R/C Soaring DIGEST

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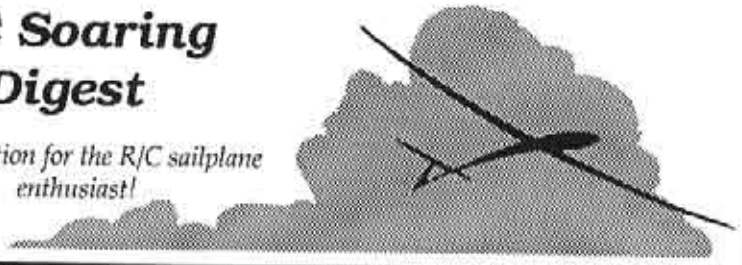
R/C Soaring Digest

A publication for the R/C sailplane enthusiast!



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

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The Soaring Site

RCSD Index

We received a FAX from George Nuse of Atlanta, Georgia who says, "Just wanted to let you know that I have posted, with his permission of course, Lee Murray's index of *RCSD* to Compuserve. It is in the "Library" section of "ModelNet". The Library section it is posted under is "General" and the file is listed as RCSD8493.zip. I think the effort that Lee has put into the Index is worthy of thanks from the many readers of *RCSD*, as they can use this file to access the years of great articles in your magazine." *Yes, George, thanks to you both!*

Flying Hand Launch at Davis, California

Daniel Hatfield says, " I just got a Climmax hand launcher from C.R. Aircraft Models. I ordered the pre-built kit because I didn't feel like going to the shop and setting up for vacuum bagging just to pull off one wing. The plane came very quickly and was truly ready-to-cover. I horsed around with the construction but I finally had it together in about three days. If I had been serious I could have done it in one day. This is a neat plane. It is very light and flies better than any hand launcher I have ever flown. I am used to the old generation hand launchers, i.e. Flipper, Finger, Wristocrat et al. I never caught a thermal with any of those planes, but they flew great on the slope. The Climmax blows them away though. This is a sweet airplane. I can't believe how high it launches. It is incredible! The lift to drag ratio appears to be excellent. Tight turns are no problem. The Climmax is very durable, too. I was flying it today and I had my share of bungled landings and the Climmax just bounces around. Nothing breaks. The important thing is that hand launch glider flying is the only practical flying style for

me, being here in Davis with no car. And the Climmax makes hand launch flying a reality. I haven't got the right conditions (or skill) yet to max the plane out, but I love flying it. It is so great to just come home from my classes, grab my glider and transmitter and walk over to the field by my house and go flying. It is unsettling how few people in my major here (aeronautical engineering) at UC Davis know anything about aircraft or have any practical experience with aerodynamics. I feel very fortunate to be involved with RC gliders and I know that my aerodynamics curriculum is greatly enhanced by RC glider flying."

Answers to a Question

In the September issue of *RCSD*, Ted Off, Frank Zaic and Russ Whitford answered a free flight question posed by Ed Jentsch of Maryland. Ed sent us a FAX to let them know, "Ted, Frank, Russ: I apologize for taking too, too long. **Thank you,** your answers were very helpful."

Article Topics

David R. Fruehwald has written to propose some article topics for *RCSD*. He says, "As a relative newcomer, I have many questions which could be one or more articles." Here is his list:

What are some of the best ways to vacuum bag a wing to produce a strong but lightweight wing?
- Possibly a step by step tutorial
- Comparison of several popular methodologies

What are some of the best ways to prepare a fiberglass fuselage?
- Things to do it after it comes out of the box up until its painted.
- Should one paint the fuselage or is there a better way?
- Summary of best materials for preparing a fiberglass fuselage.

What are some of the best ways to finish a wood wing without destroying the core underneath?
- Chemicals used to finish wood
- Sanding techniques for a ultra smooth finish
- How not to ruin the airfoil while finishing the wing

What are the best ways to make the glider colorful and what are the tradeoffs?
- Painting
- Monokote
- Staining

What tools should a beginner/intermediate pilot have?
- Must haves
- Nice to haves
- Nice to haves, but really expensive

Miscellaneous other topics
- Considerations when mounting servos in wings (electrical noise, weight, strength)
- Hinging methodologies

Aero-Towing & Hand Launch

We do not receive much information on the subject of aero-towing, and the FAI rules do not appear to be readily available for most of you in the U.S.A. Well, Dale Willoughby has provided a copy he compiled which is included in this issue, and he plans to attend the CIAM meeting in Paris, France this month on this subject. For those of you that are not interested in aero-towing and are even less interested in rules, please bear with us, however one of our personal rules is to provide information on the subject of sailplanes that can't be found or easily obtained elsewhere. At some point, we expect that complete copies of these rules will be available directly from NASSA. We'll let you know when this happens.

And on that note, this issue contains three articles on the subject of hand launch all of which were sent in by modem by Scott Smith. Thanks, Scott!

Some Notes on the WSJ

Outside of the U.S.A.? Thinking about attending but won't because of transmitter frequencies? Well, the organizers of the WSJ "arranged with the FCC to accommodate international frequencies during the 10 day event!"

The pre-registration package contains a list of hotels, travel and rental services. What some of you might not realize, because we didn't until we asked, is that discounts are being given for the WSJ. For example, if you plan to fly, you might want to give Kim a call at the Columbia Basin Travel in Richland and see if you can get the tickets cheaper than you can locally [(800) 356-6694 or (509) 943-4686].

Happy Flying!
Jerry & Judy

A New Fishing Line for Higher Launches

...by Gene Frame
Middleburg, Florida

In November '93 my son Chuck (the avid fisherman) called from Denver, Colorado to tell me that there is a new type of fishing line on the market and that he would send copies of articles that he had read.

In our next conversation, I told him that I was impressed but more for flying gliders than for fishing. Also, I had not been able to find such line in this area. Shortly thereafter, I received an early Christmas present: one 300 yard spool of 30 lb. "T.U.F. LINE plus".

I had been using a high start with 120 feet of 7/16 O.D. latex rubber with 500 feet of 40 lb. monofilament. I replaced the monofilament with 450 feet (1/2 of 300 yards) of T.U.F. LINE" and headed for the black berry patch (*R/C Soaring Digest*, page 1, Aug. '91).

On my first launch, I just stood frozen with amazement. In 65 degree dead air, my 20 inch Aquila lifted the line and rubber until it looked like it was straight up and then flew off the line like it was on a winch line. Out of five launches, I only found lift once but all of the launches were just like the first.

The line is white and easy to see on the ground and against a tree background. It's so fine (30 lb. T.U.F. is .009 " vs. 40 lb. monofilament at .025") that there is very little wind resistance and hardly any weight. The only two problems I see are:

1) Tying the necessary knots.
2) I would recommend not letting it slide past any part of your body at a high rate of speed.

Super Lines

North American Fisherman says that the new "Super Lines" are "extremely thin, incredibly strong and have very little stretch". According to the article, "Two space age fibers are the key: Kevlar and Spectra." Versions of Spectra line listed in the article are: TUF-Line and TUF-Line Plus from Western Filament Inc., SpiderWire from Safariland Ltd., SST from Gudebrod Inc., Lynch Line from Oldham's Lures, and lines from Izorland International and Mason Tackle Co. The article also says that Berkley's UltraMax line is technically in the Spectra family but is special because it includes a co-polymer core. Also, there is a drawback in knot strength, although the Spectra knot may come close to that of monofilament; knots must be very carefully tied, or they may unwind. Also, Lok-Knot is a knot adhesive and a "drop applied to any knot on any type of fishing line will make it more secure". The address listed for the TUF line used by Gene is: Western Filament Inc., Dept NAF, 630 Hollingsworth Dr., Grand Junction, CO 81505; (303) 241-8780. If any of you try and have success with any of the new Super Lines, please let us know so we can share it with all the readers. ED.

On the edge at Herold's Bay, looking southwest.

Sunbird flying off dunes at Langebaan Lagoon.

Flying in South Africa

...by John Lightfoot
66 Second Avenue
Rondebosch East 7780, South Africa
Phone: 021-697 4077 (h)

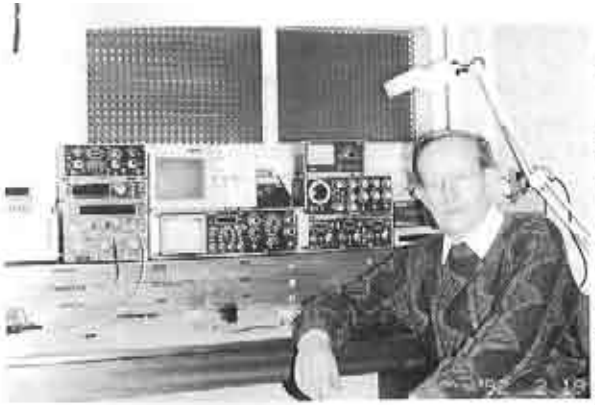
The campsite at Mossel Bay - 5 metre high embankment quite enough for sloping a HLG!

Unfortunately, although there's a huge mountain in our back-yard so to speak, there's not a whole lot of slope we can use; everything useful seems to be aligned along the wind direction! Frustrating! There are a couple of truly wonderful slopes facing northeast, but we get a northeaster about once in five years! Our prevailing winds are northwest in winter and southeast in summer. If anyone from your part of the world visits this area, I'd be delighted to meet them and introduce them to some flying sites! ■

It Ain't the Heat, Pete

...by Pancho Morris
Mesquite, Texas

People that are unfamiliar with the art/sport of thermal soaring will come out to the field or into the shop and say, "You must get great flying this time of year because it's so hot!" We try to explain that it's not the heat in general that causes lift, but the differential in temperature between different bodies of air. It is the uneven heating of the air due to the change in terrain and structures on the ground under the air that causes the warmer air to begin rising faster than the air around it. Actually, humidity may have more to do with it than heat; dry air changes temperature faster than humid air. You generally get better lift on dry days. Lately, we have been getting good lift and the humidity has been slowly going down from the spring. Some of our best flying can be in the fall when we have cool to cold nights followed by a sunny day with low humidity. The sun heats the surface quickly and the dry air over the "hot spots" warms fast and begins to rise. We get good lift all thru the winter. If you have ever flown in the late evening, you will find that you get very buoyant air as the air starts to cool, but the ground is still very warm. This is true this time of year. ■



Mr. Francis Thobois

European Chronicles

...by Marc Dufresne

Domaine de Belle Croix
17 rue Albert Camus
77330 Ozoir-La-Ferrière, FRANCE
Tel/FAX: +33 1 64 40 12 24

Artisan

So! You were wondering what I had become, heh? Maybe just one of those "flash in the pan" columnists? Naah!! No such luck...

Well, I could blame our editor, what with the way Judy has been signing up contributors lately. Competition for space is getting stiff.

(At this point, the editor was kindly requested to insert an appropriate comment... Sorry Marc, not enough space! Judy)

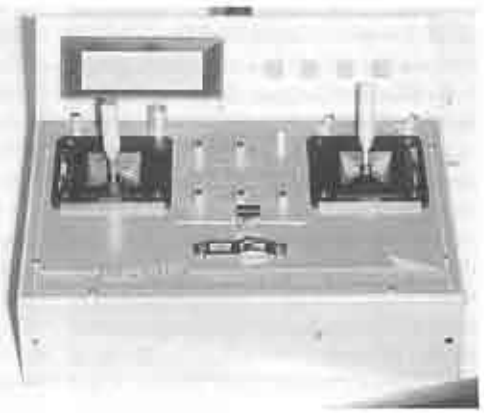
The explanation is quite simpler. First, I went on vacation in August, to come back to a very busy situation in the office. Add to that a tad of laziness, spiced with autumn weather in Paris (great in September-October), followed by dreary, gray, rainy, depressing stuff thereafter, and you get a columnist with a severe case of writer's block.

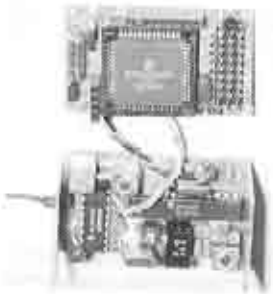
And it's not that I have no material to work with. Quite the contrary.

After the French F3J contest, I seriously set myself on getting my wings back. First, to get the PULSAR air worthy, easily done by replacing the aileron and flap cables with wing mounted servos. I ended up doing most of the work on my kitchen table. My workshop is in the garage, which is unheated, and consequently very cold and very damp at this time of year. No fun and I'll pass on having to work with soggy materials. Everything is now stocked in the spare room, awaiting better days.

Getting stick time while this was going on was going to be remedied by dusting off a Piper Cub I brought with me and gave to one of the club members to use as a trainer. I also gave him some old engines. He came back to me with bad news in the form of rusted bearings and piston rings. So, as usual, a seemingly simple project turns into a much more involved one. I eventually got the parts sent to me from California. All this means more time in the shop. We eventually managed to get one flight in before the weather got really bad.

It was my first experience flying Mode 1 (Rudder on the left, throttle on the right). A real weird feeling. The mental confusion was unnerving. Fortunately, I was flying on the buddy box. It took me the better part of two flights to get sufficiently coordinated to fly level doing figure eights. Like I said previously, it's back to square one in this department.





While all this was going on, the search for a radio became top priority. Choices were getting difficult. Functionality was not an issue. Cost, reliability and availability were. Futaba had just announced a 25% price increase due to exchange rate fluctuations. Then we had this interesting discussion at a club meeting about the way Graupner tunes its 40 MHz RF deck to meet the French 41 MHz standard with an apparent severe loss in range. All this was verified with test equipment. That left Multiplex, but they had just closed their service office in France. And their dealer network is shrinking.

I was relating all this to a friend, who then pulls out his radio and says, "Why don't you take a look at this?" THIS was a blue anodized box with industrial duty joysticks and assorted switches. At first glance, it looked a lot like a Europeanized version of the ACE R/C Micropro.

THIS was the SuperTEF. SuperTEF?? Designed and built by one of the legends of R/C modelling in France, Francis Thobois. The latest of a long series of R/C systems, it had all the features of the latest top of the line commercial systems: micro-processor control, fully programmable, model memory, etc. And two additional ones that no one else had were Dual frequency and synthesized frequency RF deck in BOTH the transmitter and the receiver.

Airtronics/Sanwa and Futaba were just starting delivery of systems that incorporate synthesized frequency deck. And at prices, that even stateside, are best described as stratospheric. The SuperTEF has been available for over two years, at a price that is comparable with equivalent crystal based sets, if bought fully built; less if bought in kit version. Kit version? More on this later.

So, I'm standing with the transmitter in my hands, obviously designed by someone who knows what he's doing. I pop the back open. Everything is neatly laid out. A real pro job. I really got blown away when I opened up the receiver. First, by the microprocessor but mostly by the use of Surface Mount Technology (SMT) and components mounted on both sides of the PC boards. This kind of stuff is leading edge technology, not something commonly used by an occasional hobbyist.

THIS had to be investigated further.

I've been reading the French air model press since I got here. So, why was it that I had not come across any references to this system? The answer lies in the fact that, while these magazines are very willing to focus on model building projects or descriptions of commercially available systems, describing how to build an R/C system or part thereof is not considered of prime interest. And since there exists a very active electronics/HIFI hobby segment, served by its own set of publications, that's where such systems are discussed and described. The SuperTEF had therefore been described in complete detail, including how to build it, in *HAUT PARLEUR*, a leading publication for this latter segment. Of course, its availability is also advertised through an electronic kit/component supplier, in the same magazine.

I made a few phone calls, first to the magazine, then to the kit supplier and eventually got to Mr. Thobois. We agreed to meet a few weeks later, at his home, located in the Flandres region, a couple of hours drive from Paris, near the Belgian border. (Flandres is the site of one of the bloodiest battles of World War I.) France's industrial and mining heartland up to the early fifties, now an economically depressed rust belt, still has its reminders in the form of coal tailings, neatly piled in cones about 100 metres high.

Mr. Thobois, now retired, has lived in the area all his life, working as a math teacher in a local high school. His interest in R/C came to him through radio, his father's hobby, and airplane modelling. When he started, around 1955, one had to do his own building. He explained, with obvious pride, that he has never bought a commercial set. All his R/C gear is of his own design and manufacture. Over the years, he has designed some 10 different transmitters and 17 different receivers, all described as building projects in *HAUT PARLEUR*, to which he has been a long time contributor. He has done it all: Reeds, analog then digital proportional and finally µ-processor based systems. The same is true of the test equipment on his workbench. Frequency synthesis is not something new either; Mr. Thobois started incorporating this technology into his systems about ten years ago.

The SuperTEF, using ideas from the HI-TECH Encoder by Hendrickson et al. presented in *RCM* in 1986, was first designed around 1989 and has been enhanced three times since then. Its software is now on its fourteenth version, with most of the latest improvements aimed at supporting the needs of sailplane fliers. Some 400 systems are now in use, most of them built by their owner. Yes. 400. Built. Now, I've built Hi-Fi kits from Dynaco. I could handle the transmitter, which is mostly point to point wiring. The receiver was something else with its SMT parts. And I'll pass on the RF deck with all its discrete components and associated alignment procedure. This is not an endeavor for the duffer or the ham-handed. One needs a well equipped electronics workshop, complete with appropriate test equipment.

Mr. Thobois mentioned that, indeed, a number of the builders got in over their head and that he had to help them out. In fact, he will happily build you a system. Most of the time, though, builders manage quite well and successfully complete the project, sometimes sending him the results for a final checkout. As for me, I opted for a ready-built version.

The specifications are pretty well self-explanatory, so I won't go into the details. So are the photographs. Besides, I'd like to get some experience in using the beast before I try to describe how it works. In the same vein, one of the builders has designed a PC-based tool that allows one to program, and then simulate the results. Once satisfied, all one has to do is to download the settings into the transmitter. A neat way to try things out without having to worry about dead batteries or setting up the plane on the coffee table while your better half wants to curl up with her favorite book or whatever. ■

Jer's Workbench

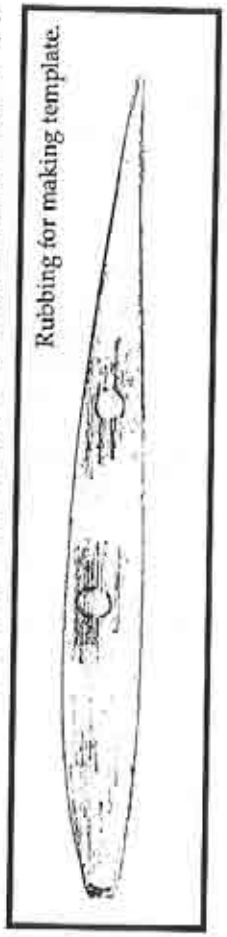
Wing Rod Template

Well, you got yourself a new kit. One of those super deluxe ones with a kevlar reinforced fiberglass fuselage, pre-sheeted obeche skinned wings with carbon reinforcement, and a couple bags of miscellaneous hardware items; everything needed to complete this beauty for this year's competition. You start reading the instruction manual. All of the bits and pieces are there. Only 20-30 hours of work is required to complete this kit; all of the hard work is done for you except one thing: drilling the holes in the fuselage for the wing rods!

