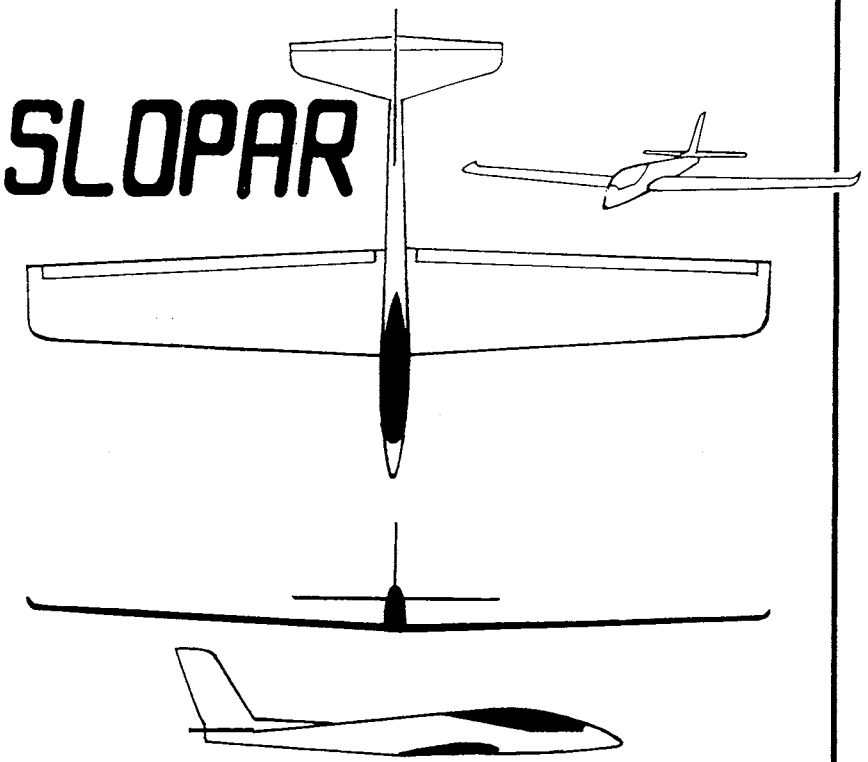
R/C Soaring DIGEST

Vol 6. No. 1 January 1989

SLOPAR



Span	52 inches
Area	330 sq. in.
Airfoil	SELIG 3021
Weight	14 to 21 oz.
Length	32 inches

Two Function - Aileron & Elevator

Designed by Mike Reed

Featured on page 11

RC Soaring Digest
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High Start

Happy New Year to all RCSD readers...and I must say that there's much to be happy about! RCSD has reached the 1,000 subscriber level, and new subscriptions are coming in every day. We have taken on a somewhat "new" look with a more professional appearance typesetting, page layout and graphics. For that, I want to give credit where credit is due and hereby thank my new printer - Jim Hobbs for literally dragging me into the 20th Century; and I want to specially thank Judy Slates for making all of this possible with her skills and ideas brought to fruition with the help of her MacIntosh computer.

Besides all those things, there are even more that promise to make 1989 a banner year: Wil Byers and the Tri-Cities (Richland, Pasco, Kennewick) Washington soarers have taken on a double responsibility this year: to again put on the fabulous Scale Slope Soaring Fun Fly over the Memorial Day weekend; **and** to host the 1989 RC Soaring Nationals in July! The site will be a field every bit as good for thermal soaring as their slope is for slope soaring. In addition, the AMA has decided to try out a "new" type of event for the soaring Nat's: slope racing!

Finally, I want to share a bit of a personal goal and hope for 1989: my retirement! No, not from RCSD, but - instead - from my regular 8-to-5 job as advertising manager for an international publication in the communications field. Retirement will **NOT** be an easy-chair, feet-in-the-fireplace event for the Gray family. Instead, it will open up the time for us to travel, to do some soaring, and to visit your clubs and contests...perhaps to become competitive again and to finish up some higher levels in LSF. If all goes well, yours truly will become one of the "professional loafers" as they're sometimes called, and attempting to get back some of that do-re-mi that I've put into the system for the past umpty-ump years! I'll continue writing and publishing, too, and may even take on some more free-lance work in that field...only this time I'll be working for ME, and it may all begin on July First, MY Independence Day!

In view of the above, all of the little niggling problems seem to pale into insignificance, or at least barely noticeable proportions. Among them, are remaining difficulties between AMA, NSS and the RC soaring folks. You know that I try to be very un-political, but - when necessary - present at the very least a balanced view of controversial situations and events. Once in a great while it becomes necessary to adopt a stand either in favor of, or against, something that has a lot of meaning for me. The simmering controversy between our National representative to AMA (the Academy of Model Aeronautics) and our special-interest group (the National Soaring Society) appears to be generating a lot more heat than light. Much has been written by people who have an axe to grind, others who have little knowledge but much opinion, and those in a minority who have some legitimate complaints. This is not an attempt to defend or represent either side, or attempt to sway anyone's opinion. Rather, I'd like to point out some facts, the first of which is that AMA IS OUR REPRESENTATIVE IN FACT. While some unpopular decisions have been made, or in some instances no decisions at all, we have to recognize that the AMA is our best, if not only, hope for the future. They have the numbers and they have the clout, all 140,000 members strong. Of this total, only a few represent organized RC soaring. NSS has perhaps 500 members or so, and - as such - represents a vocal, but small, minority within the fabric of aeromodelling.

To be an effective representative of RC soaring, NSS must grow! It must also have some numbers and thereby some "clout". Not only that, NSS must have a firm idea of

continued on page 2

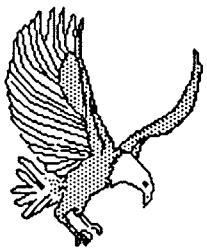
High Start...continued

where we soaring people are going, and how to get there. It's up to US to give input to our NSS vice presidents and president and let them know what WE want. If we don't support NSS or AMA we're merely voices crying in the wilderness.

Let me ask you: what have YOU done, personally or otherwise, to inform, advise or instruct either NSS or AMA as to exactly your thoughts and desires? I don't mean ill-informed nit-picking, either. What I mean is solid, constructive and potentially usable stuff from which decisions can be made and steps taken. It's all too easy to carp and complain, to whine and whimper and point fingers...but that's NOT going to do you or our beloved sport any good at all. Let's make some hard decisions here and try to change the system (if it needs changing) from within. AMA is NOT unreasonable, or at least I don't think they are, if you consider the AMA to be not just one man, but many. Recently, at the Central Arizona Model Show in Mesa, I had the opportunity to bend Jeff Troy's ear. As you know, Jeff is Assistant Public Relations Director, and a long-time modeler and flier who has seen our sport from both sides now. Speaking off the cuff, he told me vis a vis our mutual "problem": "TELL US WHAT YOU WANT. GET TOGETHER AND MAKE SOME SOLID DECISIONS ABOUT WHERE YOU WANT TO GO, AND HOW TO GET THERE, AND ASK US AT AMA TO IMPLEMENT THEM FOR YOU. WE ARE NOT INSENSITIVE TO YOUR NEEDS AND DESIRES — ALL WE HAVE TO KNOW IS WHAT YOU WANT."

Okay, admittedly this is one man's viewpoint from the "inside" so to speak, but I don't feel that it is his alone. I think we DO have a sympathetic ear or two willing to listen. Tell me, have YOU joined AMA?

