Schedule of Special Events

Date	Event	Location	Contact
Sept. 7-8	Open, Thermal/ Soaring Task T1	Gaithersburg, MD (National Geographic Society)	Bill Krajci (301) 884-5004
Sept. 14	Slope Race	L.A. Area, CA	Rich Beardsley (805) 934-3191
Sept. 14-15	TNT 2 Meter & Open	San Antonio, TX	A. Coher (512) 599-4031
Sept. 14-15	3RD Annual MASS Fall Soaring Tournament	Memphis Area, TN	Tony Digirolamo (901) 756-5528
Sept. 15	Distance	Houston, TX	Julian Tamez (703) 540-3944
Sept. 15	F3b Speed Trials	Denver, CO	John Wyss (303) 494-0363
Sept. 22	Hand Launch	Dallas, TX	Gordon Jones (214) 840-8116
Sept. 24	2 Meter & Unlimited		L. Montgomery (407) 793-8179
Sept. 28-29	ESL 2-Meter Contest	Pottstown, PA Bob McKeever (609) 538-8368	Joe Krajci (215) 632-4215
Sept. 29	Old Timers	Dallas, TX	Gordon Jones (214) 840-8116
Sept. 29	Regional Soaring Contest, Unlimited, 2M	Pleasanton, CA	Don Anthony (415) 833-0504
Oct. 5-6	Visalia Fall Soaring Festival	Visalia, CA	Ed Hipp (209) 625-2352
Oct. 5-6	2 Meter & Unlimited	Lakeland, FL	Bob Wargo (813) 938-6582
Oct. 5-6	Pumpkin Fly Standard, Unlimited	Cincinnati, OH	Jack Strother (513) 583-9018
Oct. 6	SMT Contest	Denver, CO	Lenny Keer (303) 737-2165
Oct. 12	Slope Race California State Champs	Santa Maria, CA	Rich Beardsley (805) 934-3191
Oct. 13	Dual Elimination	Dallas, TX	Gordon Jones (214) 840-8116
Oct. 13	Unlimited Thermal	Kirkville, NY (Syracuse area)	Dave Zinteck (315) 656-7103
Oct. 19	Duration 2M & Open	San Antonio, TX	Tom Meeks (512) 590-3139
Oct. 20	Hand Launch	Dallas, TX	Gordon Jones (214) 840-8116
Nov. 9	Duration 2M & Open	San Antonio, TX	Tom Meeks (512) 590-3139
Nov. 10	3-6-9 2M & Open	Dallas, TX	Gordon Jones (214) 840-8116
Nov. 10	Dual Elimination	Houston, TX	Julian Tamez (703) 540-3944
Nov. 17	Hand Launch	Dallas, TX	Gordon Jones (214) 840-8116

R/C Soaring Digest

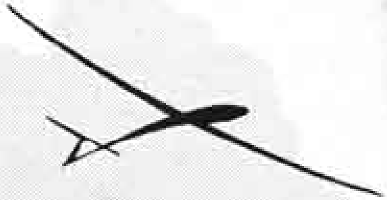
September, 1991
Vol. 8, No. 9

Soaring The Low Country in South Carolina with Ashley Davis....
Story on page 6

Ashley Davis' VG-1

R/C Soaring Digest

A publication for the R/C sailplane enthusiast!



Advertiser Index

30	Aerospace Composite Products
44	American Sailplane Designs
36	Anderson, Chuck
42	B² Streamlines
36	C.A. Bell Co.
30	Clarke, John
42	Composite Structures Technology
40	Dave's Wood Products
36	Fabrico, Inc.
30	Great Northern Model Engineering Co.
45	Greco Technologies
41	Jarel Aircraft Design & Engineering
43	Lawicki, Troy
29	LJM Associates
44	Magnum Hi-Start Co.
33	Mid Columbia R/C
31	Model Construction Videos
28,37,42	NorthEast Sailplane Products
8	R/C Soaring Digest
25	RnR Products
36	Scale Glider Components
33	Scott's Models
40	SmarTech Engineering
36	Squires, Dave
8	Tekoa
40	Triton Models
31	VS Sailplanes

Special Interest Groups

39	F3B/USA
39	League of Silent Flight - LSF
39	National Soaring Society - NSS
39	T.W.I.T.T.
39	Vintage Sailplane Assoc. - VSA

Table of Contents

Monthly Columns

Articles by the Readers

Other Sections

R/C Soaring Digest is printed on recycled paper.