Most of the manufactures who produce these fine kits neglect this one item. They don't drill the holes for the wing rods or give you a template to do this job. This job is a hard one for some people to do. You get this beautiful kit with all of the necessary hardware items; the pre-finished parts all fit, and you are thinking of the dollars that you spent. Now, "What if I drill the holes wrong, drill the wrong size, or drill in the wrong place?"

Well, I have a little trick that may be helpful to you, and make drilling these holes a bit easier.

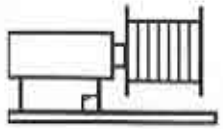
First, take a sheet of paper and lay it onto the root of the wing. That's the big end, the part that goes next to the fuselage. Using the side of a soft lead pencil, rub around the root and you will soon see the outline of the wing profile and the holes for the wing rods. Next, glue the rubbing onto a piece of wood; cut it out and drill the holes. Now, take the wing rods and slip them into the wing and slip the template onto the wind rods. Check to see if it mates up to the wing profile. Once satisfied that the template looks like the end of the wing, lay it onto the fuselage side, mark, and drill the holes. Good luck. ■



Flying Hint

...by George Siposs
Costa Mesa, California

We all know that a flying model has to be watched constantly. Take your eye off it for a few seconds and you may never find it in the sky again. There is a simple solution. Before you take your eye off the model, point the Tx antenna at it and don't move the transmitter while your eye is looking at your buddy or wristwatch or whatever. When you return to the plane, just follow an imaginary extension of the antenna... your model will be there, waiting. ■



Winch Line

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

What's in a Name?

Are you trying to decide what sailplane to buy for the upcoming flying season? Are you caught in the "what next" trap. Well, if you commute to work for any distance your prayers have been answered. Just look on the automobile ahead of you in traffic and check out the name! It seems that the model industry is somehow linked to the automobile industry when it comes to the naming of their products.

Some names have been with us for years while others are recent entries into the "name" game. The Falcon has been around for years and the Javelin was once the showcase of another manufacturer for some time. The Comet not only defined automotive style, but it also led the world in aerodynamic performance in Europe, and had quite an impact on the F3B flyers here in the United States. Special Edition is another of those names that has been around forever and is re-used in five year increments. Thus far I have only seen one instance of its use in soaring and that one is quite good.

Nova, Sport, Cobra and Vector should remind a good many of us of the sixties as these name were reminiscent of those wonderful years. The Tempest was another of the "vintage" automobiles that caught many a teenager's eye in those days, as well. The car of the nineties has a new and more powerful name such as Eagle, Tracker, Shadow and Legend. Other names emulate the phases of the moon with Lumina or Eclipse. I guess you only see an eclipse every so often like the guy who flies one? Did the Ellipse start life as a misspelled Eclipse?

Speaking of different approaches, try a Renegade or a Laser for a speedy approach to the flying field or slope as they obviously go fast or are outlandish. Other powerful names residing on automobiles that depict the philosophy of the driver are Mirage and Spirit. (You are either a free person or trying to hide.) If you win all the contests (or the majority of them at any rate) you might use Conquest for a handle.

And of course what list is complete without a scientific approach such as Spectrum or Pulsar for a couple of heady names. I think that if you don't like the name of a particular car you could always use the name of the car company and a planet to get the most out of name recognition like the Saturn. (Fortunately all the moon name are already in use.) The latest exception to all of the above nonsense is the new Ford van, a WindStar named after the two meter Windstar. Now there is an approach.

If you get bored with the actual names of the car in front of you, you can always use the sub-name, such as XL, ZX, NX, or RT. Then there are the numbers to consider such as 1000, 2000, 300, 1500, etc. Then you could go completely over the edge and use both numbers and letters like 300ZX, 2000NX, or something like that. In the modeling world there are fewer of the combination things so it must mean we have some prospective on naming convention.

We use things that actually mean something; well most of the time anyway. We use the rounded off area of the wing for instance that gives the flyer a neat number to say after the name like 600, 800 or 880. We can use the 100 for one hundred inch airplanes and 2M for two meter airplanes. Now that makes sense. We can even use the sub-name to denote more than one thing as well, like the 2.9T for 2.9 meter and T tail. The use of single digits or numerals denoting the version or year have always been popular such as 7 or 5 or III or 91.

At any rate now, the drive to work can be useful for something other than just going to work. Think about the next plane you are going to build or find a name for that scratch design you have lurking in the back of your mind. ■

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)

Utah Slope Soaring

Utah is known for its mountains. Why? It is the home of some of the best snow skiing slopes in the world. Utah is also the location of a beautiful basin ringed by mountains and filled with the Great Salt Lake. So, one shouldn't be surprised to learn that it has some very good slope soaring sites, too.

On a recent business trip to Salt Lake City I was fortunate to have the opportunity to visit a Utah slope soaring site. Hosted by Mr. Bob Harman (the manufacturer of the BAT winch) and many of the local Intermountain Silent Flyers, this trip proved to me that Utah has at least one and probably many ideal soaring sites.

The site I visited is apply called Point of the Mountain. It is just that, a point in a mountain range that stretches itself out onto the valley floor. A point that abruptly rises above the valley and continues into the range finally peaking out to the East in the Uinta Mountains at 13,449 feet. To the West of the Point are the Wasatch mountains that help to close the valley in. The term "majestic mountains" doesn't quite describe how one feels when viewing this range from the valley floor. Dwarfed might be a better description. This is a slope soaring environment.

On the southern exposure of the Point of the Mountain the winds arrive at the hill after blowing across the cities of Orem and Provo. Then it finally crosses Utah Lake and up the face of the slope. The Point of the Mountain is unique in that within about a mile it has a Northern exposure, also. So, on the Northern exposure the air, as I was told, drifts down across the great Salt Lake, then through the bedroom communities of Jordan and Sandy and pushes it way up the slope. The slope winds are aided by the fact that the entire valley is ringed by mountains. Thus, the wind is channeled into the point from multiple directions, depending upon the conditions for that particular day.

"How high are the slopes?" Starting with the Southern face, it rises above the valley floor approximately 500 feet. The face of the slope appears to have an incline of nearly 60o and is relatively straight for about a half mile. The face then begins to bend around to the West and slowly but gradually makes it way around the point to become the North face. The North face of the Point rises up somewhat less dramatically to a height of 300 feet at the first bench. However, hold on because the bench is just that: a bench. The bench, I should point out, is also the launch area for the models. Once airborne though, any model cruising the North face of the Point has the opportunity to drift back a hundred yards or so and climb up the adjoining face which lies behind. And this climb could be dramatic indeed. The rear face of the North face (have you got that) rises up about another 800 feet very abruptly and then continues to the North toward the city of Salt Lake for miles. **IT IS SPECTACULAR.**

Landing zones mean a whole lot to slope soaring pilots because their sometimes fragile models can suffer on touchdown if the LZ is poor. So, often times one finds the ideal slope soaring site where the lift is abundant and will keep up a dead engine B-767, but the landing zone sucks. Not so with the Point. No, the landing zones are quite good and I even scoped a spot on the North face where a scale model with a good retract could do touch and go landings. The only thing that could make the landing zones better would be to have them mowed and apparently club members are considering that option.

So, what could be better? Not much except for the club members and their attitudes. The fellows who came out (approximately 20 to 25) to fly with us on Saturday, December 11 made me think about how important it is to have ***FUN!*** They were a gregarious bunch. They were pilots who outwardly appeared to enjoy each others company and the camaraderie of flying R/C slope gliders. They ranged in age from the teens to retirement age. I was pleasantly surprised to see the number of young flyers participating and getting help from the more experienced pilots. They apparently have recognized the importance of having young members who will carry the club torch in future years. One flyer even showed up with a heated trailer. We were able to take shelter in it against the wind and cool temperatures (that only got into the mid 40s that day) and to share flying stories.

The models the Intermountain Silent Flyers were piloting were a potpourri collection. Many of the ships were of the kit variety while a number were from scratch built origins. Some models arriv-

Dave Jones' Samurai on launch. This model uses a wing/elevator configuration. Samurai can be purchased from Sig Manufacturing.

This 1/2 A power model was converted to a slope soarer by Bill Jensen. These 1/2 ships make fun slopers and are quite inexpensive.

Stryker is flown by Bruce Moore.

Mark Mill's Legend cruises past the face of the slope. It flew very well in 15 + mph winds.

ing at the site were even from the - God Forbid - ready to fly variety. The pictures document only a few of the many models that flyers carried to the Point this cool winter day.

Slope soaring is a riot! Right? Right! The ISF pilots are having a good time doing it. And from all appearances they would like you to come join in with them. So, if you are planning a slope vacation or just want to head out for the weekend, Salt Lake city is certainly a slope soarer's destination. I would add a caution here, however; that caution being that the land at the Point of Mountain belongs to the State Highway Commission. So safe flying is a must for the continued use of the land. To alleviate any chances for problems or conflict it is probably wise to contact the Intermountain Silent Flyers. Bob Harman is the contact and his address is 10424 Golden Willow Dr. Sandy, UT 84070. Or, telephone (801) 571-6406.

Lastly, club members told me that a large event is planned for 1995. It is to be hosted by the ISF and will apparently encompass both slope and thermal soaring events. I don't know about you, but I think I will be booking some room space for this event. ■

Hand-Launch Repairs

...by Bill West
1962 Willow Street
San Diego, CA 92106
(619) 222-5296 evenings after 7:00 PST

If you fly HLG you will soon become an expert at repair. Couple high energy launches with circling in the low level turbulence we call thermals and you have the perfect equation for unplanned abrupt contact with the terrafirma (or the nearest light pole). I used to dread repairing. I would sit and stare at the pile in front of me while I contemplated what to do first. Under the heat of battle, i.e. HLG contest, amazing repairs can be performed and, unfortunately, I have had my share of experience.

At the Summer 93 Riverside HLG contest I was checking out the trim when I got some indications that there was a thermal brewing over there by yonder tree. Well you guessed it, after having my flight path altered by yonder tree I made a one point landing on asphalt from 15' up. Half way between the nose and wing the fuselage was split in half on one side. Using fiberglass and CyA I patched it together and everything was fine for the first two rounds, until...round three. Talk about competition, Larry Jolly, Daryll Perkins, Steve Condon (the eventual winner) and other great flyers were in my heat. The task was 6 launches for 5 two-minute flights. On my first throw the side of the fuselage I thought was intact opened up and the nose of my glider was flopped over at a 30 degree angle. Well I ended up completing that flight and landing safely at the two minute mark, the rest of the round was history. The impact also caused latent defects that eventually aced both servos and the receiver over a period of months.

The lessons I learned that day were: 1) Use the time before the contest to trim the airplane and not to prove your thermaling abilities. 2) When assessing the extent of damage, put some stress on the part. For example, grab the fuselage and repeatedly twist it a little while eyeballing every joint and panel for signs of movement.

One of the repair techniques that I would like to relate is using CyA and 3/4 oz. fiberglass. CyA the fracture as always. Cut a strip of fiber glass that extends 1/4" past the nearest fracture. Place the fiberglass over the fracture and wet it out using your finger. Whalla...the repair will sometimes be stronger than the original.

Don't let that pile of pieces discourage you; armed with the right materials, techniques, and attitude, miracles can be performed at the field to keep you thermal'n.

on the Wing

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UBARA: Conclusions

In the August issue of *RCSD* we described a free flight HLG designed and built by Dr. Ing. Ferdinando Galè.

Ubara, a swept wing design, featured an elongated root chord which formed a cuspidate (bat) tail. The root airfoil was a reflexed section. Ubara's wing tips, which were flat plates, were set at -8 degrees to the root airfoil and separated from the main wing section by vertical plates. Ubara flew very well in this original configuration, but flew better after removal of its wing tips.

We asked, in our column, for reader input regarding this change in flight performance. Nat Penton sent in what we consider the best explanation for the change in Ubara's performance:

"The extreme incidence settings of the outboard tips was trimming the wing to fly at a high CL with attendant high drag.

"It is not surprising that removal of the tips resulted in better performance - lower profile drag and dramatically lower induced drag. It also provided some weight reduction and a CG shift in the desired direction. The L/D improvement should be dramatic.

"A less dramatic comparison could have been made if the incidence of the tip plates was adjustable, although it would still be a more draggy arrangement than the final version."

Interestingly, none of the submitted explanations directly examined the effects of the reflexed center section on the glider's stability and subsequent performance. Rather, the focus seemed to be on the wing tips which were removed.

Ferdi's main point, and one which we attempted to reinforce, was to draw attention to a case where the chosen tailless planform and airfoil combination provides too much stability (and hence too much drag).

Ferdi stated, "The initial idea was to alleviate the burden on the two stabilizing tips. The adjustable elevons, of thin aluminum, had to be set at neutral because Ubara turned out to be ultra stable... Without the stabilizing tips the model is as stable as with them. The glide path seems to be better, too."

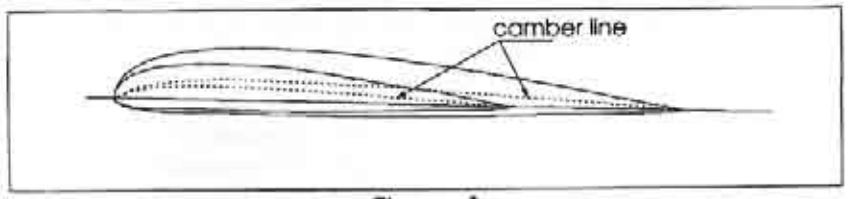


Figure 1

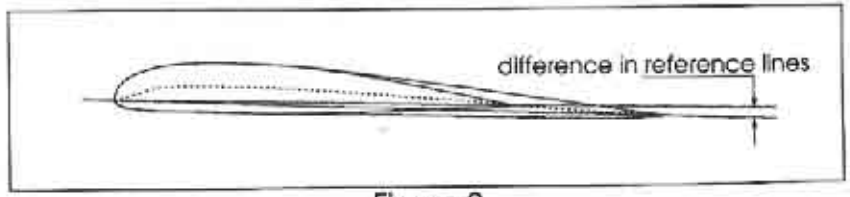
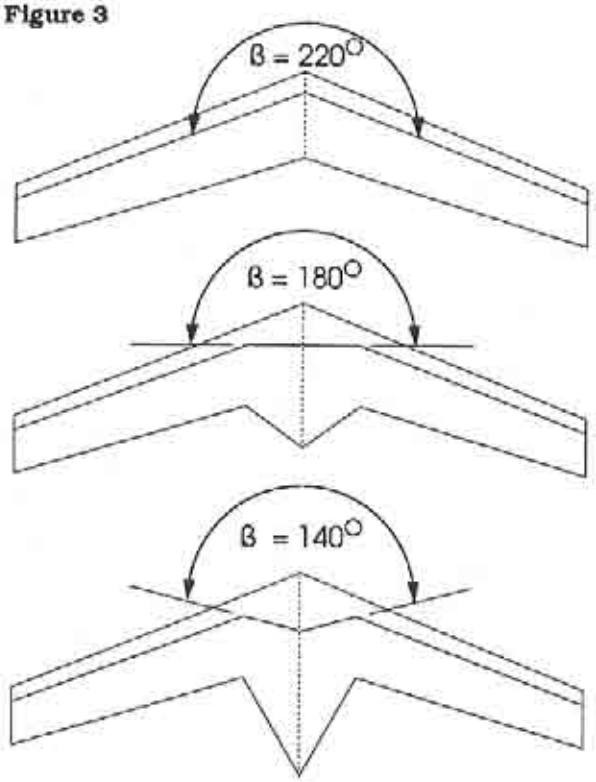


Figure 2

Figure 3



β, the angle at which the quarter chord lines of the two wings meet at the center line, should be less than 180°, according to the Horten brothers.

Thermaling is said to be improved by incorporating the bat tail configuration. But published reports have thus far described bat tails which are constructed by either simple enlargement of the entire root section (Figure 1) or by extension of the root section camber line well past the normal trailing edge (Figure 2). Notice how these methods affect the reference lines, and hence angles of attack, of the two sections. Since most modern high lift sections incorporate positive aft camber, bat tails have been a means of significantly improving lift, but at the same time increasing the wing's already strong negative pitching moment. This negative pitching moment must always be fully counteracted for stable flight.

The bat tail of Ferdi's Ubara, in contrast, was a negatively cambered surface. While this did not augment lift, the resulting planform did change the quarter chord line as promoted by the Hortens (Figure 3). But the combined effects of wing twist and negatively cambered bat tail proved detrimental to Ubara's performance — using only one of these two means of achieving the required stability would have rsulted in lower drag and better performance.

Did the reflexed center section alone contribute sufficient force to overcome the pitching moment of the entire wing? Ubara did not pitch forward, but rather flew well following removal of the twisted wing tips, so in comparison to the normal practice of twisting both wing panels, a reflexed bat tail seems to be capable of providing sufficient stability.

Would Ubara's performance have improved if Ferdi had simply retained the outer wing tip panels and changed the bat tail to the more usual positively cambered surface? We are not sure of the answer to this question. We tend to believe the twisted wing panels produced more drag than the reflexed bat tail. If this is so, the performance improvement, if any, would not have been so great as that seen in Ferdi's eperience.

Given the choice of using wing twist or a reflexed bat tail, we would at this point tend to choose the reflexed bat tail. Based on Ferdi's experience with Ubara, we think the reflexed bat tail option would yeild superior results.

We certainly welcome further ideas and comments on this topic. ■

Surrealistic or Soar-Realistic?