From the NSS point of view, I have spoken with Pete Carr, the president of NSS, again unofficially and off the cuff. We have agreed that the RC sailplaners have some legitimate complaints — some of them related to what would appear from the outside to be AMA "policy" to ignore glider people completely. I am told that the National Free-Flight Society may have similar complaints. If this is true, then let's get together with NSS, NFSS, and AMA and get these things out on the table to be worked out. Sure, it's easy to say that we'll "take our marbles and go home", but think about it: what "good" will it do? It won't hurt anyone but ourselves. We lose representation to the FAI, we lose the "numbers" game, and we lose any real voice we may have. Consider what a defection or secession would do to us: we would go back to being isolated, splinter groups of enthusiasts with no common purpose or stated goals and objectives. Right now, we have the nucleus of a GREAT organization if we'll all pull together. Pete Carr wants to make the NSS a viable and strong voice for RC soaring — but he needs your help, too. Have YOU joined NSS?



Let's get down to unfinished business and make 1989 the best year yet for soaring by working together instead of as a gaggle of individuals headed nowhere in particular.

HAPPY SOARING,
Jim Gray

On the Wing
...by B^2

Those who have seen the Proceedings of the M. A. R. C. S. National Sailplane Symposiums recognize the wealth of information contained therein. We have read our copies several times, but it seems that each reading finds us discovering some new piece of information that we have apparently missed previously. Too, we are often given to assembling facts and ideas from several of the Proceedings and coming up with a synthesis which we then are able to put to use in some way.

The Proceedings for 1983 and 1984 included some good information on Hand Launch Sailplanes (Class A). (The printed Proceedings are available from Al Scidmore, Editor, 5013 Dorsett Drive, Madison, WI 53711.) We had been thinking about building a Hand Launch Sailplane without a conventional tail assembly because of our intrigue with tailless aircraft, but it occurred to us while reading the Proceedings that each of the difficulties/problems outlined could be solved by going to a flying wing design. Here are some of the major points:

(1) The performance of a Hand Launch Sailplane seems to be inversely related to its wing loading, i. e. ; the lower the wing loading, the better the performance. In constructing our HL, we used a full D tube of 1/16" balsa and 1/8" spruce spars. Ready to fly, it weighs just about 16 oz. But the wing loading, 3.5 oz./ft^2 is actually below the FAI minimum of 3.95 oz./ft^2, so making the structure any lighter is really quite pointless. She is very strong structurally and has cartwheeled countless times with no damage. We finally broke the fin by running into a cyclone fence.

(2) Keeping the Reynolds number above 60,000 is very important. Going below that magic number makes it very difficult to control airflow over the upper surface of the wing, and small gusts can stall a wing easily. A low Reynolds number also makes pilot control a critical factor. Our HL has a tip chord of over 9 inches and flies faster than a conventional design, so its Reynolds number is always well above the minimum value.

(3) A conventional HL with a constant chord or tapered chord wing is very sensitive to CG placement - even 1/16" may make a difference - and a lot of trimming seems to be the rule. On our wing it was very easy to find the correct CG: we used a rough approximation at first and then added and subtracted weight until she flew well with the ailerons trailing smoothly with the rest of the wing. No worries of looping on launch because of wrong incidence angle, either.

(4) Thermals that are low to the ground tend to be very small, so a tight turning radius is necessary to take advantage of them. Our flying wing HL turns very tightly.

(5) Reduction of drag is of paramount importance for these small airplanes: antennas are notorious drag producers when left out in the airstream, and any protuberance has a negative effect on performance. We were able to run our antenna completely inside one wing, and reduced drag further by eliminating the rear fuselage and entire tail assembly. The reflexed airfoil has been accused of high drag, but that is at least partially overcome by the higher Reynolds number.

(6) When one of these little airplanes hooks up with a thermal it tends to get out of sight quickly. While some flyers rely on color schemes to enhance visibility, perhaps the best method is to simply increase the area of the wing. Our flying wing HL has over 700 in^2 of area all in one spot.

For those of you curious about what our HL looks like, it's simply a "Blackbird 2m" reduced to exactly 75%. Full size plans for the "Blackbird 2m" are available from Dave Jones, Western Plans Service, 5621 Michelle Drive, Torrance, CA 90503. Our plans were taken to a photocopier machine with reduction capability. We are very pleased with its performance, and are always trying to get it captured by a killer thermal at the local Little League field. (Next stop - the slope!) It hasn't won any contests, but then we haven't entered it in any, so we don't feel bad. For those of you who do enter HL contests, we hope that we've given you some ideas for your next design.

♣ ♣ ♣

Last year at about this time we heard about a XC meet in Portland, OR, and decided to go. We didn't enter, but we did take an airplane with us - an FAI maximum area flying wing. It wasn't trimmed for flight; in fact, it hadn't been flown at all, having been completed the night before. With the help of several people at the contest (lead weights from Jim Arnold and some great hand launches of our 11 pound monster by Mike Bamberg...) we found out that while there was certainly some potential, being severely tail heavy is no way to try to fly a 'wing. We were most grateful for the impressions of others at the contest (particularly Alan Halleck, who got us even more excited about the 'wing's potential than we were already), and we had such a fun time even without competing that we're planning on going back again this year.

We had the chance a few weeks later to add more weight in the nose and try her out as a cliff soarer, and she flew magnificently until pilot error put her in the water. We were certainly heartbroken over a totally destroyed airplane with only 20 minutes of flight time, but we were ecstatic over her performance and determined to build a replacement. That replacement, Pirouette, is now finished and has flown successfully from winch launches.

Why would anyone build an FAI maximum area 'wing? Well, there is a certain morale boost to be gotten from having the biggest airplane at a contest... Seriously, there are some logical reasons, and we'll outline the major points here:

First, it is a general rule that "bigger flies better", and we certainly found that to be true while flying our giant on the cliff. Second, there is an upper weight limit of 5 kg., or 11 pounds, for FAI sailplanes; when building big, that weight limit is reached very fast with a conventional sailplane. Third, keep in mind that the wings of a conventional sailplane must support all of that weight in the air, along with all of the stresses. The stresses on a XC machine can be extremely high while speeding between thermals and traveling through "microbursts" of turbulence, and it is little wonder that the casualty rate for these machines is pretty high. The ultimate effect of the FAI weight limit is to prevent really large conventional sailplanes from having the strength they need.

A flying wing on the other hand, is an inherently light structure; in fact, it is sometimes difficult to end up with a completed aircraft that meets the minimum wing loading requirements of 4 oz/ft^2, as we found out with our HL 'wing. Flying wings take advantage of what is called "span loading", a topic we'll talk about in another article, but this translates into more manageable flight loads and an airframe that is easily integrated into a very strong structure. And, since the stabilizer of a flying wing is a part of the wing itself, there are no tail feathers to blow off.

Visibility is also of concern when flying XC, as height directly equates to distance and speed, and that's the combination that wins contests. While many color schemes have been tried in an effort to maximize visibility, nothing seems to work so well as having the largest airplane possible. We feel that controlling the distribution of surface area can also

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Strength of Wood Fuselages

...by Bob Bayard

I've noticed that many kits with wood fuselages call for the top, behind the wing, to have the grain running crosswise. I've also noticed that my Olys (650 and II), which have this cross grain feature, break near the tail. It made me wonder - why cross grain? For strength, friends told me. But it didn't seem reasonable that it would be stronger that way, since balsa is stronger in both compression and tension parallel with the grain than perpendicular. So I did a little test.

I made two long boxes of 1/8 inch balsa. The dimensions of the boxes were 18 inches long and 3/4" x 1" in cross section, about the cross section shape of the Oly fuselages in front of the tail. One box had all wood running lengthwise, the other had the top running crosswise. I broke them by putting the ends on blocks and pushing down on the middle. Both broke by cracking the bottom balsa piece and the bottom edges of the sides.

