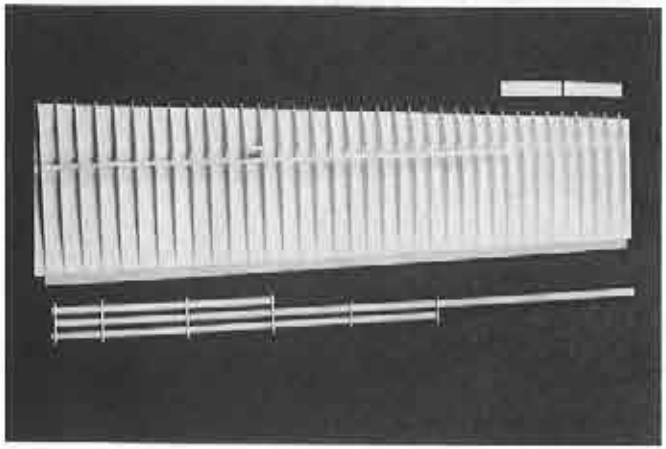


The ribs ready for gluing to the bottom skin.

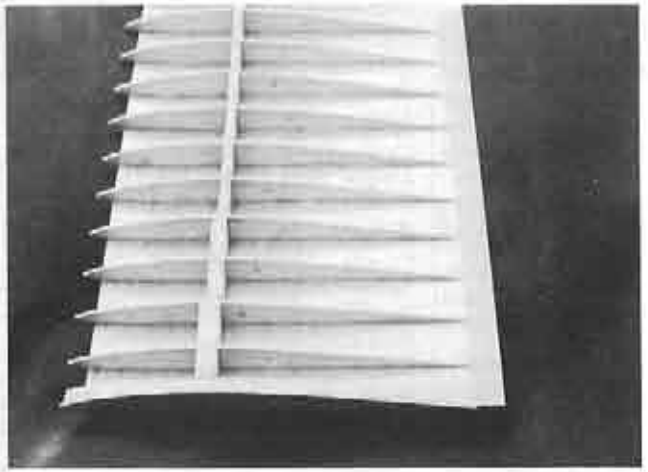
Gluing the ribs with cyano



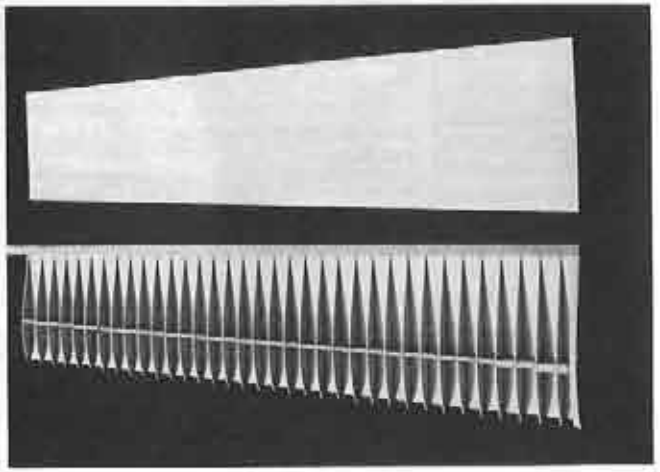
Fitting the webbing



Spar assembly and partly webbed inner panel



Inboard end of tip panel showing local strengthening of the webbing



Tip panel ready for top skinning

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.

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Reference Material

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

BBS

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

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

Contacts & Soaring Groups

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

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

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

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

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

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

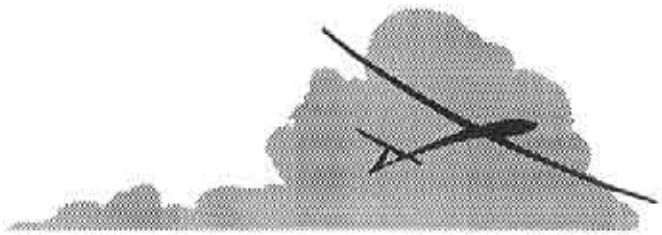
Nevada - Las Vegas Soaring Club, Steven Smith (President), 6978 Starwood Dr., Las Vegas, Nevada 89117 U.S.A., (702) 873-9591.

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

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

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

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



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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.

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

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

The Vintage Sailplane Association

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

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

LSF UPDATE

The League of Silent Flight is preparing for the 1993 National Soaring Championships which will be held August 7-14. There has been a sight change from Lincoln High School in Vincennes, In. to the Mid-America Aircenter which is approximately 10 miles NW of Vincennes in Illinois.