...by David W. Friant
Bellevue, WA

Imagine this. It's 1996. Using an off the shelf virtual reality headset and a miniature camera installed atop the canopy of your open-class sailplane you prepare for your first ground check. You flip the headset from sunglass mode into camera mode. Let's see. If I move my head right, the camera looks right. If I move my head left, the camera moves left. If I move my head up, the camera looks up. If I move my head down, the camera looks down. Great! Let's check the microphone. Snapping my fingers next to the microphone installed just under my wing, I note that it works. Now I will be able to hear those two hawks when I get up there. Next, I check the on screen instrument panel. Does the altimeter work? Yes, it does. Does my attitude instrument properly display left, right, up and down? As I tilt my plane left, then right, then up, then down, everything on screen checks. Does the airspeed indicator work? As I run with my glider, I see that the airspeed indicator shows about 3 miles per hour. Airspeed indicator checks OK. Does my countdown clock work? Yes, it does! Let's see. I will set my clock to countdown 10 minutes from launch. Yeah! I am about to experience my first soareal flight.

OK. Ready for the first launch. Let's flip the headset to sunglass mode for launching. After launch, and upon reaching level flight, I will flip the headset into camera mode and I will be really flying. Well, sort of. I mean as close as I could possibly come to really soaring. And gee, I won't get hurt even if I pile into the ground at mach 2. I wonder if I could sell glider rides to pay for this thing?

Shut up and launch, Dave! ■

Telephone Change!

David W. Friant, Wright Manufacturing Co., has a new telephone number: 206-821-1258.

Curt Nehring
Southern California

Understanding Sailplanes

...By Martin Simons

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

Pitch stability

As with stability in turns, what is needed here is a model that will hold, against minor turbulence, the attitude dictated by the position of the controls.

This is often misunderstood. A stable model is one which is always obedient to the pilot, under full control. That is, if the pilot moves the controls deliberately so that the model is upside down and then holds them and trims for inverted flight, the stable model will do its utmost to remain upside down in the chosen attitude, until the pilot changes the controls. It will then obey the new commands.

In contrast, an unstable or neutrally stable model will not stay in the position the pilot requires. It will tend all the time to obey its own whims and will require constant correction. In an aerobatic slope soaring model something like this may be desired and such a model is certainly very exciting to fly. But a cross country sailplane, flying at a distance of a mile or so and at three thousand feet, requires different characteristics.

Major turbulence, as when entering a thermal, will show up clearly and predictably if the model is stable. This, too, is contrary to some widely held beliefs. An unstable of neutrally stable model will pitch about alarmingly without warning and give false signals to the pilot constantly.

In cross country flying there is a lot of straight flying with nil bank, but to achieve best results it is very important that the airspeed, as determined by the position of the elevator and/or flap trimmers, follows the pilot's wishes. Hence a stable model is needed but of course there must be enough response to elevator movement, to change the airspeed as frequently as required.

Assuming the model has normal proportions, almost the only important factor here is the position of the balance point or center of gravity relative to the neutral point of the whole model. For a cross country model, start with the c.g. well forward. Any location between 25% and 30% of the mean wing chord would be reasonable. This ensures a good 'static margin' of pitch stability. (It also helps circling stability.) Small rearward adjustments of the c.g. may be preferred after first experience, but it is be worth calculating the actual value of the static margin before doing this. The formulae are given in most respectable textbooks.

Dynamic instability effects

Almost any sailplane which is efficient, *with low drag*, will exhibit some dynamic instability in pitch. This shows up as a phugoid or wave like motion, with a fairly long period **(Figure 12)**. The model noses down, levels out, noses up, levels out, noses down, etc. This is almost inescapable because the *main damping factor, aerodynamic drag*, is small. The pilot may be too far away to detect this slow oscillation and in some models it may never build up to any appreciable

Figure 12. Dynamic instability. The phugoid oscillation

extent and so is not a major worry.

Dynamic instability may, however, cause a steady increase in the oscillations until the model is pitching up and down seriously and eventually stalling and diving violently. Once recognised, this can easily be controlled with elevator.

To reduce the chances of serious dynamic instability (providing model has an adequate static stability margin), keep the extremities as light as possible - especially the tail. But do not be surprised or dismayed if the model 'phugoids' gently sometimes. Almost all good sailplanes do this, since it is their very efficiency which reduces the damping effect. Keeping the tail (and hence the nose) as light as possible, helps but is not likely to remove the problem completely.

Despite the many mechanical advantages of having control servos in the tail it is probably not to be recommended because they increase the dynamic instability. Even if (as may be the case) the **weight** of a couple or three servos in the tail, is no worse for *static* balance than the weight of push rods running all the way down the fuselage, the **concentrated mass** of the servos so far aft, is worse *dynamically*. In dynamic stability calculations, the *cube* of the mass involved enters the equations for moments of inertia, multiplied by the distance from the center of mass.

Do not suppose that reducing the static margin will overcome the dynamic instability problem. It makes it worse. An adequate static margin is effective in damping the dynamic oscillations.

Trim range

To fly fast and straight on course for long periods through sink between thermals, the model should be capable of flying 'hands off' at the whatever speed is indicated by the instruments. Many models currently in use do not have sufficient trim power to get the elevator down enough.

The reverse happens when circling. Usually some up trim is required to keep the turn going steadily, hands off. There may not be enough trim action available.

Solutions that suggest themselves are:

(1) Moving the c.g. back. This defeats the major need for good pitch stability. Every backward shift of the c.g., *increases* elevator sensitivity but *decreases* the stability margin. As mentioned, this may be good for aerobatics but not for cross country work.

(2) Increasing elevator or stabilator size, preferably by increasing its span rather than merely adding extra chord. A high aspect ratio surface has a steep lift curve slope, which means that a small angular change yields a greater effect on the control power.

(3) Taking a leaf from the full-sized book we might use a separate trim tab on the elevator, operated by an entirely separate small 'stick' or auxiliary slider on the transmitter. This offers itself as a simple and very effective solution which is known to work perfectly.

(4) Electronic methods - exponential control throws for the trim or perhaps a redesign of the trim potentiometer on the transmitter to give a greater range of movement, or alternative control mixers, etc. Existing transmitters do not seem to have enough flexibility in this respect.

(5) If the model has camber changing flaps (see below under **Penetration**), moving the flaps alone will cause substantial change of trim in the desired sense. This is perhaps the best solution. With flaps raised slightly the model will speed up and settle into a high airspeed. With flaps down, it will slow down. Note that the visible attitude of the model may not alter much. A perfect balance between flap position, drag and trim has the sailplane always flying at its correct attitude and appropriate airspeed for the flap setting chosen, without change of elevator trim at all. (This is a rare condi-

tion but can be achieved sometimes. The famous ASW 12 full scale sailplane was an example.)

Low sink rate in turns

An important point here is that for cross country flying we do not need to worry much about total weight and wing loading. Extra mass, in the form of ballast, may even prove necessary for penetration, so there is not much point in building a model excessively light. The light model may climb slightly better in a weak thermal, but after that it will not go anywhere.

We are not likely to attempt long cross country flights, with models, on days that look like being marginal for soaring. On good days, there will be strong thermals about and the vital thing is to have a good, fast, flat glide when looking for them - i.e., penetration.

But of course, even on strong thermal days there will be times when the model gets low and any sort of available lift will have to be used. For these occasions, the minimum sink rate in a turn and the ability to turn smoothly and accurately, will be important

For least sinking speed, the so called 'power factor' has to be kept up, which means, for a given weight of aircraft, the drag has to be reduced.

When circling in lift, wing vortex drag is always a good deal *more than all other forms of drag put together*. Even a small saving here may make a big difference to the sinking rate. The requirement is a wing with tip vortex drag as small as possible, which demands, before all else, an aspect ratio as high as possible. The aspect ratio is the ratio of span to wing area, and may be found by dividing the span by the mean wing chord. Long, narrow wings have high aspect ratio.

It is well known that if the aspect ratio is too high, the narrowness of the wing chord brings some penalties in the shape of increased profile drag. (This is the Reynolds number effect.) Laminar separation bubbles form on wings as the wing chord decreases at a given airspeed (low Re). There is also an effect of more fundamental kind. As the Re is reduced, the effect of the air's viscosity becomes more significant. Even if there is no laminar separation, the profile drag of a narrow wing increases as Re falls. Hence, quite apart from structural and handling limitations, there are aerodynamic limits to the aspect ratio. For large models of the kind we are considering, the Re problem becomes much less important than for small models in the 100 inch and two metre category.

The best way available of studying this, is to experiment with different wing designs using any of the good computer programs which are now available. Some experience along these lines indicates that we shall see aspect ratios around 18 to 20, which compares with 20 to 40 for the modern full scale sailplane (the lower value here represents the span-limited 15 meter classes).

The larger the sailplane, the higher the aspect ratio can be. Even if this makes for a heavier model, the sinking speed in circling will usually be less.

Additional savings of vortex drag come from adoption of elliptical chord distributions. That is, tapering the wing so that the chord at each point is the same as the chord of a pure ellipse would be at the same spanwise location. This does not mean the wing has to be elliptical. The basis of this is to share the lifting load as evenly as possible over the entire wing surface so that every part of the wing which produces drag, is doing its fair share of lifting. The elliptical chord distribution does this.

Further, but probably slight, improvements are *possible* by adopting a slightly swept back or even a true crescent shape, like that used on the (full sized) Polish SZD 55 standard class sailplane. The basic elliptical chord distribution is more or less retained but the planform is sheared back towards the tips. The arguments used in support of this form began with Wil Schumann who modified his (full scale) ASW 17 along these lines and produced the so-called Schumann planform. The full sized Discus is well known, and the SZD - 55 has gone further with this and is very successful. These aircraft do not necessarily always win contests against more orthodox types such as the ASW 24; the gains are not very great.

Recent research (mostly by advanced 'panel methods' of wing design by computer, but with some support from wind tunnel testing) indicates that a crescent wing with the trailing edge curved back and a rather pointed tip, is even better than the SZD 55 wing **(Figure 13)**.

My own experience, with two crescent wing sailplane models, was not favorable since both models developed wing flutter at moderate and high airspeeds. As emphasized repeatedly above, high speed flying will be a routine requirement for cross country flight, so wing flutter must be avoided even if a small sacrifice is made in thermaling performance. Even on a very orthodox wing, some studies suggest that an up and back swept or 'sheared' wing tip acts to some extent like a winglet and helps reduce vortex drag. I recently observed, in Seattle, a model which had been fitted experimentally with back swept wing tips of this kind. On a trial fast run, wing flutter appeared. Before the swept tips were fitted, the model never fluttered.

There may be some further advantage in fitting Whitcomb winglets, but the same effect can always be obtained by increasing the span for a given total area, i.e., increasing aspect ratio. This is less difficult than designing winglets and setting them correctly.

The rest of the drag of the model - tail, fuselage, etc., is of very minor importance at thermal circling airspeeds. Providing the model has normal proportions and the air brakes are firmly closed, the wing is what counts for the thermal.

Low speed handling

The management of a stable sailplane with high aspect ratio, in circling flight, is mainly a matter of trim. As mentioned

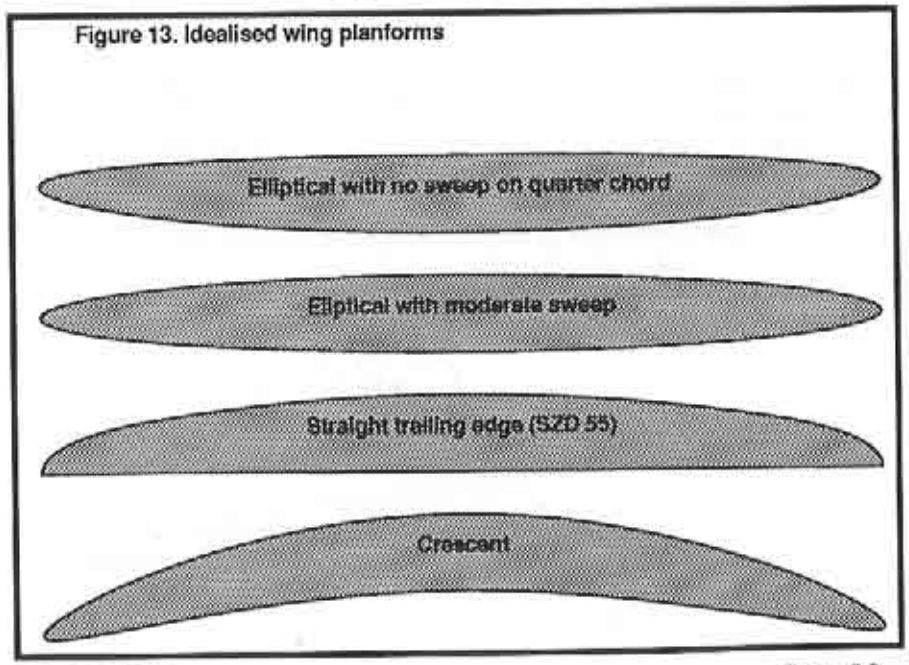


Figure 13. Idealised wing planforms

already, the elevator usually needs to be up somewhat and the ailerons or rudder positioned to 'hold off' bank.

Manoeuvring a sailplane with large wing span, either to enter a turn or to come out of one, is not so easy. The long, narrow wings tend to have a high moment of inertia. They tend to prefer to stay at whatever bank angle they happen to be, and resist any change. In rough air this is an advantage since the flight tends to remain smooth, whereas a smaller span model gets disturbed more easily.

However, persuading the high aspect ratio wing to bank, or to take bank off, requires large control power. If ailerons are used, especially if they are themselves of high aspect ratio (long and narrow, e.g. flaperons) the power is available without excessive control movement. Unfortunately, adverse drag, usually called aileron drag, is inescapable. *It is essential to co-ordinate the ailerons with the rudder.*

There is much misunderstanding of the adverse yaw which arises when a sailplane enters or leaves a turn. In order to make a model bank, or to take bank off, *one wing has to be made to generate more lift than the other.* It is this imbalance that makes the model roll to the desired angle.

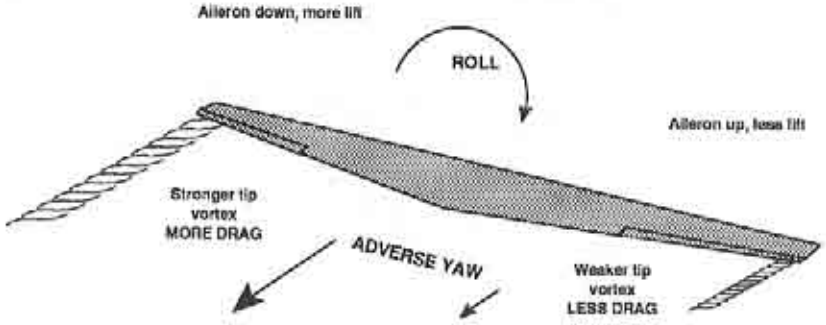
To create the inequality of lift between the two wings, ailerons may be used. Their effect is to reduce the camber of one wing and increase the camber of the other. The result is a lift imbalance in the required sense.

But a change of lift on a wing inevitably and invariably **changes the strength of the wing tip vortex.** On the wing with more lift, the tip vortex strengthens, with necessary increase in drag. There is a corresponding reduction of the tip vortex on the other wing which has less lift, and hence less drag there. The result is a considerable yawing force **(Figure 14)**. The adverse yaw arises both ways - on entering a turn, it yaws the model against the turn, on leaving a turn, it yaws it into the turn. The basic cause is tip vortex drag imbalance and that is the *necessary consequence* of the lift imbalance which is necessary to alter the bank angle.

Differential linkage, with the downward ailerons geared to move less than the up going one, have some desirable effect, especially at very low flying speeds near the stall. Flow separation on the down aileron can be partly prevented by differential gearing and so this is a useful device.

To counteract the adverse yaw, the rudder, which is the primary control surface for yawing the aircraft, must move simultaneously with the ailerons, in the same sense. In full-sized soaring, this requires co-ordinated action by the pilot, stick and rudder pedals always together. With models, electronic or mechanical rudder-aileron coupling is the obvious solution, although it is quite possible to

Figure 14. The cause of adverse aileron yaw: tip vortex drag



fly a sailplane without their aid. Pilots can get used to making co-ordinated turns with rudder and aileron. Quite a lot of rudder action is usually needed. With large span aircraft often full rudder is used with quite small aileron deflections.

It is important to note also that using the rudder alone, with ample dihedral or polyhedral, to turn a sailplane, does not remove the adverse yaw forces. The lift imbalance which banks the sailplane into the turn, or brings the bank off out of the turn, is still there. To get the turn to be smooth and well co-ordinated, heavier use of the rudder is needed than when there are ailerons.

Thus, adverse yaw, or so-called aileron yaw, is nothing to do with the downward aileron entering a region of high speed, high pressure flow, and hence suffering increased profile drag, as is so often stated. In fact, a more cambered wing surface gives less drag at high lift angles of attack. This is why well cambered wings are more efficient for flight at high angles of attack. ■

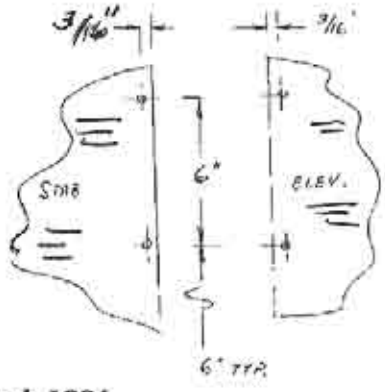
Your Control May Hinge on This

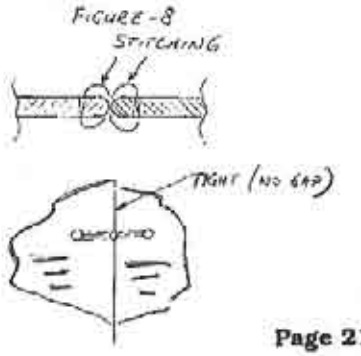
...by George G. Siposs
Costa Mesa, California

If you use the covering Monokote material for a hinge of the control surfaces, or if you find hinge installation difficult or, if your hinges keep sliding apart... you might find this time-tested method easy to use as it solves all hinging problems.

If the control surface is misaligned or leaves a gap with the main surface it will create extra drag or will not work efficiently. Back in the old days of modeling when most things were hand-made, we used to sew on the control surfaces. It's easier than you think and works very well. Sewn-on hinges can be retrofitted to already existing hinged surfaces. Here is how to do it.