The box with the straight grain on top was about 70% stronger than the cross grained box. To be sure it wasn't a fluke I made two more boxes the same way and broke them too. It wasn't a fluke.

I thought maybe it was torsion rather than beam strength that the designers were worried about, even though all of my breaks were obviously not in torsion. So I glued two broken pieces together end to end, one piece of each kind of box. When I twisted this sample, the cross grained part broke, the straight grained part didn't.

Conclusion: It's stronger to build wood fuselages with all grain running parallel, not crosswise, despite what the plans call for.

from the South Bay Soaring Society (SBSS) Silent Flyer

On the Wing continued..

assist; a large square is easier to see at altitude than a thin rectangle of the same area.

Our XC machine relies on Dave Jones' "Blackbird 2m" design (the same basis as our HL). By multiplying all linear dimensions of the 2 meter original by 1.36 we arrived at a wingspan of about 107 inches, a root chord of nearly 27 inches, and a tip chord of over 17 inches. The overall weight of Pirouette is just under 10 pounds, and her wing area is just under the FAI maximum of 2325 in^2. This still makes for "interesting" hand launches, but our 12 volt winch seems to handle her well. She turns on a dime and gives change. Her top speed is deceiving because of her size, but it is at least half again as fast as an equivalently loaded conventional design!

Between now and this year's Portland XC meet we'll be practicing as frequently as possible. See you there!

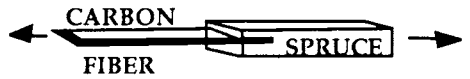
Bill & Bunny Kuhlman
P.O. Box 975
Olalla, WA 98359
-0975

Strength of Glue Joints

...by Reinhard Lahde & Bob Bayard

In the process of continuing some work that one of us (BB) started on the strength of wing spars, we felt the need to find the best way to glue strips of carbon fiber/epoxy laminates to each other and to other material such as spruce. This note reports our findings on glue strengths for aliphatic glue, gap-filling cyanoacrylate and fast (5 minute), medium speed (30 minute) and slow epoxy. The slow epoxy is the kind that sets up in about three hours and is best left overnight to harden.

The strength we were interested in is shear strength, the ability of glue joints to resist sliding or breaking along the glued surface. A typical test sample, is shown in the sketch. In this case a strip of carbon fiber laminate is glued on its upper and lower surface to spruce. We have tested not only CF/spruce but also CF/balsa and CF/CF joints.



Epoxy does not bond well to the epoxy surface of the carbon fiber/epoxy laminate if the laminate surface is even partially unsanded. Cyan is somewhat more tolerant of some shiny surface spots on the laminate. Best, of course, is to sand the laminate surfaces until no shiny spots remain. The results we report here are based on "no shiny spots" laminate preparation, though the reason we know about this shiny-spot-problem is that we were not too thorough in our sanding in the earlier phases of our inquiry.

The best joints are made with the least glue, by clamping the two pieces and squeezing out excess glue. When we made joints with thicker glue, the glue pulls apart in chunks rather than shearing along the whole surface. The strength is very low, no more than about one fourth the strength of a well-made joint.

A good joint between CF and balsa fails by pulling slivers of balsa off the piece. The glue is not torn. Bonds between these two materials are the weakest of all.

Glue joints between CF and spruce are much stronger than CF/balsa and fail by a combination of pulling some splinters out of the wood and shearing some of the glue itself. Joints between CF and CF fail mostly by separating at the glue-laminate interface, even for well sanded surfaces. The strength of the CF/CF joints is close to that of CF/spruce, maybe a bit more. Some of these joints taxed our tension machine and it had to be re-engineered in order to break all of the samples.

Aliphatic glue makes the weakest bond of the glues we tested. Next is 5 minute epoxy. The fast epoxy is somewhat weaker than the slower epoxys. The cyanoacrylate is the strongest by quite a bit, being about twice as strong as the slowest epoxy and four times as strong as the fast epoxy. The average breaking shear stresses for our samples of CF/CF and CF/spruce are given in the table.

Glue	Average Strength (psi)
Aliphatic	1220
Epoxy -fast (5 min)	1530
Epoxy-medium (30 min)	2190
Epoxy-slow (3 Hr)	3410
Cyanoacrylate	6560

In summary, if you want a good joint between CF/epoxy laminate and spruce or other laminate, sand until all shiny spots disappear, clean it, put slow zap on it and squeeze the extra glue out. That's your best joint.

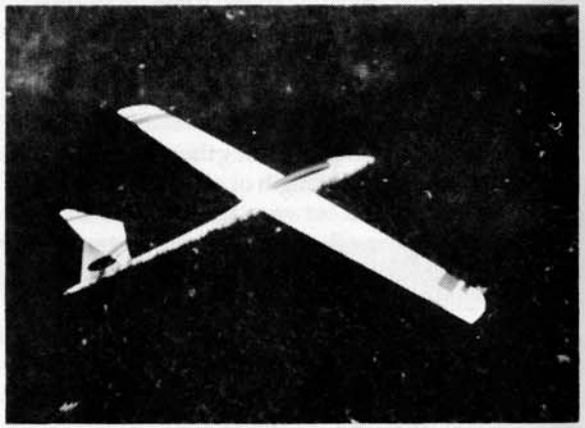
from the South Bay Soaring Society (SBSS) Silent Flyer

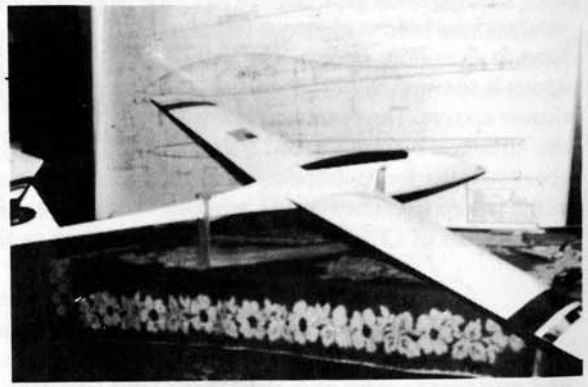
The Rotor Slope

...by Harry Smith

Jim - I think that somebody has blown alot of smoke about my R/C skills. I have been building models since 1936, but have only been in R/C for about four (4) years. After my heart attack and surgery a member of our flying club here twisted my arm to try R/C, so Roy Lightle, a club instructor, taught me what I know about R/C. So between us we'll try and write an article on the Rotor.

Kit	Rotor by VS Sailplanes
Mfg. Address	2317 North 63rd
	Seattle, Wa 98103
Mfg. Telephone	1-206-525-5776
Design	58 inch, slope soarer
Controls	Pitcheron, 2 - channel
Wing Area	305 square inch
Fuselage Length	44 inch
Flying Weight(plans)	31 oz.
(mine)	34 oz.
Airfoil	E374, 7.5
Retail Price	$64.95 direct only





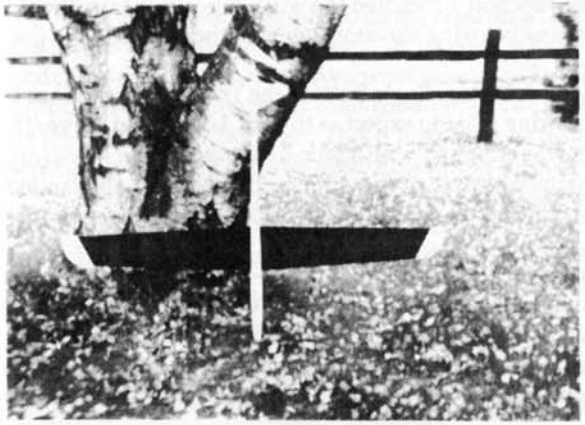
The kit has a good supply of top quality wood and hardware. A set of very detailed plans and excellent instructions are enclosed. Be sure to do as they say. The wing cores are very well done and cut from blue foam.