For those making last minute decisions to enter the absolute deadline for entry is July 10, 1993. Entries can be mailed to Mike Stump, 607 Washington St., Cadillac, Mi. 49601. Mike can be reached by phone at (616) 775-7445 or you may FAX him at (616) 779-2844.

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Task - Thermal Duration 3,5,7,9,11 w/FAI Landing

CLASSES:	AWARDS:
2 Meter -Saturday	1-5th place Sportsman & Expert
Open - Sunday	1-3rd place Novice & Junior
Junior, Novice	Overall Winner
Sportsman, Expert	

INFORMATION: Henry Bostick (214) 279-8337
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Schedule of Special Events

Date	Event	Location	Contact
July 17-18	GVRC Summer Dual Meet	Nunica, MI	Cal Posthuma (616) 677-5718
July 18	Aero-Tow Demo. Top of NJ (Club) - Raindate is July 25	New Jersey	Warren Miller (908) 852-1668
July 16-27	AMA NATS	Vincennes, IN	
July 24-25	North American Scale Soaring Assoc. Rally	Richland, WA	Wil Byers (509) 627-5224
July 24-25	F3J Interglide	West Midlands	
July 31-Aug. 1	Thermal Contest	Montreal, Canada	Etienne Dorig (514) 449-9094
Aug.	F3B World Championships	Sava, Israel	
Aug. 1	60-Min Enduro Dallas Electric Aircraft Flyers	Dallas, TX	Chuck Fisher (214) 270-2634
Aug. 7-8	Sailplane Meet Contest - Inland Empire Soaring Society	Washington Area	Robin Kirpatrick (509) 489-5841
Aug. 8	Task T1 Contest	Dallas, TX	Tom Peadon (214) 644-6131
Aug. 8	Glider Tow Day RAMS	Rowchester, NY	C. Zabinski (716) 223-1182
Aug. 7-14	LSF NATS	Vincennes, IN	Mike Stump (616) 775-7445
Aug. 14	LIFT Aug. Soar In	Traverse City, MI	Jim Johnston (616) 938-1272
Aug. 14-15	Summer Soaring Festival - Soaring Union of L.A.	Carson, CA	Steve Addis (310) 320-2708
Aug. 14-15	F3J Hollandglide	Netherlands	
Aug. 16-22	Fun Fly Soaring Week	Salt Lake City, UT	Bob Harman (801) 571-6406
Aug. 21	2M, Open	San Antonio, TX	Perry Van (210) 658-8842
Aug. 21-22	SBSS Summer Classic Open Thermal Comp.	Morgan Hill, CA	George Paige (916) 273-0415
Aug. 21-22	F3J Euroglide	Belgium	
Aug. 28-30	British Gliding Nationals		RAF Cranwell
Aug. 28-29	GVRC 2-M Champs man-on-man	Nunica, MI	Cal Posthuma (616) 677-5718
Aug. 29	TULSOAR Fun Fly	Tulsa, OK	Mike Teague (918) 747-1245
Sept.	F3J	Germany	
Sept. 4	CAMS Northern MI Sailplane CH.	Cadillac, MI	Mike Stump (616) 775-7445
Sept. 4-5	NW Soaring Meet Inland Empire Soaring Society	Washington Area	Don Hendricks (509) 534-1664
Sept. 5	609, 611 DEAF Dallas Electric Aircraft Flyers	Dallas, TX	Robert Taylor (214) 279-9296
Sept. 9-12	World Cup	Czechoslovakia	
Sept. 11-12	Masters of Soaring (Sponsored by Weak Signals)	Temperence, MI	Art Slagle (313) 477-2228 Eve.
Sept. 18	H/L	San Antonio, TX	Jerry Caldwell (210) 438-4077
Sept. 18-19	TNT Texas National Tournament	Dallas, TX	Henry Bostick (214) 279-8337
Sept. 26	TULSOAR Fun Fly	Tulsa, OK	Terry Bryant (918) 482-5817
Sept. 26/Oct. 3	2M Postal Denmark - Details in *RCSD*, "Soaring Site", June 1993	Everywhere	Steen Hoej Rasmussen
Oct. 2-3	20th Annual CVRC Fall Soaring Festival	Visalia, CA	Jerry Fox (209) 733-8091
Oct. 2-3	Annual DEAF Fun Fly - Electric	Dallas, TX	Frank Korman (214) 821-0393
Oct. 9	Team Thermal Duration Contest - T.O.S.S. - First Annual	Paramount Ranch, CA	Mike Reagan (805) 529-5513
Oct. 9-10	5th Annual MASS Fall Soaring Tournament	Memphis, TN	Bob Sowder (901) 757-5536
Oct. 10	Annual Dual Elimination	Dallas, TX	Jim Truitt (214) 348-2929
Oct. 16	Open	San Antonio, TX	Jerry Caldwell (210) 438-4077
Oct. 16	TULSOAR 12th Last Fling of Summer	Tulsa, OK	Sandy Hay (918) 665-8069
Oct. 17	TULSOAR 2M & Unlimited	Tulsa, OK	Perry Gilstrap (918) 455-5490
Oct. 24	TULSOAR Fun Fly	Tulsa, OK	Mike Stephenson (918) 445-3002
Nov. 7	610, 612 DEAF Dallas Electric Aircraft Flyers	Dallas, TX	Jack Hamilton (214) 348-4669
Nov. 14	Task T6 Triathalon	Dallas, TX	Chuck Fisher (214) 270-2634
Nov. 28	TULSOAR Fun Fly	Tulsa, OK	Doug Drullinger (918) 838-0282
Nov. 20	2M, Open	San Antonio, TX	Gene Warner (210) 732-3101
Nov. 21	5th Annual MASS Turkey Shoot	Memphis, TN	Mike Kelly (901) 756-9410
Dec. 26	TULSOAR Fun Fly	Tulsa, OK	Corey Gilstrap (918) 455-5490