Drill a 1/16" dia. hole into the edge of the main surface (e.g. stabilizer or fin) about every six inches. The holes should be about 3/16" from the edge. Drill similar holes into the control surfaces across from the primary holes. Now borrow a sewing needle from your wife, thread a two-foot long thread into it, double it up and tie the ends with a knot. Secure the knotted end of the thread in one of the holes, hold the two surfaces together and sew them together. The trick is to sew them in a figure-8 fashion, i.e. over and under. This prevents binding. Do about 10 stitches at each pair of holes then tie off the end of the thread and cut it off. The two surfaces will be held closely together (especially if you put a notch into the wood to compensate for the thread thickness) and hinge effortlessly. The figure-8 automatically aligns the surfaces to make them streamlined, prevents air bleed between them, and they will be frictionless! You'll be surprised at how well this system works. I recommend this especially for small to medium, built-up-from-wood models. ■





Warmin' Up or Hand-Launch Topics

...by Scott Smith
2 Sugarpine, Irvine, CA 92714
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Two Contests Already!

The first "publicized" contest in Southern California was hosted by the Inland Soaring Society in Riverside on January 30. Amazingly, it pulled 38 contestants, more than the "prestige" contest (which had been rained out and rescheduled).

Actually, this was not the first SoCal HL contest; Torrey Pines Gulls had hosted a 26-participant event on January 8.

The turnouts are an indicator of no less than an explosion of HL contest activity this year, since no events were scheduled last year at all until March. The Torrey Pines Gulls ALONE are sponsoring 5 more contests this year; see the calendar section for dates.

Highlights of ISS Contest, Jan 30

No, I'm not going to go into the gruesome scoring details, since the informal reader poll published last month indicates that none of you would be interested. (Don't blame you.) Rather, I am going to describe conditions and how varying factors seemed to affect pilot performance.

New Contest Format

Many highly-rated HL pilots were expected at the contest and so the format was changed as shown in the chart.

Overall, I liked the format change for the following reasons:

First round: the old 10-minute round meant that if you caught a thermal close to the beginning of the round, you had a good chance of running a radio distance check by the time it was necessary to bring the plane back to the field. If you were a novice and didn't do well here, this round really buried you. 5 minutes is a more appropriate time to stay in the air than 10.

Second round: the old 5-minute, on the other hand, is too easy given the caliber of today's aircraft. Having 3 launches to make two 3-minute flights in seven minutes makes things a little harder while not scaring off the novices too early in the contest. However, if four rounds are too long (they were in this contest with 38 contestants), then this is the round to drop.

Third round: The two-three-five minute in 10 minutes (unlimited launches) is a great format. Being the middle round, 5 minutes will probably not get you blown too far downwind, but some of the challenge of the last round is there.

Fourth round: No changes in this, the toughest of the rounds, and my favorite. By this time, an afternoon breeze may have kicked in, but two minutes will not blow you too far downwind.

Given my druthers, I would run a contest using the new 1st, 3rd, and 4th round formats, leaving time in the afternoon for the pilots to fun-fly while the conditions are still good or go home to watch sports on TV.

In any case, congratulations to Joe Rodriquez and ISS for a fine format and a fine contest.

Contest Format

	Old Format	New Format
First Round	10-min in 10 min	5-min in 5 min
Second Round	5-min in 10 min	Two 3-min in 7 min (3 launches)
Third Round	(none)	2,3, and 5-min in 10 min
Fourth Round	5 2-min in 10 min, 6 launches	same

Details of Joe's Plane

Wingspan	60 inches
Weight	11.8 oz.
Airfoil	RG15
Planform	Schumann; one break on each wing.
Wing Construction	Balsa sheet over white foam.
Fuselage Construction	Fiberglass
Servos	Airtronics 94501 (Microlite)
Empennage	V-tail made of blue foam
Aileron Dimensions	BIG (27" by 2" on each side)

Wurts

I ran into Joe at the IMS show in Pasadena; he piqued my curiosity with his announcement that he was bringing a 4-channel flaperon ship to the ISS contest. This was extremely interesting to me because no HL ship with wing control surfaces had done well in recent years in SoCal contests. If anyone could change this, Joe could.

Sure enough, Joe flew it at ISS. The aircraft details are shown in the chart. I.e., it looks like a little F3B ship. (Surprise!) Each control surface (2 V-tail elevators and two "ailerons") has its own servo which was controlled by a computer radio. So Joe can mix-and-match as desired.

The appearance was vintage Joe: no paint, no covering, and he had even pulled the case off the receiver to save weight. The fuselage didn't look as though it had enough glass to survive much of a crash. One nice performance touch was a little clear flexible plastic "door" over the finger hole to reduce drag.

Rudder/Elevator/ Polyhedral vs. Flaperon

Needless to say, everyone scrutinized Joe's ship throughout the contest. The consensus seemed to be that his ship had a noticeable advantage in penetrating straight-line to find lift. Joe's strategy seemed to be:

- Throw the plane incredibly high.
- Head straight out where lift might be.
- If you encounter sink, keep on going.
- If you encounter bad, raunchy sink, keep on going. Lift must be close by somewhere.
- Encounter lift. Turn, core strong thermal, speck out, and watch everyone else sputter in frustration.

In other words, Joe could throw the plane extremely high, then the plane could cover more ground faster than most. Joe used this combination to get to thermals that most others wouldn't even attempt. The flat wing seemed to have an advantage in covering lots of ground.

However, it didn't seem to have any advantage in circling in weak thermals, even as light as it was. It didn't seem to have any disadvantage either, at least anything noticeable.

Result: Joe lost the first round by one second, then swept the other three, winning overall with a score of 3990 out of 4000. One other flier beat 3900, and the others fell below that.

Moral: if there are any thermals, and there seem to be more out there than you think (know that there are thermals when you would bet your paycheck that there aren't), then getting to them is the name of the game.

The Other Contestants

The other item of interest was that many different models were flying, including many built-up wings. Many different models did well, probably owing to the

variable lift conditions. Overall, lighter planes did better than heavier ones, reflecting the poor lift in many of the rounds and the reluctance of contestants to venture far off-field for what thermals might be there. (This includes me; I was chicken. I admit it.)

Dr. Norm

He stayed up late trying to finish his airplane for the contest and had to fly it not quite finished. Turns out his CG was too far back, and he had more "turning authority" than he could use. His plane was all over the place in every attitude possible.

And Me

I did okay. I tasted sweet victory in the fourth round when I decided to go find my own thermals, since no one else was having much luck. I did find some, and in the process discovered that, on my modified-7037 airfoil, once you have your plane mushing, you have to give up some altitude to get it really flying again. And I did, making sure that my airfoil was flying "on step" most of the time. Voila! I covered ground quickly and sensed thermals better. Other pilots had kept pointing this out to me; this round it finally sank in.

It dawns on me that I hadn't really learned this lesson because my previous planes didn't fly well and I had been preoccupied fighting their quirks. This time, this was the first contest in which my plane was finely tuned. Things like, even throws for left and right rudder. No control binding, whatsoever. Careful attention to weight (weighted 12.3 oz). CG back a bit, but not too far. Even glassed the finger hole so that I wouldn't rip it out. The plane flew beautifully, and it turned me from a mediocre pilot to a good one. Moral: in hand-launch, take time to get your plane right; it will do more to improve your pilot skills than anything else.

It was a satisfying contest. I'm looking forward to the next one. ■

Scale Documentation

...by Asher Carmichael
Spanish Fort, Alabama

Are you a scale modeler looking for documentation for that obscure project? There is a way to find that special sailplane. The FAA carries a listing of all the civilian aircraft available on microfiche. It's updated monthly, but I think a one time subscription will be sufficient for most modelers. The file I am familiar with is RIS AC 8070-4 Aircraft Manufacturer and Model. It contains in alpha numeric sequence the make and model, registrant's name, address, etc. The cost is $11.32 for the whole library of 45+ microfiche sheets.

With the library comes 3 - 4 sheets of index fiche and some typed information. Once I found my planes, I chose the ones that looked promising and either called or wrote the owners. Most were more than willing to help. Oh yes, it may help to "bribe" the owner with $5.00 - $10.00 for his time and trouble and film expense. I found that of the 3 owners I contacted, 2 responded with 24 exposures, each.

Obviously, you'll need a microfiche reader to access the library, but most public libraries have these, or check with your public school system. Once you find the airplanes you're after, just jot down the registrant's address, etc., and you're on your way!

The library is available from Anacomp, Micrographic Services Div., 1220 Sovereign Row, Oklahoma City, OK 73108; (405) 949-9090. ■

What are the angles and effects of straight vs. dihedral vs. polyhedral wings?

(Answer to George Siposs' Question #4, *RCSD*, January 1994, page 41)
...by Ed Jentsch
Rockville, Maryland

Dihedral angle (as measured from horizontal with wings level) is a variable. It is chosen by the plane's designer. When it is zero, the plane is referred to as "straight winged". Eric Lister[1] found, when analyzing the lateral stability of 10 contest grade planes, that the dihedral angle averaged 4.4 degrees, +/- 2.5 degrees. His recommendation[2] is 6 degrees for a "first design".

Polyhedral angles also vary. Generally, the necessary dihedral angle to achieve the desired stability factor is determined first. Call this the "design dihedral angle". Then, if a polyhedral configuration is to be used, the angles of the outer panel and inner panel are adjusted so that the combination produces the same effect as the "design dihedral angle". (It's not just a matter of adding the two angles together).

The purpose of dihedral, or polyhedral[3], wings is to produce yaw–roll coupling. When a plane with dihedral wings is yawed, using the rudder, the more forward wing operates at a higher angle of attack, and the more rearward wing operates at a lower angle of attack, than when the plane is flying straight ahead. The difference in angles of attack between the two wings causes the plane to roll. (For a more extended explanation, see Eric's book, or Martin Simons' excellent book on model aircraft aerodynamics[4]). Yaw–roll coupling enables coordinated turns without the use of ailerons.

Polyhedral wings, not dihedral wings, seem to be the configuration of choice for two-channel gliders. The reason is that polyhedral wings produce yaw–roll coupling more efficiently because the outer wing panel has more leverage.

It should be evident, at this point, that there is no single answer to this question. Dihedral angle is at the whim of the designer who selects it to achieve the performance and aesthetic characteristics he or she is seeking.

What should we aim for?

Again, there is no single answer. What to aim for is what you the designer, or flyer, want from the plane. If it's performance (i.e., high L/D), then you should probably elect straight wings, since they are more efficient at producing lift. But straight winged planes are inherently more difficult to fly.

If, on the other hand, your goal is a more stable craft (i.e. one that can be flown hands-off and will return to level flight without pilot intervention), that's easier to fly, then you should choose a polyhedral configuration.

Is more (dihedral) better? Why?

Only if the plane suffers from "spiral instability"—a tendency to tighten turns without being told to by the pilot. However, before changing the dihedral in this case, make sure first that the instability isn't caused by too large a vertical stabilizer. Yaw-roll coupling results from aerodynamic coupling of wing dihedral with the vertical stabilizer. Either too little dihedral or too large a vertical stabilizer will produce "spiral instability".

On the other hand, too much dihedral, or too small a vertical stabilizer, will produce "lateral instability" or "Dutch Roll"—a tendency for the plane to swing, or oscillate, and roll from side to side.

The answer to this question then is ***no***, more isn't necessarily better. Dihedral should be "just right", or the minimum needed to prevent "spiral instability". More than that will reduce the wing's efficiency, and too much will push the plane into the realm of "lateral instability".

[1] *Eric Lister*, Sailplane Designer's Handbook, *(Clarksburg, MD: Eric Lister, 1975), p. 10.*
[2] *Ibid., p. 11.*
[3] *Polyhedral wings are a general case of dihedral wings. Or, put another way, dihedral wings are a special case of polyhedral wings, where the angle of the inner and outer panels are equal.*
[4] *Martin Simons*, Model Aircraft Aerodynamics, *(Hertfordshire: Argus Books, 1991).* ■

Hand-Launch

...by Sherman Knight
Bellevue, Washington

Hand launch, what a blast. Thanks to Joseph Conrad for providing the most fun flying I had all year. When I wanted to retrim my Genensis after installing some different servos, I had to leave my hand launch at home or the Genesis would never have come out of its box. I've had more fun with this little airplane than with any other airplane I own.

Now, I've heard some of the old guard say, "I just don't know what you guys see in that stuff" and for the longest I agreed with them. My eyes have been opened, I've seen the light, there will always be a hand launch glider in my car wherever I go. Why didn't I do this sooner?

Seriously, I learned more in two months flying my hand launch than in the last two years with my big airplanes. The planes build quickly (my Monarch was built in a weekend) and they're a blast to fly.

I don't quite know how to explain the feeling of climbing out in a max flight from a hand toss. Do you remember the first time you thermaled, or the first time you milked an extra 3 minutes out of a flight and you were less than 50 feet off the ground? Once you've done it you have got to have it again and again and again. You live for the moment. It feels great. Can I do it again tomorrow? (Wow, I guess I'm addicted.)

As you can tell I think this hand launch stuff is real great. If you get a chance you should try it. The Skeeter is an ok hand launch but needs a larger rudder, stabilizer and a SD7037 or other similar airfoil. Conrad and Pearson have some one designs that fly great. Waid Reynolds built a vacuum bagged wing on a modified Skeeter fuselage, Steve Cameron is flying an Orbiter without flaps, Rock Smith was flying a Sunrise, Jim Thomas is flying his own design, Dave Friant and Tyler Moore are flying Avion fuses with their own wing design. Jeff Kasner just received a pre-built Climmax (looks great, already sanded and ready to cover out of the box) and both Jeff and myself are flying Monarchs.

Hand launch competition is the purest form of thermal competition I've seen to date. The pilot who stays in the air the longest, wins. You fly man-on-man. The group of competitors is split in half. All the pilots in one group fly in the same ten minute window. The non-flying pilots act as timers, one timer for each pilot. The pilot who can stay in the air the longest while flying the round assignments wins. The scores are then normalized for each group. The contest is about flying; there are no landing points.

The wing span of the models entered cannot exceed 60 inches. These models are not built for launches on a highstart so the overall weight is very low. Most of the models are bent wing. The average flying weight ranges from 10 oz. to 19 oz.

Thanks again to Joseph Conrad for taking the time to sponsor these 60-inch wonders. I hope he has the time to sponsor three or four of these events next season.

(reprinted with permission of Updraft, the newsletter of the Seattle Area Soaring Society) ■

NASSA Update

...by Gregory Vasgerdsian
Concord, California

Greetings everyone! All members should have received your NASSA packet by now, and the achievement program is in full swing. We had more orders for XXL T-shirts so we had a few more printed up and at this time still have a few left. Late in the year we may go to a new design which will picture not only a modern glass type sailplane but also a P.S.S. model and a vintage glider. The database you received of scale kits is just the beginning of what we hope will become a large library of information available to NASSA members. Robert Scott of Clawson, MI wrote me a letter with some valid input and questions pertaining to the achievement program, so I thought we would try to answer some of the points he touched on as there may be other members with similar questions.

1. The building task. The building task is just that, a task to recognize the effort put in by a member to build a scale model. Please note that it is perfectly acceptable to purchase a finished scale model and that model may be used to accomplish the different soaring tasks (Duration, Distance, X-country) but you cannot get a building achievement award for such a model as you obviously did not build it! While it may seem a pain to have a witness signature and to send a photocopy or photo of the model in construction, it is the Board's feeling that in this way we place a higher value on receiving an award.

2. It is permissible to receive a Duration Achievement with a Distance or X-country Achievement on the same flight. If you cover 20 miles x-country and it takes you 2 hours you could receive credit for both a 20 mile x-country flight and a 2 hour duration flight. Please note that you cannot get credit for a distance and x-country task in the same flight, as they are in essence both distance type tasks.

3. The program is set up as a goal achievement program and though there may be gaps in time or distance tasks, it was the Board's feeling that what we have defined is a great start. We want goals to go after but we don't want a goal for every mile or every minute as it lessens the value of achieving a task. So yes if you fly 15.5 or 19.99 miles you can only get credit for the achievement of 10.00 miles. If you fly 20.01 you get credit for 20 miles. The program for the year is set, and any input for improvements will be considered for 1995, perhaps including a 15 mile task.

4. One form per achievement plus three bucks. Putting this program together and running it has required and will require lots of effort by the few for the many. Though the few are not getting paid for their effort they do want to see the organization in the black. Envelopes, copies of forms, the cost of the award certificates and mailing them all adds up. Also, with a healthy club treasury NASSA can really help events happen, supply great trophies, pay for magazine advertisements, etc. NASSA's goal is to promote scale soaring, and with a healthy treasury we will be able to. If it is found after a year that the cost can be cut we will certainly do so.

On other fronts we already have rumors of possible major NASSA rallies in Utah and Florida and will keep you informed when the rumors become reality! ■

Curt Nehring
Southern California

Dale Willoughby and automatic altimeter for F3I tow planes. (Willoughby photo)

Grob 109 B tow plane by Wik
Grob CS 77 Astir
Multiplex ASW-22
Kurwi 33 - 25 years old with all hardwood w/epoxy glass fuse. by Kurt Wilhelm, West Germany
Grob Twin Akro III (in box) by Graupner (next on schedule)
(Willoughby photo)

F3I Aero-towing Soaring Models Provisional Rules adopted by FAI CIAM in March 1993

...by Dale Willoughby

History

On Continental Europe where exotic and efficient man-carrying sailplanes are designed, manufactured and flown, they have a distinct influence on scale modelers. In addition, two well known soaring sites in Germany (Wasserkuppe and Teck Mountain) are locations that make possible and encourage modelers to copy at a smaller scale the newer and slicker designs.

In the old Western Germany, model clubs were encouraged with space provided for members to meet, socialize and fly. Many of the State provided fields are adjacent to or surrounded by State owned forests, on relatively flat land.

As in America, high-starts wear out, winches fail and hand-towing takes one or more able bodies to launch sailplanes. I use the term "glider" to denote non-scale soaring models while the scale (or near scale) types are, to me, "sailplanes".

Foremost for developing rules for aero-towing were the French, who proposed a set of comprehensive rules which were on the agenda for the March 1992 CIAM meeting. At that meeting the Soaring Sub-Committee extensively re-wrote the text (probably to eliminate French-English terms and phrases) which were then adopted and published as Provisional.

Changes were proposed and accepted at the 1993 Plenary meeting which eliminated one of the two duration tasks; the positioning of officials to one side of the speed course with the models flying the opposite side; the elimination of the official to sound a horn when the tow plane reached 200 meters (656 feet) altitude above ground; a re-flight if the sailplane pilot was not happy with his release position on the speed course; and a change in obtaining a final score due to elimination of one duration task. (See the bar on the left margin which indicates that the sentence has changed from the wording in the previous edition to that shown.)