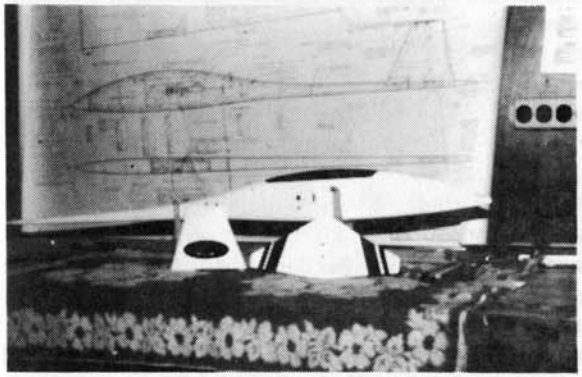
If you follow the plans and instructions, there should be no problem. But I wouldn't say that it was a beginners kit. Even then you should have some experience on skinning foam cores with 1/64 ply and obtaining a straight-stiff and thin trailing edge. This is very important on the Rotor. The body sides are already cut from 1/8" lite ply. Lite ply is not my favorite but seems to be adequate if covered with 2 oz. fiberglass, but go easy on the Resin on the tail boom to keep weight down because the model weighs enough without adding nose weight.

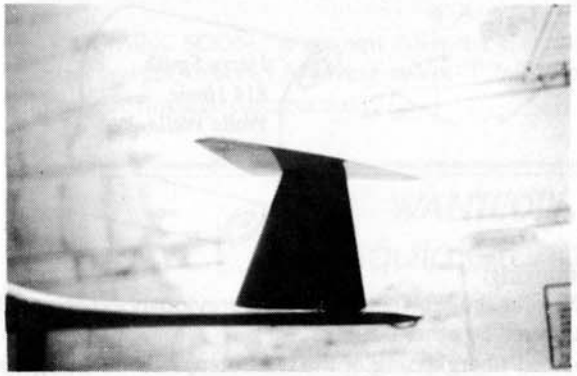
The fin and stab. material are cut to size and can be used as functioning or nonfunctioning

Sailplane by VS Sailplanes

& Roy Lightle







elevator. Ken sez, "functioning is for the non-believers". The wings can be built as a regular aileron wing or pivot function. If you want a fast rolling ship, use the pivot function (you won't be disappointed).

The body will accept standard size servos (Airtronics 631) and full size receiver. The receiver antenna can be routed out through the tail boom for a clean airplane. There is plenty of room up front for the receiver and a flat 500 MA battery pack, A 500 MA square will fit but won't slide forward enough to keep from adding nose weight. Be sure to use servos with close to fifty (50) oz. torque and 90° rotation to get enough movement for the elevator function, if set up as all functions from the wing. I didn't have a transmitter with all the electronic mixing and I didn't use Ken's diagram for the sliding servo method. Instead I used a Dubro #215 "V" tail mixer and modified it to fit the body width with a little cutting and filing, it works great.

The wing is sheeted with 1/64th ply, applied with R. C. Southern "Sorghum". Add leading edges and sand to shape. Before putting on root rib, install brass rod wing tubes. The slots are cut in the cores. Make sure you get the right angle on the tubes. Glue on root rib, install steel drive pins and add wing tips. Sand and cover.

The wing is covered with white solar film on top and black on bottom. The fuselage is fiberglassed and painted.

...continued on page 10

Rotor ...continued from page 9

When flying with all wing function, I trimmed the wing 3° positive from the stationary stab. "Remember" to get positive wing elevator function, the trailing edge goes "down".

My first flight with the Rotor was from Eagle Butte in the Tri-Cities with about 10 MPH wind from the West. Not knowing what to expect as to trim, I deposited it over the side of this 600 foot bluff. The trim was close and with a little up elevator I leveled off and started to see what was going to happen. Just then the wind quit, so I circled and landed. Dialed in some more elevator function and waited and waited. There was no more wind that day.

Second flight was at our slope site at Walla Walla at 5-Points. A long slope of probably 1/2 mile with 20 MPH wind. I pitched it out again - WOW!! I had set the plane up on a four channel radio without dual rates and could do rolls almost thinking about it. The Rotor flys like its on rails, steady as a rock. Long rounding loops and speed you can't believe. This plane's not for the light hearted or beginners. I would say this plane flys best in 20 + wind.

Set your radio for low aileron function and lots of elevator function and there shouldn't be any problem until you're ready for more action. If possible pick a soft landing spot because this plane lands a little hot.

I have a couple other slope ships and a few thermal jobs which range from a Gentle Lady on up to a four (4) meter discus that I fly on the slope, depending on the lift. But I'll gar-on-tee the Rotor, to light your fire - and a full bladder just won't hold. WHEEEE! ! ! ! ! ! ! !

Also, I understand that Ken has an up-dated version of the Rotor with a simpler body construction and optional two (2) - meter wings for light lift situations.

If you haven't already heard, Harley Michaelis has designed a new two (2) meter thermal sailplane to be kited by Ace R/C under the name of Easy Eagle. Polyhedral. New airfoil. Optional flaps. Is a beginners kit. Some new features and a fantastic flyer .

The word from Wil Byers as of October 24, 1988, that the 1989 Nats are to be held in the Tri-Cities area. I'm not sure if this has been totally confirmed yet.

- Lots of Lift -

Harry Smith
814 Home
Walla Walla, WA
99362

♣ ♣ ♣

Ken Stuhr's Comments:

The problem with the broken tail boom is something not previously experienced with either the prototype or encountered by other builders.

Rotor is designed not to need fiberglassing of the tail boom, as the fuselage is plenty strong without the added fiberglass - and weight - in the tail boom area.

The problem reported by Smith and Lightle could possibly arise from previous unsuspected and undetected damage - such as a crack or weakness caused by a hard landing; i.e., near crash.

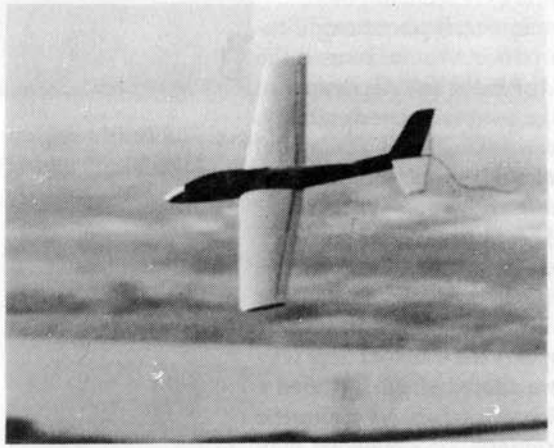
The Slopar

...by Mike Reed

The Slopar was designed to fill the need for a "light air" slope glider. Carefully built, the Slopar will weigh about 14 oz. This weight is ideal for low-lift slopes such as beaches and calm inland slopes that have a wind velocity of 9 to 12 MPH. This glider can be ballasted to 28 oz. for flying in normal wind conditions. The basic shape of the Slopar was inspired by the Aermacchi 339 Par jet. This is not a scale airplane but an efficient clean design that will fly in very light lift with some good looks thrown in.

The Slopar was designed to use small radio gear such as the Futaba four-channel with S-33 servos. However, the fuselage can be built to suit standard systems.

The versatility and low-drag qualities of the Selig 3021 airfoil give this plane sparkling performance. Construction is balsa wood with fully sheeted wings.



The SLOPAR above the hills of Riverside., home of the LaSierra Slope Soarers byMike Reed

Mike Reed
1775 Dumitru Way
#B
Corona, CA 91720

I am now finalizing the plans, and getting them printed. They will cost $7.00 folded and $11.00 rolled. Please send a S.A.S.E. if you wish additional ordering information.