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

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

Classified Advertising Policy

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

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

For Sale - Business

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

SILENT FLIGHT CLASSIFIEDS, and more each month! List the gliders and electrics you no longer fly in our free ads. Radios, winches, sniffers and accessories, too. List it free in SFC. Subscriptions are 1 issue @ $1.00, 1/2 year @ $5.00, yearly @ $9.00. SFC, 329 Little Ave., Ridgway, PA 15853.

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.

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

IRON ON CARBON FIBRE 3.7 Oz./yd^2, .007 - 2"x48"... $9.00, 12"x48"... $18.00, 1'x10'... $42.50. Iron on S-glass, 12"x48"... $10.00. Chopped carbon fibre... $2.95 bag. 100# test kevlar pull-pull system, 25' plus teflon-teflon sleeving... $7.00. 100% satisfaction guaranteed. Only $1.00 S&H. CA res. add 7.75% tax. Send LSASE for brochure & free samples to: California Carbon, P.O. Box 39, Jamul, CA 91935; (619) 669-6348.

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

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

For Sale - Personal

Airtronics ATRCS Transmitter and 8 Channel Receiver on CH 30, good condition, complete with original ATRCS manual, transmitter nicad batteries will have to be replaced... $400.00. Bob Cooke (415) 771-9588 N. Calif.

Dodgson Maestro Megan, 128" or 140", E374, NIB... $195.00; Pierce Aero. Co. PARAGON, 118", NIB... $40.00; Pierce 970, 120", NIB... $50.00; Gemini MTS, 100", NIB... $55.00; Airtronics original OLYMPIC 100, NIB... $75.00; Pica Waco YMF-3, 1/5 scale, NIB... $135.00; Culpepper CUPEROSA, E214, NIB... $35.00; Bob Sealy LASER, 123", NIB... $125.00; real cute hand launch Bird of Time kit, NIB... $25.00; Airtronics AQUILA, recently built professionally with carbon fiber reinforcement to fuse, 5/16 wing joiner rod, non breakable spar, balsa sheeted wings, built for up coming Nostalgia contest... $175.00; Graupner Electric Speed 700 Turbo motor in Multi-purpose 2M OSPREY E, aerobatic, thermals extremely well and will ROG, sheeted E193 foam wing, needs 8 cell battery and motor control... $245.00, send $1.00 and SASE for Photo Pak. Contact Ray Hayes, 69598 Brookhill Dr., Romeo, MI 48065; (313) 752-0732 after 7 pm.