As a major contributor to the FAI Soaring Rules in the past, I "bird-dog" the changes made and was really puzzled by the "automatic altimeter" phrase in paragraph 3.I.2.4. e). Inquiries to AMA proved non-productive since at that point in time AMA was moving to Muncie leaving behind Micheline Madison, the FAI specialist.

Since I had been at the FAI headquarters in Paris in 1992 (see July and August 1992 *RCSD*), and had a nodding acquaintance with the staff, I wrote for an explanation of the device called "Automatic Altimeter" specified for use in F3I competition.

In due time, Mr. Thierry Montigneaux, FAI Executive Officer, furnished a copy of the 1989 French publication *RCM* which detailed the device Mr. Andre Maulet had designed and was producing named ALARM. It then became clear to me why the wording in 1992 of paragraph 3.I.2.4 e was changed from "The glider shall be released at a maximum altitude of 200 meters above ground level. This altitude shall be determined by an altimeter with transmission to the ground carried in the tow plane." The second sentence was changed to "This altitude shall be determined by an AUTOMATIC ALTIMETER carried in the tow plane."

In addition, the first sentence of 3.I.2.4. g originally stated "The official operator shall advise the pilot when his model approaches the release height. He shall order the release of the model (sounding a horn) when the glider reaches an altitude of 200 meters". This sentence was deleted by the motion of the 1993 Soaring Sub-Committee. These rules are not available from AMA as provided here. Changes to the rules at the Plenary meeting on 24 & 25 March 1994 will be made available for publication by *RCSD*.

Mr. Andre Neveu and Mr. Jean Rosseau were mentioned in the *RCM* article as providing the specifications to Mr. Andre Maulet to design the AUTOMATIC altimeter. It was put into production in France sometime in 1991. The minutes of the 1993 Plenary show both gentlemen were present and it was the French delegation that presented the agenda change outlined above.

Description of the Automatic Altimeter

The printed circuit board with surface mounted components is housed in a strong ABS box measuring 43mm (1 5/8") wide, 55mm (2 1/4") long, and 25mm (1") high. It must be handled the same as your receiver. EXCEPT, the 9mm high projecting tube of the pressure transducer must not be covered. In addition, the cabin or the cockpit of the tow plane must have no holes in the firewall or cowl to enable the prop blast to force air into the chamber where the Automatic Altimeter is placed. If so, you will encounter a false and varying barometric pressure reading.

A miniature pressure transducer is calibrated to send a signal which is amplified to 1mV (one millivolt) per millibar. The pressure gradient/frequency is constant at about 10Hz per millibar. This electrical current is converted into a frequency easily recognized by the microprocessor. It is the uP program which converts these millibars into meters according to International Standard Atmospheric Curves. At sea level, the millibar represents about 8.3 meters altitude, but at 2,000 meters it increases to 10.1 meters. The microprocessor has stored in its memory the number of millibars it has to count to reach one of the programmed altitudes. When the pre-set altitude is reached, the microprocessor will override the command from the transmitter and generate a fixed signal which was set by the potentiometer while on the ground and the throttle serve will go to idle. This is the signal for the pilot of the towed sailplane to release. He has three (3) seconds to do just that according to the F3I Provisional Rules, or be penalized one attempt! Refer to paragraph 3.I.4.2 g.

Like all altimeters, the Automatic Altimeter must be re-set to Zero at field altitudes. Here the microprocessor will

do it in about 20 seconds when switched on. Also, when the tow plane has landed, the microprocessor takes another 15 seconds to adjust to the ground level atmosphere. This feature eliminates concern for pressure or temperature variations during the contest day. There is no need to open the black case in as much as all adjustments and installation of the input wires from the receiver and the output wires to the servo connector are made with a small screwdriver. If the seal is broken, the warranty is void. One aileron extension cut into two pieces and tinned is all that is needed since the Automatic Altimeter uses current (about 15mA) from the nicad battery through the receiver. Once this device has signaled a release altitude, the pilot of the tow plane has control of the throttle restored for landing.

A word of caution: Since the rules provide 90 seconds (1.5 minutes) from take off to release, do not use a tow plane with excessive power. The inexperienced pilot of the sailplane will be all over the sky in a very erratic pattern, so we have found out. It is possible to launch and release every 3.5 minutes, far enough time to tell the tow pilot exactly where the thermal is awaiting for the Duration Task. And a capable tow pilot can place your sailplane in just the right position for the Speed Task at your request.

If you fly the tow plane for other reasons, just switch it off or disconnect from the receiver. It is important that you range check your radio BOTH with the Automatic Altimeter on and off. There must be NO DIFFERENCE in reception or wiggle of any of the servos for both tests, providing you have the Frequency Pin!

The Automatic Altimeter has been calibrated and tested at the renown Centre d'Essais en vol de Bretigny using the Z4000 altimeter which was made for aeronautics as a reference. In a range from 1 to 2,000 meters (over 65,000 feet) in temperatures ranging from Zero to 40 degrees Celsius (32° to 104° F) there was less than a 10 meter error!

The Automatic Altimeter can be set to any of these altitudes: 100, 150, 200 or 300 meters. They are available now (at this point in time) at $365.00 which includes shipping via UPS 2nd Day Air (even to overseas destinations) from Dale Willoughby, PSC Three, Box 3000, Travis AFB, CA 94535; after March 31, the address will be 58417 Rundle Drive, KV Estates, Moffat, CO 81143-9701. No checks or COD, only a US Postal or International Money Order made payable to Dale Willoughby.

Each one has a one year warranty PROVIDING THE SEAL IS NOT BROKEN. I will include an up-to-date copy of these F3I Provisional Rules with your order, and an aileron extension cord if you specify your radio system.

F3I is an up and coming event in which soaring clubs can participate with minimum set up time, regardless of the direction or force of the wind... except gale force... and is at the cutting edge of the MAJESTY OF SOARING!!

✈ ✈ ✈

Dale's plans to publish a "F3I Booklet" as noted on page 5 of the December 1993 issue of *RCSD* are canceled. He stated in view of the publication of the foregoing information regarding F3I, all readers now have access to the correct F3I Provisional Rules and perforce, need not mail a separate request to Dale Willoughby. In addition, Byron Blakeslee, on page 34 of the December 1993 issue of *RCSD*, stated that NASSA had prepared a list of scale sailplanes which will be mailed out to all members who provide them with a S.A.S.E. Thus Dale's decision to abort his individual efforts to provide as much F3I information as possible and to work with the World Soaring Jamboree and NASSA through this fine publication will achieve the same goal. ■

LIFT OFF!
...with Ed Slegers
Route 15
Wharton, New Jersey 07885
(201) 366-0880 - FAX (201) 366-0549
9:30 AM - 5:00 PM (Closed Sun. & Mon.)

The ABC's of Controllers

A few months back I wrote an article on speed controllers. Since then I have received quite a few phone calls from beginners who did not understand the terminology regarding controllers. So, for the beginners in electric I will explain some of the terms. For the experts this may seem to be a bit oversimplified, but remember we all have to start someplace.

The two common ways to get power

Compiled by Dale Willoughby, AMA 436 CD
PROVISIONAL RULES FOR FAI SPORTING CODE 1993 SECTION 4c - AEROMODELS
This is Annex G to CIAM MINUTES of 26th March 1992, incorporating changes adopted at the 1993 Plenary meeting held on March 25 & 26 1993.

3.1. CLASS F3I - AERO-TOW SOARING MODELS

3.1.1. GENERAL RULES

3.1.1.1. Definition of an Aero-Tow Glider Contest.

An Aero-Tow contest is a competition in which each competitor performs with the same glider two different tasks; speed and duration, after having been towed to soaring altitude.

This competition must take place on a reasonably flat and horizontal terrain with a low probability of slope or wave activity.

3.1.1.2. Definition of a Round

A round includes TWO tasks, each is attempted after aero-tow release at 200 meters above ground level:

- One speed task; a 1000 meter distance flight performed on a 250 meter course.
- ONE Duration Task; A flight with maximum duration of 8 (eight) minutes and a precision Landing.

The TWO tasks must be performed with the same glider without change of any parts (except in case of collision with another model in flight).

3.1.1.3. Definition of the Speed Course

The speed flight is performed between two parallel planes, 250 meters apart. Each vertical plane is established with a sighting apparatus to identify the crossing of the plane by the nose of the glider. The judges announce to the pilot when his model crosses the plane, by the use of an acoustic or optical signal. One plane has to be designated as the Start and Finish plane. The timekeepers shall stand near the Start and Finish plane.

During the Speed Task, the timed flight shall take place to one side of the safety line, whilst all judges/timekeepers shall remain on the other side of the safety line. The side which is flown is chosen by the organisers. The flight is annulled if, when sighted by means of any optical aid, the safety line has been crossed by any part of the model.

3.I.1.4. Characteristics of an Aero-tow Glider

An aeromodel which is not provided with a propulsion device and in which lift is generated by aerodynamic forces acting on surfaces remaining fixed (i.e., not rotating or ornithopter type surfaces). Models with variable geometry or area must comply with the specifications when the surfaces are in maximum and minimum extended mode. The model must be controlled by the pilot on the ground using radio control connection. Any variation of geometry or area must be actuated at distance by radio.

a) Maximum flying weight ..... 5kg.
Maximum loading on the ST (surface area) ..... 75 g/dm squared.
The mass must be identical for the TWO tasks in each round.
Example: A glider being 50 g/dm2 loaded during the Speed Task has to be identically loaded for the duration task.
Minimum wing span 3.5m

The glider must have a semi-scale look:

a1) The fuselage width, measured in centimeters at the maximum cross-section, excluding the fillets, shall be at least equal to 3.2% of the glider wingspan.
Example: 400 cm x 3.2% = 12.8 cm.
The fuselage height, measured in centimeters at the maximum cross-section, shall be at least equal to 4% of the glider wingspan.
Example: 400 cm x 4% = 16 cm.

a2) The fuselage shall include a transparent cockpit canopy, similar to the ones used on full size gliders (sailplanes).

a3) To facilitate take-off, the glider must possess a wheel with a minimum diameter of 4 cm, and giving a minimum fuselage-to-ground clearance of at least 1 cm.

On the ground, only a change of the wing and tail incidence angles is allowed. In flight, surfaces and incidences may be changed by remote control.

The switching on of the radio receiver shall be done without opening of the cockpit canopy with the help of an exterior control device.

Any device for transmission of information from the model to the pilot or his helper, including gyroscopes, variometers and any visible device on the exterior of the glider (flashing lights) is prohibited.

from your battery to your motor is either with a switch or a speed controller. A switch does just that; it will turn the motor on or off. In some cases this can be a disadvantage as it is either full on or full off. I do not recommend an on\off switch that does not have a soft start when using a geared motor, especially if the gears are nylon. In a direct drive glider an on\off switch works well. There are two types of on\off switches. One type uses a relay which is mechanical, and the other uses electric circuitry. Most on\off relay switches do not have BEC or soft start while the electronic on\off switches can have BEC and soft start.

The speed controller regulates the RPM of the motor prop proportionally. This means that you can run the motor from idle to full speed using your throttle stick. One of the features that a lot of speed controllers have is a soft start and a soft stop. This means that when you turn on the motor it starts slowly and stops slowly. This takes a lot of the load off the motor making it ideal for a geared motor.

Another feature that many speed controllers offer is BEC, which stands for "battery eliminator circuit". This means that the battery from the motor will also power the receiver and the servos. This is a nice feature if you are trying to save weight. This feature eliminates using the receiver battery. BEC's are usually not used with anything more than ten cells. Most controllers that have BEC also have

Prefabrication of the models: Models which are assembled by the builder from prefabricated parts and in which the builder installs the equipment are allowed.

In any configuration, the glider must constantly comply with the above characteristics.

b) The radio must be able to operate simultaneously with other equipment at 20 khz spacing. When their radio does not meet this requirement, the working bandwidth (maximum 50 khz) shall be specified by the competitor.

3.I.1.5. Competitor and helper.

Each competitor must operate his radio equipment personally. He is permitted one helper to assist him during the launching and the flight.

3.I.2. TECHNICAL AND SPORTING RULES FOR THE CONTEST

3.I.2.1. Number of models.

The competitor may use two (2) models in the contest.

3.I.2.2. Technical Control and Processing

Each competitor shall present a model configuration certificate (see 2.3.5. and 2.3.6. Section 4a) for each model.

Models shall be processed in accordance with B-13 Section 4B.

Models shall be weighed before and after the speed and duration flights of each round.

3.I.2.3. Organization of Starts.

For the first speed task, the starting order shall be established by a crew. The starting order for the other speed tasks is then determined by a sequential rotation of the first starting order (1/N where N is the number of rounds).

For the duration tasks, the competitors shall be combined in groups by a draw. For this purpose, each competitor must enter two different frequencies at least 20 khz apart. The organizer will be the only person able to determine the most suitable frequency so that the competitors can fly in groups of 4 pilots. The starting order is determined before the beginning of the flights.

The tasks will be flown in the following order in successive rounds:

1. SPEED 2. DURATION 3. DURATION 4. SPEED 5. DURATION 6. DURATION... and so on.

When called by the Starter, the competitor has two minutes preparation time before taking off. At the

end of two minutes preparation time, if his model is not ready for take-off, the competitor is penalized one attempt. The same holds true if, for any reason, he abandons his take-off.

For the duration task, the time between the release of the gliders of the first and last competitor of one group must be less than ten minutes.

The time required for the towing-plane/glider between take-off and release must not exceed 1 min. 30 second. Once the 90 seconds time has elapsed, the release is compulsory with no further attempt.

In all cases, a new attempt is repeated immediately before the following competitor.

In the case of paragraph 5.6.2.7., the Contest Director is the only person who can make the decision to allow a new attempt at the end of the task.

3.I.2.4. Launching.

a) All gliders shall be launched by aero-towing with a radio controlled aircraft made available by the organizers and flown by a pilot designated by them.

b) All launches shall start with the glider on the ground. The use of dollies/launching trolleys is not permitted.

c) The tow plane shall conform to the General Characteristics of Aeromodel (see paragraph 1.2 - Section 4c), except that the maximum flying weight shall be 10 kg and that the maximum swept volume of the motor shall be 25 cm 3.

d) To facilitate aero-towing, the glider shall be fitted with a single tow-hook, working with a simple nylon bow, situated not more than 10 cm from the nose of the model.

e) The glider shall be released at a maximum altitude of 200 meters above the ground level. This altitude shall be determined by an automatic altimeter carried in the tow plane.

f) The same TYPE of measuring apparatus shall be used for all flights in the same task.

g) The release must be executed within three (3) seconds following the order to do so; if not, the competitor is penalized one attempt.

h) For the Speed Task, the model shall cross the start plane within two (2) minutes after release of the model.

i) If the towing-plane/glider crosses the start plane before the 200 meter horn is sounded, the glider shall, after release, return behind the start plane to perform the speed flight. The glider

auto-cutoff. This means that when the battery voltage drops below a certain point the controller will not let the motor run. There will then be enough voltage left in the battery for the plane to operate for approximately twenty more minutes.

Another feature is overload protection. This means that if you exceed the current range of the controller, the controller will shut before it will self destruct. Overload protection is a nice feature that may someday save your motor, battery or plane.

Temperature protection is also a feature that better controllers have. If you exceed the recommended amps or have something binding, the controller will get hot. When the controller senses too much heat, the controller will automatically shut the motor off, thus allowing the controller to cool off and save the controller. Overheating will also sometimes occur when you run your motor at a low RPM for a long time, especially the controllers that have a brake. The best way to eliminate this condition is to run the motor at a higher RPM for a few seconds.

Most controllers have a brake which is built in the electronic circuitry. This will stop the propeller from spinning when the motor is shut off. When using folding blades, the blades swing back even with the fuselage which will greatly reduce the drag.

There is also high and low rate. The low rate is not as efficient as the high rate especially at low throttle settings. Although some are not bad for use in a glider where we go either full on or full off, the high rate is definitely the more efficient way to go.

Opto-coupled means there is some reduction of interference between the motor and the receiver helping to eliminate glitches.

can start its speed flight after release without waiting for the 200 meter horn to sound.

Only the judge can indicate the position of the glider for the correct crossing of the start plane.

3.I.2.5. Definition of an attempt.

For each task, the competitor is entitled a second and last attempt when:

a) the glider is not ready to take-off after two minutes preparation time.

b) the towing has to be interrupted because of the competitor's fault.

c) the release occurs above the allowed altitude.

d) the duration of the flight after release is less than 30 seconds.

3.I.2.6. Number of attempts.

For each task, if the first attempt is not conclusive, the competitor is entitled to a second attempt.

The flight may be repeated if:

a) the glider collides with another model. Should the flight continue in a normal manner, the competitor may demand:
- that the flight in progress be accepted as official;
- or to repeat his flight by another launch;

b) the flight has not been judged by the timekeepers;

c) the towing is interrupted through no fault of the competitor;

d) for the speed task, after release from the tow line and before the model has crossed Base A in the direction of Base B, the competitor may signal his intention to relaunch (reflight) and ask for a second attempt. The pilot shall land his glider within 90 seconds after release from the tow line.

3.I.2.7. Penalty.

If, for the Duration Task, the glider loses in flight any part, the flight time is penalized with a 200 point penalty.

3.I.2.8. Cancellation of Flight and Disqualifications.

The flight is annulled if:

a) the competitor uses a glider not in accordance with these rules;

b) the glider was not ready for take-off during the second attempt;

c) during the Speed Task, the glider loses in flight any part (except after crossing the finish plane and during landing).

A competitor is disqualified:

a) in case of intentional or flagrant violation of the rules.

b) if the model is controlled by anyone other than the competitor.

3.1.2.9. Timing.

The launch-officer times the two minute preparation time from the moment he calls the competitor for departure.

The timing of the flights must be ensured by two timekeepers provided with chronometers. Timing can exceptionally be ensured by only one time keeper, but in this case, he must use two (2) chronometers simultaneously.

3.1.2.10. Definition of a Landing Point.

The landing point is that point on the ground vertically below the nose of the model when stopped.

3.1.2.11. Definition of the Landing Area.

The landing area is defined by a rectangle, 20 meters wide and 40 meters long, defined on the ground by tight lines.