♣ ♣ ♣

COMING SOON... is my new 1-5 meter class slope racer "Laminar". The Laminar features swept Quabeck 1,5/8 wing, swept "T" tail, two function control, 48 1/2 inch span, and unique fuselage construction.

MARCS National Soaring Symposium Review

...by Lee Murray

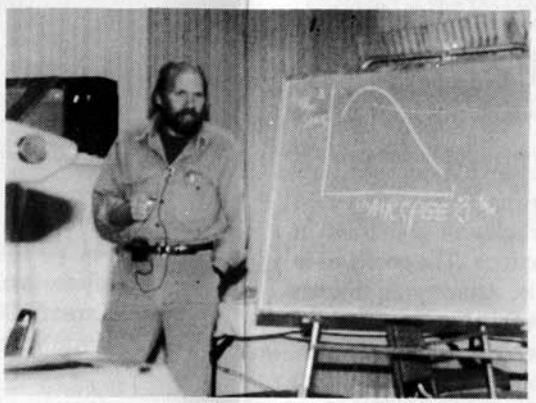
The 1988 National soaring symposium was excellent by many standards. The list of speakers and the agenda were solidified too late to be publicized. Otherwise the attendance would have easily eclipsed the previous high of about 120. I will only comment on each of the talks. However, the proceedings will be available through Bill Vogelsang, 5933 Mayhill Dr., Madison, WI 53711.

This years program was perhaps broadened somewhat to include electric propulsion. Past CIAM president Henry J. Nicols (Henry J) was in attendance from England and gave relevant comments about the beginnings of CIAM and representing your country in international competitions not your club or yourself.

Walter Good gave an informative talk about modifications made to the Gentle Lady to produce what he termed the "Gutsy Lady". Carbon fiber was added to the full depth spar of the S4061 airfoil and to the leading edge, increasing the durability. A thermal sniffler was added and the weight of the model increased to 41 ounces. The wing remained a three piece wing but without center dihedral. This together with a removable stabilizer made the model fit into a small box for easy transport.

Noal Rossow & Dave Mroz demonstrated the vacuum bagging technique for foam wing construction and listed the materials they sold for this purpose. The use of furniture veneers was a unique contribution which appears to be an excellent way to produce skins for wings. Kits were offered which included a hand vacuum pump with gauge which was capable of giving the desired results for under $50. The common 1/64 plywood may disappear from hobby shop shelves due to price increases from the single source in Finland. The consensus of comments from the audience was that the best construction may be 1/16" balsa on blue foam from the aspect of durability and serviceability. Arrow shaft hinge materials were also available from Rossow & Mroz. Silicone (RTV) adhesive was recommended for attachment of the arrow shaft hinges.

F3B Panel discusses rule changes for the future and new launch equipment. (Wayne Fredette Winch)



Ed Elaranto - Meteorology for Modelers.

Charles Fox, a full size sailplane flyer and modeler, gave a talk on Crescent Shaped wings which he has built and flown. Data was presented from wind tunnel and other testing of wings which had swept leading and trailing edges which emulated bird wings. Modest improvements performance (3-5%) were available through these changes over conventional wing platforms.

Craig Christensen gave a talk on Electric Sailplanes. According to Craig with comments from Larry Jolly and others, motor and battery improvements have peaked out and one can purchase very affordable systems which are effective. At greater expense high performance can be achieved which will match or exceed the performance of similar gas models (Pattern, Pylon, Soaring). Attention to details and safety is very important. A good competitive sailplane would have a 100-130" span, a 40 size motor with 13 x 7 folding prop, 20 to 24 cells, and a motor controller. Such a set-up will take a model to the limits of visibility in 45 seconds.

David Fraser, an engineer and physicist, discussed "How to Design a Perfect Sailplane" using computers. The refinement of model sailplanes is far from complete. A modeler with the aid of personal computers will achieve improvements in the next ten years which will be at least as great as those made in the previous ten. Key elements to making improvements were 90% good engineering: Know the goals for the improvements; Know limitations of size, weight, complexity and tolerance for unusual flying conditions; Study other designs and be skeptical of performance claims. Wind tunnel tests made by Selig and Donovan at Princeton (aided by D.F. and many others) will facilitate this advance.

Byron Blakeslee, Richard Burnoski, Wayne Fredette, and Bob Sealy had a panel discussion on F3B and where it is

...continued on page 14

Craig Christensen talks on Electric Sailplanes

Hewitt Phillips illustrates the mounting of airfoil on his test vehicle

Lee Murray receives Wisconsin Sailplane Championship fromAl Scidmore (1987 Champion)

David Fraser describes how to design the "Perfect Sailplane"

MARCS Review... continued from page 13

going. Their comments are combined with those of Larry Jolly who gave a talk later on. Changes in launch equipment which are eventually going to occur will enable more modelers to participate. The possible inclusion of a sport class would further expand the participation. The U.S. has been unable to exert much influence on F3B rules due to the low level of participation multi-task competition here. Larry Jolly stressed that models need not be complicated or expensive. Practice, however, is a most important element in becoming a successful F3B flyer.

"Cross Country Racing" by Pat Flinn covered the Sugarloaf Classic cross country race in Virginia during 1988. The 30 mile course was completed by several of the contestants. A video tape was made of the event showing the launching, flying of the models in thermalling and run for the next thermal mode. The video showed the teams being transported through the course (wind in the ears, eyes to the sky, thermal sniffer singing away). Pat's XC sailplane weighs about 11 pounds, has a 142" wingspan, a flat bottom airfoil, and steel wing blades joined in a welded blade box in the fuselage. Information about eight major annual XC races was presented.

"Meteorology for Modelers" by Edward Elaranto was an extremely interesting talk which will enable the modeler to estimate when and where lift is likely to occur and to what altitude. Clues from the sky, the wind, terrain, and the temperature were enumerated. Edward has expertise in sailing and gives talks to groups on how to locate favorable changes in wind direction, also flies full size and RC sailplanes. A man who knows and understands your needs. Blue blocking sunglasses are recommended for seeing haze associated with thermals (See Jim, you can see thermals).

Hewitt Phillips, one of only a few NASA Distinguished Research Associates, now retired (Langley Research Center), gave a talk on tests he made using his modified 1966 Oldsmobile. Hewitt positioned an airfoil in clean air (without turbulence) above and in front of his car to do experiments on airflow over laminar wing sections. The goal was to detect boundary layer separation and turbulence on laminar airfoils. After trying simpler methods, the goal was achieved with the aid of sophisticated NASA thin film anemometer instrumentation on his wings. The method developed was useful for airfoils up to transonic speeds and was of interest to many engineers and ultimately to model sailplaners. (We all wondered just how fast his Olds really goes.) MIT used this method to achieve a 40% drag reduction for a human powered sailplane.

Table clinics included displays of: computer programs for computing the performance of models from David Fraser and LJM Associates (IBM compatibles and Macintosh); another computer program for plotting airfoils on dot matrix printers by Chuck Anderson for Commodore, IBM compatibles, and Macintosh; equipment for vacuum bagging of wings; a new F3B winch by Wayne Fredette; an Airtronics 7SP modular radio with ATRCS mixing of channels; a variety of sailplanes brought by modelers; models cut from aluminum beverage cans (Bob Howard). The raffle prizes included an Ace Thermal Sniffler, Off-The-Ground Quasoar, an Airtronics radio, and CA glue. The banquet was also at the Ramada Inn this year adding to the convenience of the affair. The after dinner speaker, Steve Metz, presented slides and a talk about his travels through Europe visiting soaring sites for both full size and model sailplanes (he flies both). His slides of a vintage sailplane soar-in were outstanding. I agree with Steve that his was truly a trip through "Wunderland".