FALCON w/glass bag, RG-15, RTF... $400.00; Dodgson CAMANO, needs work... $60.00; Multiplex FLAMINGO CONTEST, needs work... $60.00; Bird of Time kit... $40.00; RTF CHUPEROSA... $75.00 or $125.00 w/servos; RTF Bob Martin TALON, new... $60.00; RIDGE RUNT, partially built... $20.00; RIDGE ROCKET, slope, scratch built... $50.00; 100" 7032 cores & spars... $25.00; Dodgson WINDSONG kit... $125.00; HARLEQUIN w/2 sets of wings (205 & 193 airfoils)... $40.00. All plus UPS. George Voss, 1403, Lincolnshire Rd., OKC, OK 73159; (405) 736-4492 days, (405) 692-1122 eve.

1/4 scale PILATUS B-4, a real hanger queen, 147" wing span, obechi covered foam wings, fiberglass fuselage, RTF w/white & blue fuse, red & blue sunburst on wings, retract... $750.00 or with 6 servos, Ace Silver Seven Tx & Rx... $1000.00; Airtronics LEGEND, covered in blue & white monokote, RTF, test flown only... $250.00 or w/Ace Silver Seven, 5 servos, Tx & Rx... $500.00; 2 Silver Seven Transmitters, gold stickered, on 12, 16, 46, 52 with 5 Silver Seven receivers on 46, 4 on 52, one on 12, and one on 16. Trade in value towards ACE PRO 8000 Tx and 810 Rx. Over $700.00. Will sell for $500.00. Jim Ealy @ (609) 448-8726 NJ.

FEATHER CUTTER with 26" & 52" bows with pwr supply... $185.00; vacuum pump for bagging... $85.00; Micropro 8000... $250.00; Dremel belt disk sander... $75.00; Lots of other stuff like epoxy. Call Jon at (515) 682-4604 Iowa.

Wanted - Personal

Roebers Discus, new or flying. Canopy for Multiplex DG 300/17. Robert Ritschel (619) 756-3367 S. Calif.

Scale sailplane, completely built/half built/kit. Reasonable offers, only. Scott Carroll, Rt. 2 Box 43, Odessa, WA 99159; (509) 982-2533.

Advertising Guidelines

Types of Advertising

Business

Business advertising is subject to the full rates.

Classified

Classified ads are free of charge to subscribers and are printed on a space permitting basis provided the ad is personal in nature and does not refer to a business enterprise. Classified ads that refer to a business enterprise are charged $5.00 per month and are limited to a maximum of 40 words.

Clubs & Non-Profit Organizations

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

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

Deadlines

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

Advertising Rates Effective December 1, 1990

(Cost per month based on number of ads within a year)

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

Notes

- A 10% discount is available if the same size ad is run continuously for one year and payment is made for the full year in advance.
- Effective July 1, 1993, the maximum number of pages allowed is two for any advertiser. A full rate card is available on request.
- *RCSD* has neither the staff or the facilities to investigate advertising claims. However, we would hope that any subscriber would feel free to contact us immediately if they are unable to resolve any issues they may have with any advertiser.

ULTRA GP

SUPER PIVOT WING
MOLDED HOLLOW CORE WINGS
EPOXY GLASS FUSE WITH 5 OZ. KEVLAR
BALSA SHEET TAIL GROUP
MACHINED MECHANICS
98% RTF - NO PAINTING

SPECIFICATIONS

WING SPAN	55 3/8 inches
LENGTH O.A.	33 inches
WING AREA	311 sq. inches
WEIGHT RTF	24 to 27 ounces
WING LOADING	11.1 TO 12.5 oz / sq. ft.
AIRFOILS	MOD. SD8000/SD7003
PRICE	$300.00

The ULTRA GP is an advanced aerobatic slope soarer. It is outstanding in speed and roll rate. The molded wings ensure consistency and repeatability of performance. The wings are driven directly without drive pins running in fuselage slots. Larger than normal throw volume is available to the pilot. The Ultra GP tracks smoothly and has gentle stall characteristics. The airframe has been engineered to survive the rigors of slope flying. The Ultra GP is an exceptionally durable performer.

OAKLAND MODEL ACADEMY
650 E.17 St. #14
Oakland, CA 94606
(510) 839-0436

PRECISION CONTROL PRODUCTS

SOARCRAFT

615 N. FARR RD
SPOKANE, WA 99206
(509)926-4803

SERVO MOUNTS

S33/133 S128 S148 — 94141 94501 HS80

FRAME MOUNTS FLUSH IN WING

LAMINATED AIRCRAFT PLY CONSTR. STAINLESS SCREWS

SERVO BONDED TO HATCH

$12.50 PAIR

ORDERING:

CHECK OR M.O
$2.50 S&H
WA STATE RES ADD 7% TAX
CATALOG ON REQUEST

STAB RETAINERS

SILVER BRAZED STAINLESS STEEL CONSTR

FOR 3/32 OR 1/8 PIVOT RODS

$4.00 EA

AILERON/FLAP HORNS

6061-T6 ALUM

$3.00 PAIR

BELLCRANKS

3/32 OR 1/8 PIVOT ROD

NON-BINDING INCIDENCE PIN BEARING

DELRIN BEARING

6061-T6 ALUM BODY

$10.00 EA

Genesis

Out launch, out soar and out land the competition with Genesis.