3.1.3. SCORING

a) Speed Task

The time required for the glider to fly 1000 meters, four (4) laps of the course, shall be recorded in second and tenth of seconds.

b) Duration Task

Each timekeeper records the whole duration of the flight, from the release of the model from the tow line until:

b1) the glider comes to a standstill on the ground;

A relay switch with a brake is a good, easy and inexpensive way to control the motor in your glider, but most will require a receiver battery pack and they do not have many safety features. An electronic on\off with BEC and all the safety features is about all you will need in a 7-10 cell electric powered glider. The most versatile, reliable, efficient and unfortunately expensive is a proportional controller with all the goodies built in.

I hope this helps the beginner understand some of the features of controllers and on\off switches.

Happy flying! ■

b2) or, the flight is stopped by an obstacle;

b3) or, the glider disappears from the timekeeper's sight.

One point is awarded for each complete second of flight up to a maximum of 480 points (8 minutes).

One point is deducted for each full second flown in excess of 480 seconds.

Twenty (20) additional points are awarded if the landing is performed inside the rectangle. The landing direction must be the same as the take-off direction imposed at the beginning of the task. A touch-and-go in the opposite direction is recorded as zero.

No landing points shall be awarded if the glider:

b4) hits the pilot or his helper during the landing process; or

b5) stops in an inverted position; or

b6) executes a rotation of more than 90 degrees from the landing area axis (length of the rectangle).

If the model stops more than 100 meters from the centre of the landing area (rectangle), the flight time is penalized 200 points.

c) For each task (duration or speed) the winner is the competitor who has obtained the best partial score.

The Partial Score (P/s) for the Duration Task for each competitor is:

P/s = 1000 X T/c divided by B/t - Pp where:

T/c = competitor's partial score = (P/c + E/p)

B/t = partial points of the best competitor in the group = P/c + E/p

P/c = points awarded to the competitor

E/p = extra points for landing

Pp = penalty points

The partial score P/s for the Speed Task for each competitor is:

P/s = 1000 X B/t divided by T/c where:

B/t = best speed time

Volunteer Needed

Due to rain, snow, and ice conditions in New Jersey during the month of January, Ed was a bit later than usual in getting his column to me. We need a volunteer to monitor weather conditions in the New Jersey area that will call Ed on or about the 5th of the month to let him know if the weather outlook is not good. Carrier Pigeon or Thermal Buzzard Services may not be out of the question!

Judy

The Pacifica Triangle?

...by Jef Raskin
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As followers of the occult know, to fly a plane into the Bermuda Triangle is an open invitation for it to be swallowed alive by an interglactic UFO populated by little green persons. (They're not sexist in those advanced civilizations.) Now there is the Pacifica Triangle, located between the dunes, the corner of Palmetto and the Daly City dump. (Yes, that's one of the romantic Pacifica Coast places we fly!)

Vultures club president Yesso Tekerian and I were working on judging for the 1993 aerobatics contest. I am an experienced judge and he wanted to learn the art. He started with the AMA's excellent video on judging aerobatics (Judging and Flying Precision R/C Aerobatics Academy of Model Aeronautics, 5151 East Memorial Drive, Muncie IN 47302), and then we went to the slope. I would fly maneuvers, sometimes deliberately making mistakes but usually just flying the maneuvers as well as I could and making mistakes anyway. I was flying the very plane that won the contest last year, a 36" span Anabat 2.

After each maneuver he would call out the score and then we'd discuss the maneuver and the call. With all his study and practice he was well on his way to becoming a first-rate judge when, with both of us watching it, the plane simply disappeared. Vanished. Popped out of existence. There was no fog and one small cloud could be seen at Linda Mar, a few miles away. The plane was not particularly far off, I had been flying maneuvers in close. The air where we, and others, were flying was perfectly clear, the mountain behind the plane was clearly visible. Two friends were standing behind us, watching and kibitzing. We asked if they could see the plane. They couldn't either.

We figured that with the stiff wind, the plane had to either go down to the cliff below or be blown over our heads and we were scanning both above and below its last-seen position. We saw nothing. It was gone. Everybody helped in the search which included binocular checks of the beach, the cliff, the ocean, and the hills behind us. Then we drove up the hill to look down on the roofs of the houses and into as many back yards as we could without arousing suspicious dogs. A few days later a friend in a hang glider did an aerial reconnaissance. My name and address were on it, but there were no calls and no mysterious lights descended on my house.

Not being believers in the occult and doubting that outer spacians want to take up slope soaring, here's what we think happened. The plane was flying away from us at the moment it disappeared. I was about to give Yesso another rear view of a four-point roll. In this position it has very little area. The plane was mostly white (dumb!) and the bold red trim on the wings was invisible in that orientation. It might have been positioned in front of that one little cloud I mentioned and blended in with the background for an instant. I've had two planes fly into fog banks while slope soaring, and by putting the controls in position for a gentle turn, had one pop back out and another fall out the bottom. Both planes were flown to gentle landings. So I tried to fly a curve with the Anabat, but the plane was never seen again.

When you lose a plane in clear air with eight eyes on it, it's spooky. I'll miss my favorite Anabat. On the other hand, all my new Anabats have florescent orange stripes on them.

The Pacifica triangle struck again at our 5th annual contest. After a week of perfect lift, the day of the contest proved to be hot and totally breezeless. This just doesn't happen on the coast around here. We abandoned Milagra Ridge and found the wind to be just detectable on your sweaty, sunburned skin at the dunes, but not enough to keep the lightest floater up. The pelicans and gulls flew by with heavy wing beats. So, there is no contest report.

Imitation is the sincerest form of flattery department: a new company is making a neat sport flier called the Whirlwind using the Anabat construction techniques: white foam, spruce spars, and the same kind of tape for covering and hinges. It is not designed for aerobatic competition or training since it does not have a symmetrical foil, but like the Anabats it is tough and easy to build. Meanwhile, Anabat Products, the company that is now manufacturing and selling my designs (The demand grew too large for me to make kits in my garage.) had me design a series of larger models. With 48" span and a higher aspect ratio they can fly in light breezes with full-size servos and 500 maH battery packs. Alternatively, they positively float with small equipment.

The 48" span Anabat 2 can readily handle 4 channels of gear without stretching its wing loading, and I am flying one such. With elevator, rudder, flaperons, and flaps-coupled-to-elevator, it is a joy. It will loop (inside or outside) from normal rapid level flight without a preliminary dive, and since it has rudder, can do good slow rolls, four pointers, hammerheads, and true snaps. Due to the Anabat's typical reluctance to stall, the snaps are not as crisp as on some planes. On the plus side, it's easier to make them stop where you want them to; avalanches are pretty easy to fly. Its square loops are unbelievable for a glider, again thanks to the coupled flaps. When you come to that first top corner it looks as if there isn't possibly enough speed to hold a horizontal inverted line, but of course the flaps come down (with respect to Earth, though up with respect to the plane) as you push on the stick for inverted flight and it floats across the top of the square inverted without drooping. The ailerons are still 25% of chord and full span so rolls can be quick, though with the higher aspect ratio wing (6:1) keeping them axial requires the timely touch of rudder and elevator. On the 36" series (4.5:1 aspect ratio) you get axial-

T/c = time of the competitor

Final Score: The final classification for each competitor is compiled by adding the scores of each round (Round Score - Partial Score for the Duration Task + Partial Score for the Speed Task) but the Lowest Round Score is canceled. When less than four (4) rounds are flown, all Round Scores are added to obtain the Final Score.

In order to decide the winner when there is a tie among the first three competitors, a Duration Task is repeated for these competitors.

looking rolls with aileron alone. By the way, all the Anabats now come with all linkage hardware including the servo pushrod connectors. Shows the advantages of having a slightly larger company, as Anabat Products can now afford to buy these items in bulk and toss a set in each box without losing money on the deal.

My company, Anabat Aircraft, is now mainly doing design work and manuals for Anabatic Products and other companies. There is a sorta-scale A-10 Warthog for slope combat on my bench that shows promise as a kit; the biplane proved a flop and will not be kitted, and I am working on a very high performance (aerobatic wise) Anabat TW. The TW stands for "taper wing" and unlike present Anabats will not be hands-off-stable, nor suitable for beginners, and will have a rapid but predictable snap (present Anabats have super-gentle straight-ahead stalling characteristics. It will have a knife-edge ability, too. If it performs as well as the computer says it will, a kit might come out in '94 but it will take a lot of flight hours, I am sure, to get it just right.

Anabat Products, 411 Beach Park Blvd., Foster City, CA 94404; (415) 573-9363 ■

Ersatz Airfoil Nomenclature

... by Jef Raskin

The other day I was out at the flying site and a designer of a new kit was showing me his plane.

"What airfoil does it use?" I asked him

"A modified Eppler 374," he said. He intended that as a definitive answer, but I pressed on.

"What do you mean 'modified'," I asked.

"I made the bottom flat and then stretched out the top in back."

"Oh," was the only thing I could say.

But I was tempted to launch into a lecture about how often I'd heard the phrase, "It's a modified X", as a description of an airfoil. This is only a bit more annoying as when an airfoil is described as "semisymmetrical". At least when an airfoil is "semisymmetrical" you know that its camber isn't 0, although you don't know anything else about its performance. To learn that an airfoil is a "modified" something else, even if there is another descriptor (if given, the most common is "thinned"), gives you no information.

No information? Well, nothing of any use in predicting how the aircraft will fly or what the airfoil looks like. If it flies well, you cannot look up its coordinates to duplicate it, though if its a dog you can avoid it by using a published airfoil. The term "modified" tells us that there are no wind-tunnel or computer studies of the airfoil, nor even a body of experience with the airfoil or the designer would have used the name of the foil.

The Four Airfoils of the Uninformed

Working on my video review column for *Model Airplane News*, I get to see a lot of tapes that purport to teach people about model airplanes. Some of them betray their aerodynamic ignorance by dividing airfoils into three kinds[2]: "Flat-bottomed", "semisymmetrical", and "symmetrical". Some add a fourth type: "Undercambered". These terms are defined by looking primarily at the bottom surface of the airfoil (a strange place from which to judge an airfoil).

- Undercambered: the bottom is concave.
- Flat-bottomed: The bottom along most of the foil is a straight line.
- Semisymmetrical: The bottom is convex but not as convex as the top.
- Symmetrical: The bottom and top curves are the same.

Some prominent modelers have written error-filled articles on aerodynamics making the usual, if incorrect, distinction by stating that a flat-bottomed airfoil has more lift than the other two, the semisymmetrical has less than the flat-bottomed and but more than the symmetrical section.

If you think about it for more than three seconds, it becomes clear that it makes nonsense to say that one particular airfoil generates "more lift" than another. airfoils generate different amounts of lift depending on their angle of attack, speed, the density of the air and such stuff. For example, a wing of whatever airfoil can be flown at an angle of attack where its lift is zero. What you can compare are the *maximum* coefficients of lift available (at a given Reynolds number, Re) from different airfoils. Specifying Re is necessary since there are pairs of airfoils (call them A and B) where A will have a higher maximum coefficient of lift than B at one Re, but it will be the other way around at a different Re.

The maximum coefficient of lift (Cl_{max} for short) depends largely on the camber of an airfoil. The camber is a line that lies halfway between the top and bottom of the airfoil. (If you want to draw some camber lines, remember that distance from a line is measured perpendicular to that line.) Within broad limits, the more camber, the higher Cl_{max} the airfoil has. It turns out that an airfoil with undercamber or a flat bottom can have *less* camber than one with a convex bottom, and therefore a lower Cl_{max}.

The statement one so often reads and hears about the relative performance of the three kinds of cambered airfoils are simply wrong. Of the four terms, the only one that makes aerodynamic sense is "symmetrical". I note in passing that "symmetrical" is an absolute. A shape is either "asymmetrical" or "symmetrical". The term "semisymmetrical" is an oxymoron as well as aerodynamically uninformative.

Editors and Readers Arise!

Of the four common and mostly uninformative names for types of airfoils, the only one with significant aerodynamic meaningfulness is "symmetrical". The others have utility solely as descriptors of the shape of the bottom of an airfoil, not as an indicator of their flying qualities. Editors and readers of model (and full-size) airplane books and periodicals should immediately raise a red flag of warning when any of the other three are encountered. When editing or reading, here are some hints and examples of how to handle them:

1. If an author uses a phrase such as "the airfoil is a modified Ziegfield 512", change it to "the airfoil is one I made up".
2. If an author says something like "I chose an undercambered [flat-bottomed, semisymmetrical] airfoil to give the plane sufficient lift", then editors should ask for a more precise statement such as "I chose an airfoil with 4.5% camber to obtain a Cl_{max} of 1.1 so that the plane could land at about 16 mph". An explanation such as "I chose this airfoil because many successful models of this type use it" is also acceptable. If the author cannot supply detailed information then change the phrase to "I chose an airfoil that looked right to me".
3. Articles that say things like "Beginners should choose a trainer with a flat-bottomed [semisymmetrical] airfoil because..." should be rejected on the basis of incompetence.
4. A statement such as "I chose a flat-bottomed airfoil so that it would be easy to fit to the flat top of the fuselage" is acceptable since "flat-bottomed" is not being used as an indicator of flying qualities.
5. Be especially vocal in complaint when advertisements or catalogs use these terms incorrectly.

[2] *Dare I paraphrase Julius Caesar and note that this division "Gauls" me?* ■

On The Air With Cornfed

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Fun in Phoenix

Went to Phoenix this February. Boy, did I have a great time. I want to say thanks to the Phoenix group. Ya'll sho' did one good job of hosting and providing a good time and great weather. Warm, sunny skies and light winds, it don't get no better than that. Thermals were everywhere. Now, there was a couple of times when I felt like a dog with fleas. Man, I was scratching hard to stay aflight. I did manage to work out my air times, but the landing zone was unforgiving and the competition vicious. I would knock one flyer off, but ten more would be in line to whip me up. I felt like a step child being slapped around.

One thing I learned in Phoenix, if you want to fly with the big boys, you better carry a big stick.

Joe Wurts finished first both days and first overall out of 127 entrees. CONGRATULATIONS, Joe! Super flying!

I will be back next year. Thank-you, Phoenix Group!

Super-V Review

Well, out of the box came my new Super-V. My, it sure is pretty. White top-sides. Black bottoms. Within two minutes, all was unpacked. Body looked good. Not too many pin holes. Wing rods fit like a glove. Sliding wings onto rod and body. Suddenly, I was caught into the heavens of my mind visualizing the plane in flight. Tail fit oh so well. Coffee still hot in cup. Plane assembled. There it lay. My it sure is nice not to have to build a plane. Just put the power in it, paint up the body, trim it out, and C.G. it. About ten hours. Beat that! So much for building the plane. What really matters is, "How does it fly?"

Out to the field me and the plane go. Took about two minutes to assemble. All was ready except one thing. Need to cut me a path for the high start. Hooked up the tractor and there I went. I never thought Dad would have minded me cutting down a few rows of mustard greens. It was just ten acres. Now every time we sit down to eat, it don't matter if it's beans or broccoli; if it's green, Dad starts fussing. I won't do that, again.

Back to the plane. Hand launched it a couple of times. Needs a little down trim. Okay, here we go. Pulled and pulled that rubber 'til the line was singing. Wiggled the stick with my lips, reared back, and heaved the plane. It looked like it was going straight up. Leveling off while holding a little up elevator, then nosed the plane over and off it went. My, it seemed to fly too flat and slow. Let me dive test this thing. Hmmm... Pulling up too much. Brought it back for landing. Pulled flaps. Now, that looked right. Elevator to flap setting is okay. Plane now in hand; C.G. was all right.

Let me stop here and tell you folks that are in the dark about V-tails that if you will set up your plane (V-tail) right, it really will fly. Three signs to watch for in setting up a V:

1) Watch your plane for improper flying indications. If your plane needs a lot of down trim and still wants to fly nose up, then one C.G. might be too far back, but probably not. More than likely, the rear of the V-tail is too high. To compensate, first move the C.G. back and forth. If the plane still wants to pull up when flying at best L/D, then the rear of the tail is high in the saddle or leading edge is too low. Shim with thin ply; then go fly. Your plane should fly nice and flat with a long glide slope.

2) Plane seems to want to head to ground too soon when in flight. You might put a little up trim in the elevator. That will help a little, but it still might not look exactly right. The best way for me to describe how the plane will look is that it looks like it is in sink. What is happening here is that either the leading edge is too high or the trailing edge is too low. This causes the V to act as if down position elevator is making the plane fly downward. So, if you try to compensate with up trim, it causes a lot of drag to the tail right from the get go. Now, we know that the problem is not in the wings because they line up to the fairing on the body. Therefore, you correct the problem at the tail. Shim the V at the rear; then go fly.

3) Plane pulls left or right. To check alignment of the tail, measure outer most trailing edge of each side of the tail to center of the body up front and behind the canopy. Make sure one side of the V is not further back than the other. Adjust if needed; then go fly. If it is a Super-v, it will have a very good, flat glide.

Wow! My head hurts. Must have thought too much tellin' ya'll how to set up a V tail. I need a nap...

Okay, nap's over! Let's fly some more.

Shimmed rear of tail, and launched. That seems to be just right. Nice flat glide, but today is not a thermal day.

Well, a week has passed and it's out to the big field with my buddies. Up to the winch I go. "Now, take it easy up the line," Rusty said. So, I did. It tracked real nice with a mild zoom. Within 200 feet of flight, I knew this was a plane I would want to fly for a long time. It was love at first flight. It was as if Cupid shot an airplane arrow through the clouds of my heart. I was in love with this plane. The roll rate was crisp and responsive. Pitch was smooth. I eased over to the left with the plane and found some lift. Circled around and started to climb. I noticed the plane over reacted to the controls, so I decided to bring it home. Set up for landing, the plane was very predictable and slowed down real good. I was able to land in the area planned.

Looking the plane over, I decided to remove 1/2 oz. of nose weight, as I like to fly about 1/8 of an inch rear of recommended C.G. Then, I took a little rudder control out.

Back to the winch I went for another launch. This time I felt like a man. I hooked up and didn't even look at Rusty. He just said," Go ahead." I loaded the winch up, then heaved the plane. Out it went, rotating upward. It looked like it was going straight up full bore on the winch. Off with the launch mode and ZOOM! Up it went to the moon.

Circling here; looking there. No lift in that air. That plane was like a blood hound on a cold trail. But, wait a minute! What's that? Yep, the elusive thermal... But I'm not sure. Mama told me not to circle at those low levels. Well, she ain't around. Hmmm... New plane... Yeah, go for it! Easy... easy... come on baby, don't let me down. My, this thing turns well and floats on a prayer. Up, up, and away. No muss, no fuss. That baby just won't tip stall. Up and away it went from low down to up real high.