Lee J. Murray
1300 N. Bay
Ridge Road
Appleton, WI
54915-2854

Gemini 3M+
... by Art Boysen

Enclosed is my version of a stretched GEMINI which I call Gemini 3M+. I bought a Gemini kit and went from there. Everything is the same except the wing.

I built the center panel flat and 48 inches long. Then, I stretched the tip panels out to make the total wingspan 122.5". Also, I swept the tips as shown below, and added flaps and ailerons. I kept the same airfoil which Bob Dodgson calls "the airfoil of a blimp: the MB253515.

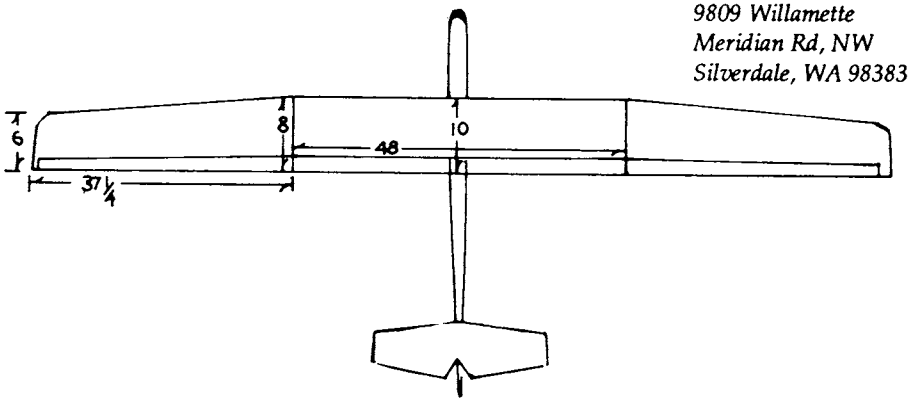
My radio is an Airtronics MD7SP which in my opinion is a very fine radio.

This winter, I plan to rebuild the wing using a Leon Kincaid airfoil: the K3311 or 3312. I'm also thinking about putting a more radical tip on the wing. So far, I am happy with the results I have obtained, but want to try something different again.

Enclosed is the MaxSoar listing for the Gemini 3M+ which is shown for the Selig S4061 airfoil since I have no data for the MB253515. Incidentally, I should mention that I am very happy with the MaxSoar program (available from LJM Associates) and have found it very user friendly when run on my Mac Plus computer.

I've enclosed my renewal form for another year of RCSD. It's the only magazine I read from cover to cover as soon as I receive it, and find it very good all the way through. I'm looking forward to the next issue, and want to thank you for a fine magazine.

Art Boysen
9809 Willamette
Meridian Rd, NW
Silverdale, WA 98383



Art, those are mighty fine words to hear, and I appreciate them very much. Keep on reading, because we have some exciting new things coming soon. JHG.

It's All Vpeek ...by To Me

Roman Paryz

For some, reading articles that deal with the aerodynamic technicalities of sailplanes and soaring is like trying to read Greek. Just what are lift coefficients and Reynolds numbers? No, they don't have anything to do with women's bra sizes or aluminum foil! They do deal with the basics of why any aircraft performs the way it does. For those of you who are not aerodynamicists or haven't been flying long enough to learn about some of these concepts through osmosis, I'll try to explain them to you in laymen terms. This won't be a course in aerodynamics since this is only a ten page newsletter, but it will hopefully clear up some questions that you may have. Here goes.....

REYNOLDS NUMBER Reynold's number is just that, a pure number without dimensions, i.e. it has no inches, feet, etc. associated with it. It is a relationship that compares some physical characteristic of your model and the speed at which it is flying to the air that it is flying in. For those wanting an equation it is as follows:

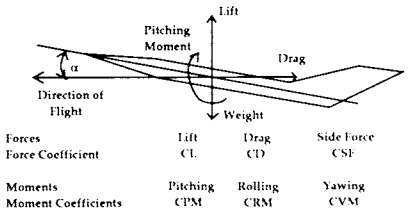
$$RN = \frac{(l)\ (v)\ (\rho)}{\mu}$$

- l - Characteristic length - usually the average chord length of the wing. This average chord can also be referred to "mean aerodynamic chord" or MAC. This dimension is usually in feet.
- v - Velocity - The airspeed of the sailplane in feet/second.
- ρ - Rho - The density of air. For calculations use 0.0023769 slugs/cubic foot.
- μ - Mu - The absolute viscosity of air. In simple terms, this is the "stickiness" of the air. A typical value for Mu is 3.7371674×10^{-7} pound seconds/square foot

The larger the Reynolds number, the better the performance of your sailplane. There are only two (practical) ways that we can change the magnitude of this value. The first place it can occur is on the building board. To increase the RN all you have to do is increase the wing chord of your design. The larger the chord, the higher the RN. This is easier said than done since most of us build from plans or kits and a change of this nature is a major redesign. Increasing the wing chord also affects the aspect ratio of the wing which I will get into later.

The other method of changing RN is by far the easiest. All you have to do is fly faster: the faster the airspeed, the higher the RN. The other impractical ways to change RN is to alter either the density or viscosity of the air but, as they say, "It's not nice (possible) to fool with mother nature". In case you're wondering, typical R/C sailplane RN's range from 100,000 to 300,000. A typical full scale Boeing 747 RN is approximately 100,000,000 (if the lift is good).

COEFFICIENTS Force (lift, drag, side) and moment (pitching, yawing, rolling) coefficients are used to describe the various loads acting on your sailplane in a non-dimensional form (as a pure number). It seems strange to talk about a 1.2 lift coefficient (C_L). Just how much of this C_L do I need to keep my airplane up in the air? First you need to know how these coefficients are obtained. See below:



Forces	Lift	Drag	Side Force
Force Coefficient	CL	CD	CSF
Moments	Pitching	Rolling	Yawing
Moment Coefficients	CPM	CRM	CYM

Force Coefficients

$$Cf = \frac{\text{Force}}{(.5)(\rho)(V^2)(S)}$$

Moment Coefficients

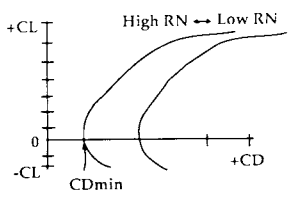
$$Cm = \frac{\text{Moment}}{(.5)(\rho)(V^2)(S)(l)}$$

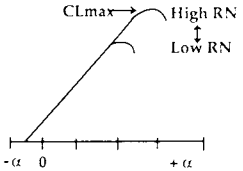
α Angle of Attack

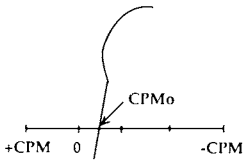
In the above equations, p and V follow the definitions shown in the Reynolds number section. Some of you may have seen the quantity $(.5)(p)(V^2)$ referred to as Q. This value represents dynamic pressure in pounds per square foot (i.e. the pressure associated with the movement of the air). That load you feel on your hand when it's stuck out the car window going 55 MPH is dynamic pressure. The other new terms in the above equations, S and I, are the reference area in square feet and the reference length in feet or inches (units must be consistent with your moment) respectively. The wing planform area is usually the value chosen for S. The wings mean aerodynamic chord is used for I in pitching moment calculations, whereas the wing span is used for the yawing and rolling moments.

So what does this all do for you? Coefficients provide a way of comparing different design configurations on a common ground. For instance, just saying that sailplane **A** can produce 10 pounds of lift and sailplane **B** only produces 1 pound doesn't mean that **A** is 10 times better than **B**. **A** could be a Sagitta XC and **B** could be a Zephyr. With the coefficient equations using the proper wing areas and flight speeds for each, you may find that both sailplanes could be operating at the same lift coefficient. Amazing but true.