RnR Products introduces the ultimate high-performance thermal sailplane.

"We asked serious pilots what they really wanted in a competition thermal ship... and listened carefully. We took what we learned and developed Genesis. It's a lightweight, efficient, precisely-molded, super strong composite sailplane that's affordable.
The design computer says it's a winner.
We'd like to know what you think.

Almost Ready to Fly.
Only $489.00

SPECIFICATIONS

Span:	113"
Flying weight:	70 oz.
Airfoil:	SD7037
Area:	855 sq. in.
Wing loading:	11.7 oz./ft.
Aspect ratio:	14.2:1
Stab:	Full-flying, key-mounted on rocker assembly
Wing configuration:	Hollow core, three piece, parabolic planform.
Construction:	All molded in glass, carbon fiber and Rohacell.
Finish:	Pre-colored gloss gelcoat - no painting required.

Available exclusively from **Siegers International** and:

RnR Products
1120 Wrigley Way • Milpitas, CA 95035
(408) 946-4751

Call or write for a free information packet on Genesis, the Synergy III, Synergy 91, Nova and SB XC.

WINDSPIEL MODELS
Importers of Fine R/C Scale Sailplanes & Dealer for JR Radio

DG - 600 3.6 M
$850.00

Wing Span:	**360 cm**
Length:	**141 cm**
Aspect Ratio:	**22,1**
Wing Area:	**59 dm²**
Weight:	**3400 - 4200 g**
Profile Quabeck:	**HQ 3-14**
Wing Loading:	**55 - 65 g/dm²**

Our Full Color Catalog in English is $10.00 U.S.

P.O. Box 2121, Coeur d'Alene, ID 83816 • PH/FAX (208) 667-2276

BANSHEE

A No-Compromise Competition 2 Meter from Agnew Model Products!

Banshee is a clean, stable 2M design capable of excelling in all conditions. Uses the E387 for excellent dead air performance complimented by the ability to carry ballast in heavy winds. Banshee is a very forgiving design equally at home in the hands of the intermediate or advanced soaring pilot.

Kit Features - Pre-sheeted wings w/polyhedral pressed into each panel, pre-sheeted stabs, high quality fiberglass fuse & canopy, all hardware, detailed building and flying instructions, root rib pre-glued, ailerons and flaps pre-cut, robust 9/32" Dave Squires' rods for zoom launching. 80% complete out of box.

LSF NATS WINNER!

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

Kit: $275.00 + $12.50 S&H

Available This Summer from Agnew Model Products

BANDIT

***for Thermal & SMT:* $375.00 + $15.00 S&H**

S3021 / RG 15 Options Available

✦ Pre-sheeted three piece bolt-on wing w/flaps and ailerons pre-cut (113" span, 900 in² area) ✦ Pre-sheeted stabs ✦ Beautiful kevlar reinforced fiberglass fuselage ✦ All hardware ✦ Complete instructions ✦ Dihedral pressed into center panel. Call or write for details.

Vertigo

Vertigo Kit W/Fiberglass Fuselage: $89.95 + $5.00 S&H

Add $35.00 for Pre-Sheeted Version.

Vertigo Fiberglass Fuselage: $45.00 + $5.00 S&H

The Vertigo fuselage will accomodate both V-tails and standard tail configurations. Pre-aligned incidence. Allows Vertigo to be built **lighter and stronger!** Call or write for details.