Now, one thing I've noticed is that V-tails need a lot of up elevator in a turn, more so than a regular tail plane. I could

go on and on, but there's not enough time to tell it all. So, let me give an overview of the plane in general:

Airfoil	SD7037
Flying Weight	68 - 70 oz.
Wing Span	110"
Wing Loading	10 - 11 oz./ft.^{2}
Designer/builder	Mark Levoe

Vacuum bagged glass & carbon wings
V-tail
Very good glass work

I have owned many of the new planes out there. Out of the best ones, I would have to say that this plane is at the top of the list for thermal duration planes. This plane needs to be flown. You can't just let it float around. If you use your camber and reflex coupled with elevator and move the C.G. back and fly at minimal sink, this plane will work the lift like no other I have ever seen. I find, personally, that V tails seem to climb faster in lift. Maybe it's because of the big tails. In my flying this plane, I can find no real bad flying habits. This winter, I flew in a lot of heavy wind. The plane seemed to love it. Actually, I believe the L/D became greater with a little wind on the wings.

Now, I'm not tellin' anyone out there to go and buy this plane, but I can say that I have trophied five of the last seven times when flying this plane in competition.

Signing Off,
Cornfed

P.S. Say your prayers and wash the car.

ATTENTION: Henry Bostick of Dallas, Texas. Would you explain to my wife the meaning of L/D? She says it means love and devotion. I say it means to fly long distance and/or make a long distance phone call. Please straighten her out for me. Thanks. Cornfed. ■

Beyond Mean Aerodynamic Chord -

Where to put the Center of Gravity, stabilator pivot, and wingeron pivot on your glider.

...by Richard Moran
2535 Kendall Avenue
Madison, Wisconsin 53705

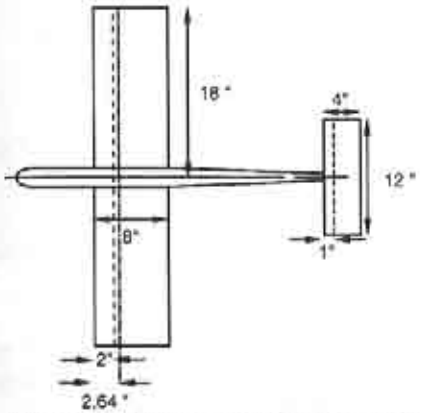
Every designer must guess an initial center of gravity (CG) location for an original model's first flight. If the initial guess is moderately close, we fine tune the CG by flight testing; we use the "dive test", and perhaps even measure "dead air" times. If the initial prediction is particularly bad, we take the model home in a bag. We use the "C-A", and perhaps try again.

There is one location for the pivot of a "full flying" stabilizer ("stabilator" or "pendulum elevator") that minimizes the forces on the elevator servo. An effective control mechanism for slope soaring is the wingeron; the wings change pitch angle with respect to each other to effect roll axis control. The pivot for such a wing must be similarly located, to avoid huge servo loads.

The center of gravity should initially be located at about 33% of the mean aerodynamic chord (MAC) of the wing, the pivot point of an all moving elevator or wingeron should be located at 25% of the MAC of the elevator. Use Integral Calculus, or a drafting method described by Simons to find these locations. Both methods have serious disadvantages for the average model builder.

An equivalent way of saying "33% of the MAC" is "the line (perpendicular to the fuselage) that has 33% of the wing area in front of it." We can find this line using basic high school math skills.

Here is an example. Consider an ugly (but good flying) little slope glider with rectangular wings and elevator. To make things interesting, let's modify this kit to have wingerons and a full flying elevator. (Sorry, Jef.)



We know where to put things on rectangles. Put the wingeron pivot rods at 25% of 8"...

0.25 x 8" = 2" from the leading edge of the wing.

Put the elevator pivot rods at 25% of 4"...

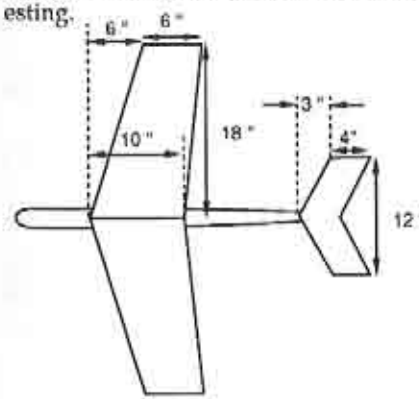
0.25 x 4" = 1" from the leading edge of the stab.

Finally, put the center of gravity at 33% of the wing chord...

0.33 x 8" = 2.64 " from the leading edge of the wing.

For the wingeron pivot, we found the line that has 25% of the wing area is in front of it. We found the line that has 25% of the elevator area is in front of it. For the center of gravity, we found the line that has 33% of the wing area is in front of it. AREA is the key!

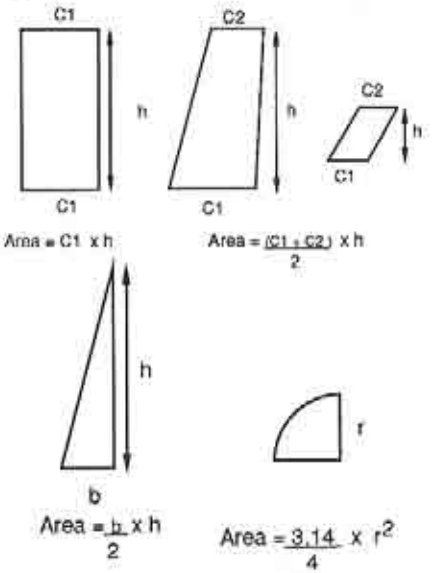
Let's modify the little sloper so it looks faster, and the example becomes interesting.



We must put the pivot points on the line that has 25% of the (wing or elevator) area in front of it. We should put the CG on the line that has 33% of the wing area in front of it.

With a little geometry and algebra, we can find these solutions for anything you care to build.

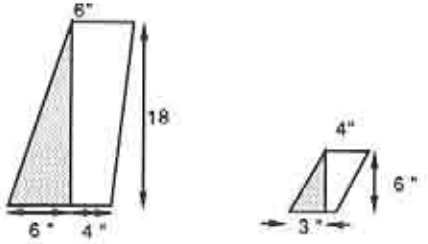
The following area formulas are sufficient geometry for practically every planform:



For our modified sloper, the right wing has area = 1/2 (10 + 6) x 18 = 144 in^2; and the right elevator has area = 1/2 (4 + 4) x 6 = 24 in^2.

25% of the wing area is 0.25 x 144 in^2 = 36 in^2 (for the wingeron pivot line)
25% of the elevator area is 0.25 x 24 in^2 = 6 in^2 (for the elevator pivot line)
33% of the wing area is 0.33 x 144 in^2 = 47.5 in^2 (for the CG)

Find the lines that have these areas in front. Divide the planforms into the leading edge triangle and the remaining trapezoid. Divide and conquer!

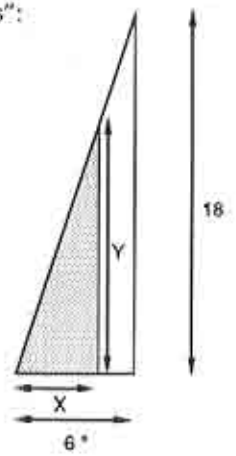


For the wing, the area of the leading edge triangle is 1/2 (6 x 18) = 54 in^2

For the elevator, the area of the leading edge triangle is 1/2 (3 x 6) = 9 in^2

The wing's leading edge triangle has 54 in^2, so the pivot line (at 36 in^2) and the CG line (at 47.5 in^2) will be somewhere inside the leading edge triangle. Likewise, the elevator pivot is somewhere inside the elevator's leading edge triangle.

Now we need algebra. Sorry. Hang with me, and learn just enough to get the answer. Recall the rule for "similar triangles":



The height divided by the width is a constant ratio... for the wing -

$\frac{Y}{X} = \frac{18}{6}$ We can solve for Y in terms of X; Y= (18/6) X, or Y = 3 X.

We want to find the location X where the area of some triangle is 36 in^2 (for the pivot rod.)

The area of a triangle is 1/2 (X x Y)

and Y= 3 X

substituting in for Y,

the area of the triangle is (1/2) (X x 3 X) = (1/2)3 X^2

now solve for (3/2) X^2 = 36 in^2

$X^2 = 36 \times (2/3)$ ...whip out the calculator

$X = \sqrt{24}$

X = 4.9 inches

The pivot rod for the wingeron should be located 4.9 inches from the leading edge of the root cord of this wing.

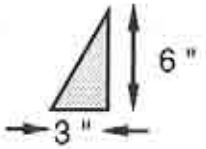
The calculation for the center of gravity looks similar:

$(1/2)\ 3\ X^2 = 47.5\ in^2$

$X^2 = 47.5 \times (2/3)$

X = 5.63 inches

The first approximation for the center of gravity at 33% of the MAC means the CG should be placed 5.63 inches from the leading edge of the root chord.



The height divided by the width is a different ratio for the elevator -

$\frac{Y}{X} = \frac{6}{3}$ We can solve for Y in terms of X; Y= 2 X.

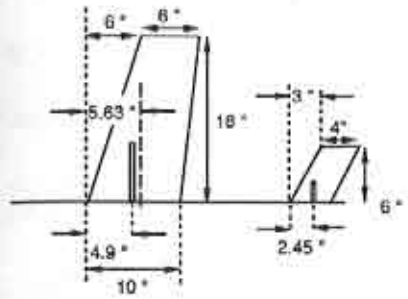
For the stabilizer pivot rod, we want to find the location X where the area of a triangle is 6 in^2

The area of the triangle is 1/2 (X x Y) and Y= 2 X

substituting in, the area of the triangle is (1/2) (X x 2 X) = X^2

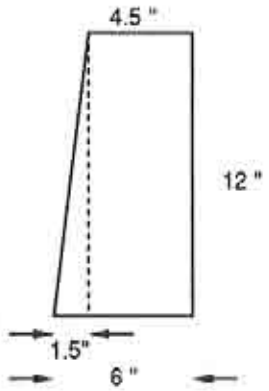
solve for X^2 = 6 in^2; X = 2.45 inches

The pivot rod should be 2.45 inches from the leading edge of the root of the elevator.



Don't go and build this thing, the design is a **joke**.

Some examples are easier. Consider this elevator planform:



To find the pivot location, first calculate the total area. Looking at the planform as the sum of the leading edge triangle plus a rectangle leads to an immediate insight...

triangle + rectangle =

1/2 b x h + C2 x h =

1/2 (1.5) x 12 + 4.5 x 12 =

9 in^2 + 54 in^2 = total area = 63 in^2

The pivot goes at the 25% line of 63 in^2 = 15.75 in^2.

In this example, the pivot point will not be inside the leading edge triangle. The leading edge triangle has only 9 in^2. The answer will fall in your lap.

We want 15.75 in^2. The leading edge triangle has 9 in^2. This leaves 15.75 - 9 = 6.75 in^2 to be accounted for in the leading rectangular portion of the wing.

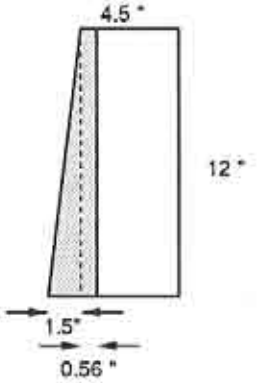
For this rectangle

X x 12" = 6.75 in^2

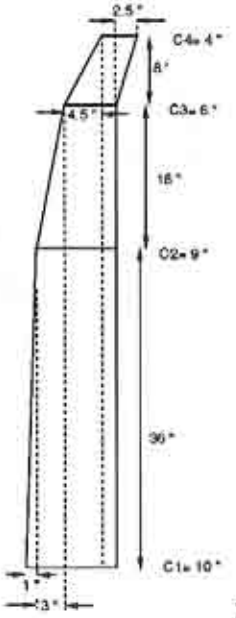
X = 6.75/12 ; X= 0.56 inches from the back of the triangle.

Thus, the location of the pivot should be at

1.5" + 0.56" = 2.06 " from the leading edge of the root of the root chord.



Perhaps you are interested in an open class thermal duration type wing:



The first step is to calculate the area.

Add up the three panels. Each panel is a trapezoid of Area (1/2)(Ca + Cb) x h

area = ((10 +9)/2) 36 + ((9+6)/2) 16 + ((6+4)/2) 8 = 502 in^2

Let's skip the wingeron example, and calculate a first guess for the center of gravity.

33% of 502 in^2 = 155.6 in^2

Next, we must find which region contains the line that has 165.7 in^2 front of it.

Obviously, it is not in the little leading edge triangle of the first (most inboard) panel.

The first leading edge triangle only contributes (1/2)1 x 36 = 18 in^2

Next, look where the second panel forms a leading edge triangle, 1" from the leading edge of the root chord. Calculate the area as the sum of the (second panel's) leading edge triangle and the rectangle (in the first panel) underneath the triangle.

The second leading edge triangle contributes 1/2(3 x 16) = 24 in^2

The rectangle underneath this triangle contributes 3 x 36 = 108 in^2

24 in^2 + 108 in^2 = 132 in^2

Alternatively, this area is a trapezoid, if you look at it sideways. Using the trapezoid formula

1/2 (36 + (36+16)) x 3 = 132 in^2

Either way, the total area in front of 4 inches from the leading edge of the root chord is

18 + 132 = 150 in^2... just a little short of 165.7 in^2.

The region we seek must be a little more than 4 inches from the leading edge of the root chord.

We need to acquire another (165.7 in^2 - 150 in^2 =) 15.7 in^2, in the region defined by the third panel's leading edge.

For the third panel's leading edge, Y/X = 8/4.5, or Y= 1.78 X,

the triangle area is 1/2 (X x Y) = 1/2 (1.78 X^2) = .89 X^2

For the rectangle below this triangle, the area = 52" x X

As we march X inches towards the trailing edge, the area we acquire is 0.89 X^2 + 52 X

We need to get another 15.7 in^2, so....

0.89 X^2 + 52 X = 15.7 or

0.89 X^2 + 52 X - 15.7 = 0

This is called a quadratic equation. Quadratic equations have the general form

a X^2 + b X + c = 0, where a, b, and c are constants (such as 0.89, 52 and -15.7)

The equation to solve for X is

$$X = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

(remember this from school? Often, there are two solutions for X. One solution may be nonsensical)

$$X = \frac{-52 \pm \sqrt{522 - 4(0.89 \times -15.7)}}{2 \times 0.89}$$

$$X = \frac{-52 \pm \sqrt{2704 + 55.89}}{1.78}$$

$$X = \frac{-52 + 52.53}{1.78} \text{ or } \frac{-52 - 52.53}{1.78}$$

so, X= 0.30" or -58.72"

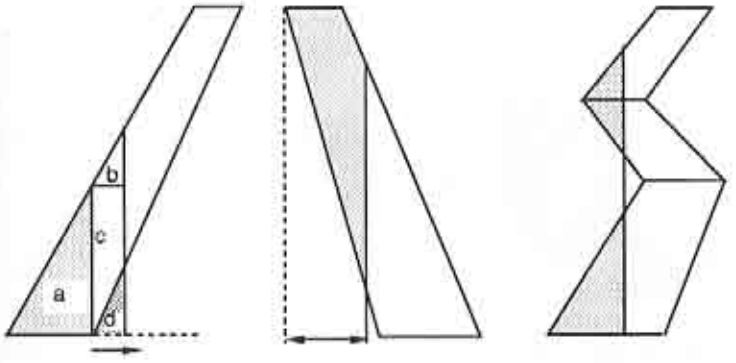
-58.72 inches is obviously not a solution we want.

The center of gravity should be arranged at 0.3 inches back from the start of the third panel, at 1.0 + 3.0 + 0.3 = 4.3 " from the leading edge of the root chord.

Using the area technique, you can find the CG for almost any planform. Here are some hints: (Top of next page)

Note: the 33% "rule of thumb" to determine the CG will not be adequate for flying wings that use washout to cancel pitching moments. Any wing will balance near the 50% of the area line, before adding nose ballast, servos, etc. A useful fact for "wingnuts", or estimating nose moments.

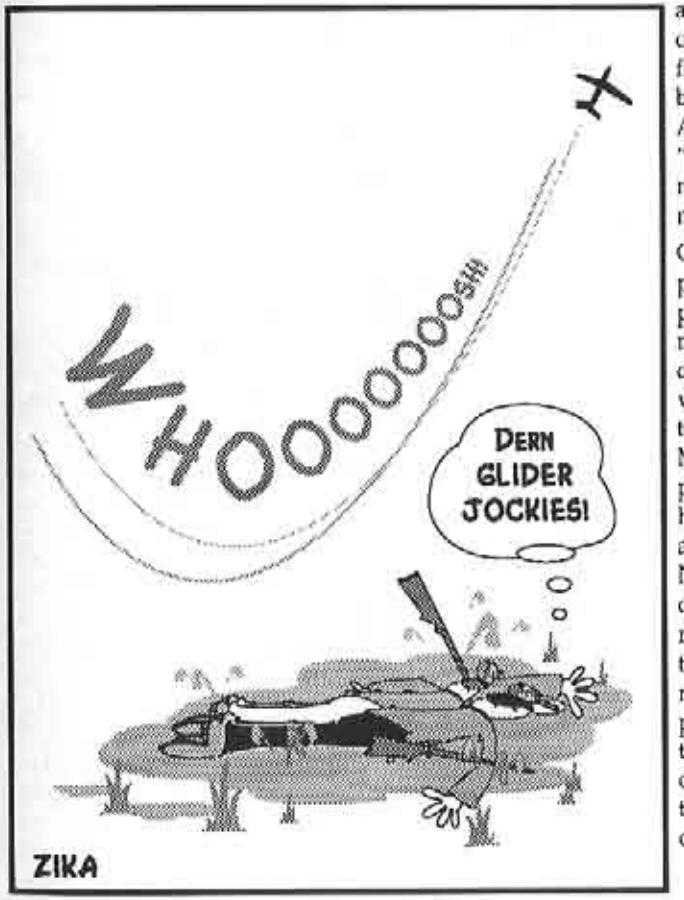
Conclusion: Lots of people talk about percentages of the mean aerodynamic chord, but nobody would tell you how to find it! 25% of the MAC is the same place as the line that has 25% of the wing area in front of it. Now the cat is out of the bag, and it is not just for aeronautical engineers any more. You have plenty of examples to help you work out important details for your next original design. ■



a + b + rectangle c - d

Forward Swept Wing

You get the idea !