THE PLOTS Most of the technical data for airfoils or sailplanes are usually presented in graphical form so that various design or Reynolds number differences can be compared easily. See the samples below for various RN's on a fictitious airfoil.







Drag coefficients are usually plotted against lift coefficients. You can see the benefits of operating your sailplane at higher RN's. As RN increases, CD decreases. There are, however, limits to this decrease which we won't get into at this time.

Lift coefficients are usually plotted against angle of attack (α) or pitching moment coefficients. As α increases, CL also continues to increase to some maximum value (CLmax). Increasing α beyond this point only produces less lift and your sailplane begins to stall. Larger RN's help increase the α at which stall occurs.

Pitching moment coefficients are calculated with respect to some reference point, usually the quarter chord line of the wing, and are presented graphically against CL or α. For models we fly (flying wings excluded), the CPM should be a slightly negative value at CL's near zero and become more negative as CL increases. This helps in providing a good stable flying sailplane. If the CPM were positive or becomes less negative rapidly as CL or α increase, the sailplane would be unstable. The more α, the more +CPM; the more +CPM, the more α; and on and on. The CPM value at CL=0 is referred to as CPMo (CMo). CPM is not as sensitive to RN as the other coefficients. If you were wondering, I didn't goof when I put the +CPM to the left of 0 and -CPM to the right. This is pretty much the industry standard for reasons which I don't have room to explain.

ASPECT RATIO is dimensionless and follows the same rule of thumb as Reynolds

...continued on page 22

International Scale Soaring Fun Fly
May 27, 28, 29, 1989

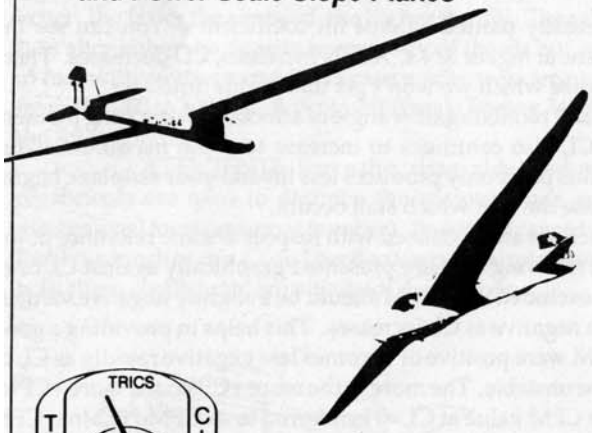
WilByers, VP, Tri-City Soarers, 632 Meadows Drive, E., Richland, WA 99352

The weekend of Memorial Day 1988 was the weekend of the first-ever National R.C. Scale Fun Fly and Soaring Social. This event was marked by outstanding enthusiasm and tremendous support from the soaring community. As a result, the event will probably go down in soaring annals as a great success. Therefore, we, the Tri-Cities Soarers, feel it is worth repeating in 1989.

If you attended and enjoyed yourselves, we want to inviite you to come back and share this event with us again! If, however, you were not able to attend this event last year, but think this event is the kind of soaring happening you want to be part of, we most heartily welcome you to come to the Tri-Cities and participate in the INTERNATIONAL R.C. SCALE SOARING FUN FLY, MAY 27, 28, AND 29, 1989.

PRE-REGISTRATION DEADLINE APRIL 29

Must be Scale Gliders
and Power Scale Slope Planes



For Information contact:
Wil Byers
632 Meadows Drive East
Richland, WA 99352
USA
Phone (509) 627-5224

Contestant Fee - $30.00
Banquet Included!!

Guest Speaker and Presentation

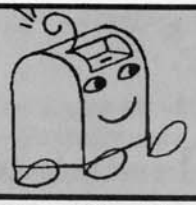
Additional Entries
$5.00 per plane

No Judging
No Rules
No Hassles
Only flying, looking, swapping and talking

TRICS TRI CITY SOARERS

AMA Membership & Participation Required
THIS IS STRICTLY A FUN FLY!!

THE GRAY AREA



My old friend and former neighbor, Charlie Spear, writes to tell us of his latest exploits. Charlie was VP of the NSS and lives in North Carolina.

Dear Jim:

I'm afraid it's time to drop my subscription to RC Soaring Digest. I'm no longer flying sailplanes, nor am I in competition with them. It's not that I haven't enjoyed your magazine these past few years, but when you're out of the main stream, it isn't that interesting.

I've gotten quite interested in electrics, flying everything from aerobatic types to sailplanes, and am enclosing the spec's on my ULTRA MARK IV which is a great flying airplane and very, very competitive. It climbs like a scalded cat, moves out like an eagle, yet will slow up to a crawl. It takes a lot of down thrust, some right thrust and re-working of mini-servos to get maximum throw.

I wish you continued success with the mag, and hope you are enjoying living in Arizona.

With sincere regards, (signed) Charlie.
288 Holly Lane, Mocksville, N.C. 27028

ULTRA MARK IV: Designed by Mike Charles. Span: 84";Wing loading: 10 oz. per sq. ft.; Weight: 51 oz.;Motor; Geared Astro 15; Batteries: Sanyo 10 cells,(number 900 SC); Prop.: Geist 13 -7; Controller: Astro on-off; Radio: Airtronics with S4401 mini-servos; Covering: Black Baron Film and Micafilm.

Comments: Charlie, we're sorry to see you miss all the coming issues of RCSD, but we're glad to see you doing something with electrics. Since you are a writer and photographer by profession, why don't you do a nice feature article on your ULTRA MARK IV? I'd sure like it, and I know our readers would be interested. JHG

For some time now, Marshall Searcy has been working on a sailplane design called the ROGUE. Here's his recent letter:

Dear Jim:

Guess what? It's finished! Of course it' s raining now, but I hope to test fly this week.

The wing was an even 122" span, and should be an excellent thermal flying ship. THE DISCUS SHAPE IS OUT! Too much tip stall, even with washout. Washout of even 1/4" slows it d o w n.

I'm looking into an Eppler 374 at the root, transitioning to an E193 at the tip with a straight-back tapered leading edge (see sketch). The enclosed photo shows me in all my glory...

Best, (signed) Marshall Searcy
P.O. Box 1508, Porterville, CA 93258-1508.

"Whistle while you look!" Here's the ROGUE (less rudder). The rudder is a matching color scheme: black/white/orange/white/yellow-same as on the wings! Orange letters and numbers.

THE GRAY AREA

RCSD's English correspondent, Tony Beckett, writes about some recent experiences and things of interest:

Dear Jim:

A couple of enclosures from John Stevens who continues to produce good things as well as good results: he won INTERGLIDE and was overall Champion at the British Nat's, as well as featuring in all the fly-offs of nearly all the contests he entered this year! This summer I had two contacts via the U.S. The coincidence being that they were both by telephone, and both on the same evening. One was from a serviceman whose base is not far from my home. He is now a regular flier at Burrough Hill, and plans to do some flat-field flying with us at Peterborough this winter. The other was from a guy who lived in Canada and who reads your column in a commercial U.S. magazine.

Some time ago you mentioned exchanging letters with me in your column. Mike kept the information, as he is an expatriate born and brought up in Uppingham with relatives in Seaton, near me. This summer, for the first time in 25 years, he returned to his old home and contacted me. We had a great time swapping experiences and talking about the different types of flying we did.