Agnew Model Products
166C Springwood Circle, Longwood, FL 32750; (407) 260-6223

TNR TECHNICAL INC
YOUR BATTERY STORE

Authorized **SANYO** Distributor

STANDARD	SIZE	CAPACITY (mAh)	DIA	HT	WEIGHT (oz.)	PRICE
N-50AAA	1/3AAA	50	.394	.591	0.12	$ 1.65
N-110AA	1/3AA	110	.551	.650	0.28	$ 1.50
N-150N	N	150	.453	1.122	0.32	$ 1.50
N-200AAA	AAA	200	.394	1.720	0.35	$ 1.75
N-270AA	2/3AA	270	.551	1.161	0.50	$ 1.50
N-600AA	AA	600	.543	1.945	0.92	$ 1.50
N-650SC	1/2SUBC	650	.866	1.016	1.02	$ 3.00
KR-1300SC	SUBC	1300	.866	1.654	1.70	$ 2.00
KR-1500SC	SUBC	1500	.866	1.654	1.66	$ 3.00
KR-2000C	C	2000	.992	1.929	2.47	$ 4.00
KD-4400D	D	4400	1.272	2.362	5.30	$ 7.00
KR-7000F	F	7000	1.272	3.543	8.13	$13.00
HIGH CAPACITY						
N225AE	1/3A	225	.650	.612	0.42	$ 3.00
KR600AE	2/3A	600	.650	1.094	0.77	$ 2.00
KR800AAE	AA	800	.543	1.949	0.85	$ 2.50
KR1000AE	4/5A	1000	.650	1.654	1.09	$ 2.95
KR1100AAE	7/5AA	1100	.543	2.530	1.06	$ 3.25
KR1200AE	A	1200	.650	1.909	1.08	$ 2.95
KR1400AE	A	1400	.650	1.909	1.09	$ 3.95
KR1700AE	4/3A	1700	.650	2.598	1.48	$ 4.95
KR1800SCE	SUBC	1800	.866	1.654	1.62	$ 3.50
KR2800CE	C	2800	.992	1.929	2.75	$ 5.95
KR5000DET	D	5000	1.272	2.280	5.28	$ 8.95
FAST CHARGE						
N600SCR	1/2SUBC	600	.866	1.016	1.02	$ 3.25
N800SCR	A	800	.650	1.909	1.16	$ 3.00
N1000SCR	2/3SUBC	1000	.866	1.299	1.44	$ 3.50
N1400SCR	SUBC	1400	.866	1.654	1.87	$ 3.50
N1700SCRC	SUBC	1700	.866	1.654	1.80	$ 4.50

Specify Solder Tabs *FREE* of Charge

4 CELL RECEIVER PACKS (Flat or Square)

4N-50AAA	$ 8.95	4N 800AR	$11.95	4KR-1300SC	$11.95
4N-110AA	$ 7.95	4KR1000AE	$12.95	4KR-1500SC	$13.95
4N-150N	$ 8.95	4KR1100AAE	$17.95	4KR-1800SCE	$18.00
4N-200AAA	$ 8.95	4KR1200AE	$13.95	4N-1400SCR	$16.00
4N-225AE	$12.95	4KR-1400AE	$16.95	4N-1700SCRC	$19.95
4N-270AA	$ 7.95	4KR 1700AE	$19.95	4KR2000C	$20.00
4N-600AA	$ 8.95	4N-650SC	$13.95	4KR4400D	$34.00
4KR 800AAE	$11.95	4N-600SCR	$13.95	4KR5000DET	$42.00
4KR-600AE	$10.95	4N-1000SCR	$15.95		

5 CELL RECEIVER PACKS

To order a 6 volt Battery Pack add the cost of a single cell to the 4 Cell Battery Pack.

CONNECTORS

FUTABA	J	$4.00	AIRTRONICS	$4.00
FUTABA	G	$4.00	JR/HITEC	$4.00

TRANSMITTER PACKS

8N600AA 8KR800AAE	1 row of 8 AA	$15.95 $20.00	8N600AA 8KR800AAE	2 sticks of 3 1 stick of 2	$15.95 $20.00
8N600AA 8KR800AAE	4 sticks of 2 square	$15.95 $20.00	9N600AA 9KR800AAE	3 sticks of 3 10.8 volt	$18.00 $22.00

GELL CELLS

6 volt	1.2 AH	$12.00	12 volt	7.0 AH	$15.00

TNR Technical Inc.
279 Douglas Avenue • Altamonte Springs, FL 32714 • (407) 682-4311

1-800-346-0601

FAX (407) 682-4469

Add $4.00 shipping & handling. 7% sales tax for Florida residents.

DEALERS' INQUIRIES WELCOME

VISA MasterCard Discover

SLEGERS INTERNATIONAL

Route 15, Wharton, New Jersey 07885

(201) 366-0880 - FAX (201) 366-0549
9:30 A.M. - 5:00 P.M. (Closed Sun. & Mon.)