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 submitted 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.

RCSD should not be considered to endorse any advertised products or messages pertaining hereto. An advertising rate card is available for businesses, clubs and personal advertising.

RCSD Staff

- Jerry Slates — Editor/Technical Editor/Jer's Workbench
- Judy Slates Publisher/Submission of Mat'l Via Disk (MAC or IBM 5 1/4") or Modem (Printing by J. Morgan Graphics & Design, (510) 674-9952)

Feature Columnists

Martin Simons, Bill & Bunny Kuhlman (B2), Gordon Jones, Wil Byers, Ed Slegers

R/C Soaring Digest
P.O. Box 6680
Concord, CA 94524 U.S.A.
(510) 689-0766, FAX (510) 798-6436

The Soaring Site

R/C Soaring Digest is now printed on recycled paper that meets the current EPA guidelines for "waste paper"! While the cost of printing is fairly comparable to the old costs (recycled paper is generally more expensive), the paper will probably be less opaque than the paper used in the past. Since this column is written beforehand, we'll just have to wait and see how it looks when it comes off the press. Several of you have asked us if we used recycled paper and, now, we're pleased to say that we're helping address the need for better utilization of our natural resources!

Looking for Gene Cope?

Although he is still in Washington, Gene just moved and his new address is 3203 1/2 Main Street, Union Gap, Washington 98903; (509) 457-9017.

California Tax on Publications

Those of you in California have probably noted the controversy taking place regarding the new tax regulations on publications and newspapers. It's been on the news channels and in the newspaper headlines and, yes, they impact the *R/C Soaring Digest*. Although we are not pleased with the increased paperwork required and the lack of specific guidelines, we expect to continue to provide *RCSD* in a timely fashion! We'll keep you posted.

Area Code Change

They're changing our telephone area code! Effective September 2nd, our new area code will be 510 instead of 415, but you can still dial 415 until January 27, 1992 and the call will go through. This change affects *R/C Soaring Digest*, Viking Models, U.S.A., and Dave's Wood Products (Dave Acker).

Renewal Process

As of this month, we will only send out one renewal notice. In the future, we hope to stop sending out that one notice, as well. We are looking for a manufacturer or business who carries a dual carrier (peel off) label that can be used on a laser printer. Why? We really need to figure out how to change the process so we can save some time. It takes around 40 hours to package *RCSD* every month for mailing what will labels, notices, envelopes, and 1500 copies to 16 (Welcome, Switzerland and Finland!) countries. The top line across the top of your mailing label contains a series of codes which identify your expiration date and the type of postal service you requested.

FAX News

From Jim Thomas, Holland, Michigan "On the news front, the results of the 1991 NATS: Brian Agnew, Brian Agnew, Brian Agnew, Brian Agnew, and Larry Jolly. Seriously, Brian won XC, Hand Launch, 2M, Std., and Unlimited. Larry won F3B. The perpetual trophies: Lee Renaud and Hi Johnson to Brian, and the Pruss team award to Michigan Soaring league #1 (Jim Thomas, Troy Lawicki (The DUCKMASTER), and Pat Sullivan). Falcons showed very well, not only with Brian waxing everyone, but in Standard class, Falcon 800's took places 1, 2 and 3 (Brian 1st, I was second, and Rick Lake (MI) was 3rd)."