Over the years, I have made a set of battery chargers using a very simple circuit that has caused no problems. Would you like a circuit diagram for RCSD? **(Tony, do birds fly, do fish swim? By all means, we would like that diagram. JHG)** I use either a commercial transformer built in to the charger, or an external 12-volt model train transformer of the sort modelers seem to collect.

By the way, If you do make it to the U.K. when you retire - or before - Catherine and I would be delighted to have you stay with us as our guests. Incidentally, if you are ever asked about Accommodation in the U.K., we would be very happy to offer good value B&B for our visitors from the U.S.

Regards (signed) Tony; The Poplars, Harringworth Road, Seaton, Oakham, Rutland, England LE15 9HZ. Telephone 057-287-876

Tony, I'm sure many of our U.S. modelers who plan to visit England will get in touch with you about the Bed & Breakfast. I can vouch for the quality and quantity of your cooking and the comfort and convenience of the accommodations. I'd also like to say how much fun it was to slope soar with you at Burrough Hill. JHG

♣ ♣ ♣

Frank Zaic will need no introduction to old-time modelers, and RCSD is proud to welcome Frank once again to these pages.

Dear Jim:

Thanks for your letter. Lots in it to answer, but will put it aside for that later. Main thing at the moment is the enclosed "Index". You talked about doing some rubber model building, etc., and would be glad to send you whichever copies you think would do the trick. **(Frank has issues available of almost ALL the books he ever published! JHG)** Had an idea that you were retired, but you mentioned the eight to five work -- can't imagine you have to spend so much time with RCSD. Glad to note ads in it. In this respect, **wonder if you would put a small notice in to the effect that I still have quite a bit of material to make up the SCOUT 72, and that I would be willing to let it go at very reasonable terms to anyone who would be interested in making up the kits, and let the fraternity know that they are available. Also have some stock for the Olympic 99 wings.**

(Frank, my pleasure to announce this for you, and hope you get a big reply!)

Glad that you are getting results from the Princeton tunnel. It would have helped if they had noted the angle of attack for the readings -- also an outline of the airfoils tested so that a comparison could be made. Could be that they will do so eventually. Main thing is that something is being done.

Regards, and not too cold a winter. Still waiting for the rain here. (signed) Frank, P.O. Box 135, Northridge, CA 91328

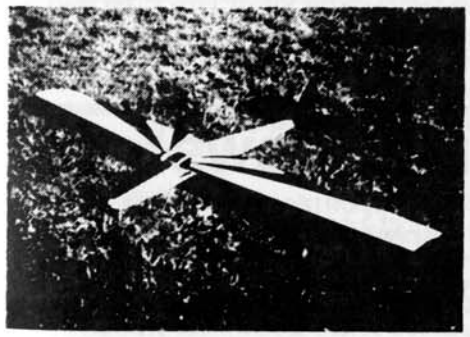
Comment: **I, too, am glad that the work goes on with the Donovan - Selig tests. We are looking for complete results to be published soon in SOARTECH. I imagine that the airfoil shapes will be shown, along with all of the angle of attack data that you mentioned. It is interesting to note that Michael Selig has designed some entirely new airfoils based on the results from his wind tunnel tests. These ought to be even better than the earlier ones. JHG**

♣ ♣ ♣

Recently, RCSD received a letter and photo with spec's from a company called BANZAI ENTERPRISES who manufacture a neat slope soarer called the BANZAI. Here's Jeremy Teo to tell us more:

Dear Sir:

Enclosed please find a US money order for $22 to cover a year's subscription to your magazine. Please include any advertising rates.



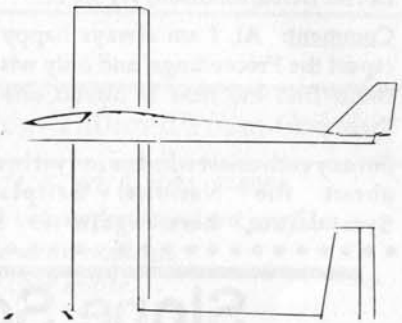
Banzai Enterprises is a small business kitting different glider designs. Right now, we're kitting a 60" combat aerobatic slope soarer.

It uses an Eppler 374 airfoil, has aileron and elevator for control, and fairly conventional construction. The fuselage incorporates balsa, plywood, fiberglass and optional carbon fiber. The wing has a foam core with a spruce spar, and it is sheeted with Kromekote (a shiny cardboard-like material).

This sloper has been very successful flying on the slopes here in southern Vancouver Island (Victoria). It's aerobatic ability has satisfied our every design objectives. It is smooth flying, and can be flown fast or slowed down for gentle landings. It's a fun glider to fly, and I've enclosed a photograph.

If you desire more information, please write. We'll be happy to oblige. (signed) Jeremy Teo, Banzai Enterprises, 2997 Anderson Avenue, Port Alberni, B.C., Canada V9Y 2V3.

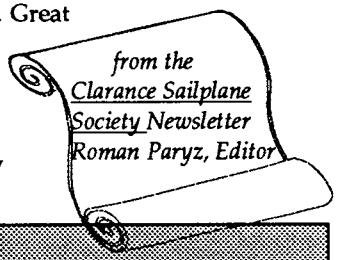
Jeremy, we're happy to present your new slope aerobatic BANZAI to our readers, and by now you have received our advertising literature. We look forward to seeing your ads in RCSD, and we wish you success with your new design. Thanks for telling us about it. JHG



BANZAI SPEC'S: Airfoil: Eppler 374; Wingspan: 60 in.; Wing Area: 450 sq. in.; Weight: 28 to 35 oz.; Wing Loading: 9-11 oz./sq.ft.; Overall Length: 36 in.; Radio: 2 channels (std. size); Options: rudder & flaperons.

Vpeek...continued from page 17

number in that bigger is better. The equation for aspect ratio is ($AR = b^2/S$). It's only comprised of the square of the sailplanes wingspan (b) divided by the wing area (S). Typical values of AR for the R/C sailplanes we fly are anywhere from 9 to 15. To increase AR you can either increase wingspan keeping wing area constant or decrease wing area keeping the span constant. The second of these two methods is less desirable in that the sailplanes chord must be reduced if span is held constant. Great you say, but don't forget about Reynolds number that wants the chord to be as big as possible. For R/C sailplanes, building high AR wings is a challenge because they tend to be more fragile (especially those spot landings). Ran out of room for now. If you have any questions just ask.



The Gray Area continued...

Dear Jim:

I am enclosing a copy of the 1987 National Synposium Proceedings. Sorry to take so long to get this into print. We always vow to do better next time. We have the next one (1988-JHG) to start work on pretty soon.

I have also enclosed information about this and past Proceedings in the hope that you will alert your readers to their availability. Keep the information on soaring and soaring activities flowing, as we really don't have a lot of it to read most of the time.(signed) Al Scidmore, 5013 Dorset Drive, Madison, WI 53711.

Comment: **Al, I am always happy to report the Proceedings, and only wish I could find the time to attend one of these years.**

For any enthusiast who has not yet heard about the National Sailplane Symposium, here again is the information: it takes place during the first weekend in November each year at the University of Wisconsin in Madison, and sponsored by the Madison Area Radio Control Society. The three-day Symposium is always well attended by those who want to learn about all of the latest techniques for improving sailplanes and soaring. Well-known and famous modelers and fliers are there each year to share their experiences and results of the past year's efforts. The speakers are recorded, and the recordings develop into printed Proceedings. For those who would like copies of the Proceedings for the six past years (1983-1988) write to: Walt Seaborg, 1517 Forest Glen Road, Oregon, WI 53575. The Proceedings take up well over 100 pages of text, drawings, photographs, charts and other information, and will form a valuable reference source for your library. The 1983 and 1984 Proceedings are available for $10 by First Class mail, and the remainder are available for $11 each via First Class mail. JHG