(L-R) Standing: Rich Burnowski, Scott Gregory, Rick McGovern, Glenn Poole
Kneeling: Ron Kukral, Wayne Fredette

New Years Day with S.O.A.R.

...by Ronald Kukral
New Lenox, Illinois

SOAR held its annual New Years Day Fun Fly on New Years Day. (Funny how it always seems to work out that way.) The weather started out cold and windy, then got downright nasty. We had six club members and a new comer. The flying was OK 'til noon when the fog and low clouds rolled in. Glenn Poole had his SLS Maxette up in the low clouds riding some good lift. When he came down the plane had some icing on the wings.

Rich Burnowski had his custom Galactica V (V is for slick V-tail). It was very light and flew very well, especially considering the conditions and the fact that it was the first time out for the plane. Several flyers got to fly Rich's plane and all liked it. Other flyers who braved the cold were Ron Kukral (Banshee), Scott Gregory (Protostar MT), Wayne Fredette (Ninja - right plane for the wind), Rick McGovern (Soarus electric & Legend), and new comer Don Woelfel (Uhu All). Jerry Bannister showed up just to fly Rich's plane.

The flat land soarers don't give up just 'cause it's cold, snowy, or rainy! ■

Throw That Sucker, Tucker

...by Pancho Morris
Mesquite, Texas

At a recent contest, I saw a beautiful, new ship destroyed on launch immediately after it came out of the flyer's hand. It was a large, heavy plane and it did a violent tip stall and snap roll into the ground. The beginning of the launch is very critical. The plane must have flying speed when it leaves your hand, or it is very likely to stall and crash as this plane did. All too often, I see fliers, some with many years of experience, pump up a little winch tension and then simply let go of the plane. My heart always fights its way past my Adam's apple and lodges somewhere between my ears. Miraculously, these planes will often drop the tail, sag a bit, and then start to climb out. These are usually light, floater type planes.

The fear of destroying the plane at the beginning of a launch is actually the thing that can cause it to be damaged. A beginning flier with a light airplane fears that he will fold the wing if he builds up too much tension on launch. It is much better to have too much than not enough. Wings are generally not damaged at this point in the launch.. If a wing fails at this point, there was probably some structural weakness due to damage or construction error. I would not stall a hot winch before I launched a Gentle Lady or such, but it is better to be sure you have good tension before you launch. The next important factor is the throw. You must throw the plane. You should throw it as if you were hand launching it without the winch. It is best to throw the plane more out than up. You had better know what you are doing if you throw the plane up, or the results might make you wish you had. If everything is right on the plane as to elevator trim and tow hook location and C.G., the plane will immediately assume a steep climbing angle and very little launch height will have been given up.

You should stay on the winch briefly after the plane is released in order to make sure it is locked into a steady, stable climb before you start to pulse. The length of time you stay on the winch depends on the strength of the wing. Again, this is not where wings fail. The most stress is put on the wing as it rounds out over the top of the launch and is approaching the turn around. This is where you see wings fail.

A good flight starts with a good launch, and a good launch starts with a good throw, so make sure the plane is flying from the very start. ■

R/C Soaring Resources

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

Seminars & Workshops

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

California Composite Seminars - Thirty five dollars for a six hour plus Composite Technician lesson includes lunch! Two people minimum, please. Clubs? We travel, too! Please call (805) 822-7994 and ask for Scott Metze.

Reference Material

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

BBS

BBS: SLOPETECH, Southern California; (714) 525-7932, 2400 - 8-N-1

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

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

Contacts & Soaring Groups

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

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

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

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

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

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

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

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

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

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

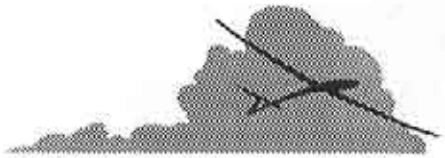
Nevada - Las Vegas Soaring Club, Jeff Burg (President), 853 Shrubbery Lane, Las Vegas, Nevada 89110 U.S.A., (702) 459-8100.

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

Texas - Texas Soaring Conference (Texas, Oklahoma, New Mexico, Louisiana, Arkansas), Gordon Jones (Contact), 214 Sunflower Drive, Garland, Texas 75041 U.S.A., (214) 271-5334.

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

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



NASSA
North American Scale Soaring Association

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

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LSF

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

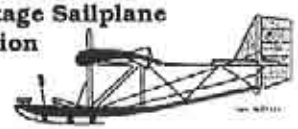
League of Silent Flight
10173 St. Joe Rd.
Ft. Wayne, IN 46835

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

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

Send SASE for membership application and flyer: "What is T.W.I.T.T." or, send $2.50 for full information package including one back issue of our newsletter, postpaid. Full membership is $18.00 (US) or $22.00 (Foreign) per year and includes twelve issues of the newsletter. Back issues of newsletter are $.75 each, postpaid in USA.

The Vintage Sailplane Association



VSA is a very dedicated group of soaring enthusiasts who are keeping our gliding history and heritage alive by building, restoring and flying military and civilian gliders from the past, some more than fifty years old. Several vintage glider meets are held each year. Members include modellers, pilot veterans, aviation historians and other aviation enthusiasts from all continents of the world. VSA publishes the quarterly magazine BUNGEE CORD. Sample issue $1.-. Membership $10.- per year. For more information write: **Vintage Sailplane Association, Route 1, Box 239, Lovettsville, VA 22080.**

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

Schedule of Special Events

Date	Event	Location	Contact
March 5	Hand Launch	Poway, CA	Bill West (619) 222-5296
May 14	Mid-South Warm Up	Huntsville, AL	Lars Ericsson (205) 859-0255
May 14-15	Masters of Soaring	Covina, CA	Pete Olsen (909) 597-2095
May 21-22	Renewed CVRC	Visalia, CA	Ed Hipp (209) 625-2352
May 21-22	CSR International Slope Race	Davenport, CA	John Dvorak (408) 259-4205
May 29-30	Radio Glide	Oxford, England	Jack Sile 0449-675190
May 30	Hand Launch	Poway, CA	Bill West (619) 222-5296
May 28-June 6	World Soaring Jamboree	Richland, WA	Wil Byers (509) 627-5224
June 4	Hand Launch	Poway, CA	Bill West (619) 222-5296
June 11-12	Cross Country Race SCSA California Double-Cross	California Valley, CA	Keven Anderson (805) 296-5126
June 11-12	Nebraska Soaring Open	Lincoln, NE	Loren Blinde (402) 467-4765
June 25-26	Flatland Open	Hillsdale, KS	Ed Kempf (913) 780-5543
June 23-26	Mid-South Soaring Championships	Memphis, TN	Bob Sowder (901) 757-5536
July 16-17	COGG Cross Country "Dash for Cash"	Cookstown, Ont. Canada	Jack Nunn (705) 728-4467
July 23-24	Inter Glide F3J	Birmingham, England	Jack Sile 0449-675190
Aug. 6	Hand Launch	Poway, CA	Bill West (619) 222-5296
Aug. 13-14 & Aug. 20-21	Holland Glide	Amsterdam/ Amay Belgium	Jack Sile 0449-675190
Sept. 10-11	F3J	Germany Heerieden, Bavaria	Jack Sile 0449-675190
Sept. 17-18	SIG/EISS Glider Contest	Blakesburg, IA Antique Airfield	Jim Porter (800) 524-7805
Oct. 1-2	21th Annual CVRC Fall Soaring Festival	Visalia, CA	Phil Hill (209) 686-8867
Dec. 3	Hand Launch	Poway, CA	Bill West (619) 222-5296

NEW PRODUCTS

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

The Merlin

...from M M Glider Tech

The Merlin is a versatile airplane that can do almost anything. It thermals great for hand launch and high start launching; it flies super on light lift slopes. The Merlin is made with a durable ABS polystyrene vacuum formed pod. It has a built-up wing and a solid tail for quick and simple construction. The boom is made of a fiberglass aeroshaft for strength and durability. Building time is about 12 to 15 hours. The Merlin will be available in kit form, and include machined cut parts, parts bag, instructions, and a full-size blueprint. The radio gear required is a micro/mini system. Specs on this airplane are: 50" wing span, 6" chord, 280 sq. in. wing area, s3010 airfoil, 26 1/4" fuselage length, 11" pod length, and 12 to 20 oz. flying weight. The Merlin kit is available for $36.95 plus $5.00 S&H. (Add 8.25% sales tax if CA resident.) For more information, send a SASE to MM Glider Tech, P.O. Box 39098, Downey, CA 90239; (310) 923-2414. ■

F3B Eagle

...from SMaL Enterprises

SMaL Enterprises has obtained all rights to the "F3B Eagle" from Allen Development. The F3B Eagle is an all moulded composite sailplane designed to win F3B events. It has proven itself at the last two F3B World Championships by taking first and second at the 1991 Championships and recently taking second at the 1993 Championships.

The specifications are:

Wingspan: 112.5"
Wing area: 935 in^2
Airfoil: RG-15 (SD7003 optional)
A/R: 13.5:1
Stab area: 100 in^2
Weight: Min. = 75 - 80 oz. (11.5 - 12 oz/ft^2)
Max. = 24 oz/ft^2

Production rates of the F3B Eagle will be increased to meet market demand without sacrificing the quality that Allen Development is famous for.

For additional information or to place an order, please contact SMaL Enterprises at (408) 554-8539 between 6 p.m. and 9 p.m. Monday thru Friday. ■

Advertiser Index

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,** 3703 Penny Ln., Carrollton, TX 75007; (214) 394-0119.

MINI HI START KIT designed especially for 1-1/2 meter (hand launch). Thirty feet of 1/8 tubing stretches four times relaxed length for gentle launches. Two day glow colored tow lines, 120' and 150', use separately or together. $19.95 + $4.00 shipping. Sky Bench Aerotech, 58030 Cyrenus Lane, Washington, MI 48094; (313) 781-7018.

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

PRECISION COMPUTER CUT FOAM WINGS for your sailplane. Any airfoil combination, washout, taper, sweep, skin thickness. $28 for typical four panel 2M. For complete info, send SASE to: Wings!, 3198 Shady Oak Lane, Verona, WI 53593; (608) 845-7961.

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

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

For Sale - Personal

GENESIS, NIB... $395.00. Call Bob Belton @ (602) 526-8012, Arizona.

Airtronics AQUILA, RTF, professionally built for LSF Nostalgia event... $200.00 plus $20.00 shipping. Original Airtronics Olympic, NIB... $85.00 plus $6.00 shipping; Graupner CIRRUS, NIB... $250.00 plus $8.00 shipping. Call Ray Hayes @ (810) 781-7018, Michigan.

RnR SYNERGY 91, NOVA and Vision. Turn key, no excuses. $1800.00 not including shipping. Steve Hudson (405) 793-9213 after 5 PM, Ok.

Fiber Glas Flügel DG-600... $700.00; Simprop Sagitta... $250.00. Bob (619) 753-8146, Calif.

NIB Airtronics kits: LEGEND... $175.00; CUMIC PLUS... $125.00; SAGITTA 600... $55.00. Frank @ (818) 790-1297 after 6 PM, Calif.

Airtronics CUMIC PLUS, 120" yellow and orange Mica Film, white glass fuselage, wing has 4 micro servos operating spoilers and ailerons, fuse has 2 mini servos for elevator & rudder, wing bag, contest proven, beautiful condition... $190.00; Sig SAMURAI, pivot wing sloper, red vacuum bagged wings, white glass fuse, RTF with 75 oz. wing servo and std elevator servo, flight tested over Lake Michigan, smooth flier... ; sport windi, complete with deep cycle battery, line, like new condition, light weight, pretty, Bosch motor... $250.00; Tehachapi Mountain sloper, 3 micro servos, 60" carbon/glass/kevlar bagged wing & V-tail, yellow with red trim glass/carbon fuse, like new... $150.00; Jade SHOGUN, jet sloper, fast, two mini servos incl., RTF, good condition... ; Sweitzer 1-26, 2 meter from very old Sterling kit, all wood clear varnished, all open bays covered with transparent gold film, fuse all plank construction, show winner, set up with two standard servos... $150.00; WINDFREAK, 100" thermal eliptical-hedral flying wing, 1400 sq. in., covered in transparent blue/yellow/orange/, smooth thermaler w/releaseable tow hook, three mini servos, RTF... $150.00. All are plus UPS. Gordy Stahl @ (414) 873-5842 eve, Wisconsin.

ULTIMA 129" wing span, unlimited class sailplane, built with 2 different wing profiles, original 4061 and 7032/7037. 4061 is the original wing, monokote covered (good for speed or windy conditions); 7032/7037 is obeche covered (wide speed range but floats more on calm days). Both wings have carbon/epoxy reinforced spar and trailing edge; 7032/7037 has a stretched center section (meaning more flap area) for better landing control; 7032 is used in the center section and 7037 in the tips; both are in three sections with tips joined by German wing blades. Asking $280.00 plus S&H. Call Chuck on (201) 584-3117 eve., New Jersey, or AT&T Mail !crobinett.

FUTABA FP-T4NBF FM Conquest 4 ch transmitter w/FP-R-127 DF[illegible] FM receiver. Two packages available: one on channel 41 and one on channel [illegible] like new, less than 6 mos. old. I have upgraded to computer radio. Will sell for $60.00 ea. postpaid. Call John @ (205) 880-7579 CST, Alabama.

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

Sailplanes International AXEL, NIB... $150.00; Efone DG-100, 2m span, glass fuse, NIB... $75.00; 3m RAVEN, pre-sheeted wings & stab, fuse, plans, NIB... $50.00; V.S. V-MAX, RTF, fast & aerobatic, 3 sets of wings including 2 Futaba 5101's, absolutely beautiful... $300.00. All items + shipping. Call Jeff @ (702) 459-8100, Nevada.

RnR Products NOVA slope racer, special one with the SD 2055 airfoil, very clean & fast with arrowshaft hinges, equipped with Airtronics servos (141's in wings), just add receiver and you're ready to rock, best if used with a Vision radio... $425.00 takes it all along w/extra brand new NOVA fuselage as a back-up. SYNERGY 91, beautifully molded RnR model, excellent condition, very low mileage, six Airtronics servos, battery & switch, just add receiver, $1000.00 invested, will sell for... $700.00; Multiplex ASW-22, mint condition, "full boat" version of the long since out of production Multiplex beauty, Alpina MAGIC wings (same as DG-500 w/ Ritz 2 airfoil) with added flaps and tip extensions, total span goes to 15'3" with the scale tip extensions on, 13' with short tips, set up for slope & thermal flying (winch or aerotow), nine Airtronics servos to operate rudder/elevator/ailerons/flaps/spoilers/retract/aero-tow release, will sell with custom wing & fuselage carrying bags (add receiver, charge the 1200 mil battery, and you're ready to launch)... $1000.00 firm. Call Steve Condon @ (619) 594-7823 days or 565-4361 eve., So. Calif.

WACO 750, RTF, electric with Astro Cobalt 05 FAI motor, spinner, folding prop, vacuum bagged gray foam composite 3 piece 100" wing, brand new plane flown about a dozen times, never crashed... asking $150.00, includes shipping. Call Chuck (201) 584-3117 eve., New Jersey.

Thermal Eagle, built, brand new, custom paint on wings, flies great, w/servos & battery... $675.00 + freight; 1/3 scale ASW-20 fuse & canopy... $225.00 + shipping. Cornfed @ (205) 471-2507, Fred Rettig (205) 964-5077 Alabama.

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How To Read Your Label for Expiration

214 1ST 94/01

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Limited time pricing: Genesis: $449
Synergy III: $599
Synergy 91: $549 SB/XC: $749

Available exclusively from
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1120 Wrigley Way
Milpitas, CA 95035
(408) 946-4751

"The AVION"

(ah-V_YOHNQ)

Fuselage

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

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

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

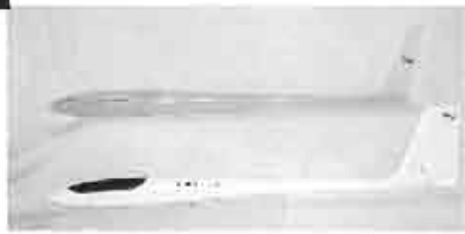
AVION Professional price is $65.00(US.)
AVION Standard price is $55.00(US.)
Price includes a fiberglass canopy and CAD drawings showing the empennage and fuselage construction and the electro-mechanical control system.

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

206-821-1258

"Another Wright Manufactured Product"

Liberty



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

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

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

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

Includes: Molded glass canopy.

Available from
SLEGERS INTERNATIONAL
201-288-9880 (8:30am-5:30pm EST)
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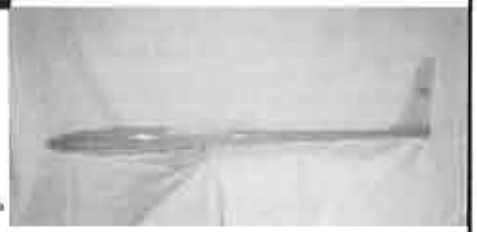
Spartacus

open-class competitor



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

Spartacus Competitor $90.00 (US)

Specifications: Length: 53 inches; weight: 11oz.; width at widest point: 2.2"; molded fin; accomodates open-class plug in wings using an SD7037 airfoil with a 10" root chord.

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

Includes: Molded canopy.

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Two NEW designs from Layne/Urwyler!!

★ Saturn HL ★

Saturn HL is simple – it's a great flying HandLaunch that won't empty your wallet for exotic micro radio gear, with an extra measure of durability built in to keep you flying.

Specifications:

Airfoil:	**E387**
Planform:	**Triple taper**
Wing:	**Foam/Obeche**
Fuselage:	**Glass/Kevlar**
Wing Loading:	**5.5 oz sq in**
Standard or V tail	
Kit price:	**$99.00**
Pre-sheeted:	**$149.00**

★ Saturn 2.0 ★

Saturn 2.0 is our exciting new two meter that shares a lot of the design and flying characteristics of our sucessful, contest winning, Saturn 2.9T – with one small twist. It can also be built as a V tail.

Specifications:

Airfoil:	**HQ 3/10 - 3/9**
Planform:	**Triple taper**
Wing:	**Foam/Obeche**
Fuselage:	**Glass/Kevlar**
Wing Loading:	**9 - 10 oz sq ft**
Standard or V tail	
Kit price:	**$149.00**
Pre-sheeted	**$239.00**