"I want to pass along a bit of sad news that was passed along to me, recently. I received a call from Jeff Troy (NATS Soaring CD a bunch of times during the '80's) and he told me that Fran Olix had died about a month ago from liver cancer. Fran was a member of the Valley Forge Signal Seekers. Jeff's assistant CD for the NATS, and the CD outright in 1988 at Lincoln. Fran leaves a wife and 1-year old son; he was only fortyish. I don't know if you ever had the pleasure to know this man; I am glad that I did."

Looking for ZANONIA

The following question is from Ray Reiffer, 9060 80th Ave., Zeeland, MI 49464. If you can help, please drop him a line. "Do you have any knowledge of plans ever having been drawn up for Ross-Stevens RS-1, (which) is more commonly known as the "Zanonia"? I'm even willing to purchase "full-size" prints if any are in existence. I've written the current owner on this point, but have received no response, as yet." Ray would also like to know if any of you could provide input on another subject. He says, "As a fun project and point of curiosity, I've built this ship "DAS DO DO" from the movie "Escape of the Birdmen". However, I have had no luck in verifying the story and thus documenting this ship. Perhaps the readers of *RCSD* could provide some input on this subject. Just for fun, soaring enthusiasts should see this old Doug McClure movie."

Blackberries to Sailplane Addiction

Bruce Abell, Cessnock, NSW, Australia, says, "I've been giving a lot of thought to the results of the reader survey as published in the June 1991 issue of *RCSD* and thought a few comments might be in order. (Q) How to keep a high-start from hanging up in wild blackberry bushes. (A) We've run into this problem and, short of building a winch and pulling drogue down to the turnaround each flight (lots of walking involved in this), the only way out is to station someone (the next flyer?) down near the anchor and have him flip a piece of rope (or cloth) over the line after release and trot back to the launch point running the line through the rope/cloth loop. This will drag the drogue back in line before it reaches the ground (or blackberry bushes). This also involves a bit of exercise, but "beggars can't be choosers"! (Q) Why is this hobby so addictive? (A) As to why our hobby is so addictive (worse than the hard drugs!!), I think the basic cause can be summed up in one word — CHALLENGE! What hobby offers such a diverse variety of disciplines? We have F/F, R/C, & Control Line as the basis of our hobby, but each of these breaks down into a great variety of areas such as R/C Pattern, Pylon Racing, Ducted Fan, Scale/Power & Glider (Slope & Thermal), Helicopter, Seaplane, Thermal Glider, Slope Soaring, etc., etc. ———!! The list is almost endless and is limited virtually only by the imagination of the participant. Then we have the side issues such as what materials to use and where, fuel formulation, flying techniques, launch systems for gliders, propeller design, model design, construction techniques, assessment of the air (e.g., when you have flown into a thermal), covering materials, airfoil design and assessment, etc., etc. ———!! Each and every one of these and other portions of our hobby pose a CHALLENGE to the individual which, in most cases, is almost impossible to achieve to perfection. (E.G., How many Glider Guiders can score a perfect flight EVERY TIME?) This is, I believe, why we see so very little of what I call the "Ratbug Element" in our hobby. That type of mentality does not willingly accept these challenges and then continue on further. So, we have a great diversity of types of people involved in Aeromodelling (Perhaps, I should say Modelling!) who cover all aspects, whether they accept the challenge of just (?) flying, building or the ultimate (?) of designing, building and then flying. You ALL have that wonderful attribute of an engineering mind! I salute you!" ■

Happy Flying, Jerry & Judy

Label Example

Subscription #	**Class of Service**	**Expiration Date**
21	A = Airmail S = Surface (Outside of U.S.A. Surface takes 2-3 + months for delivery by boat.) 1ST = 1ST Class USA 3 = 3RD Class/Bulk USA (3RD Class takes up to 6 - 8 weeks for delivery.)	92/01 Expires January 1, 1992. Unless renewed, the last issue is December, 1991.

All other codes used are tracking codes or special handling codes. "V" for example identifies a current advertiser which makes it easy to pull up labels.

Ray Reiffer's DAS DO DO

Jer's Workbench

Tow Hooks

This last month, I received several inquiries concerning tow-hooks. I was asked what is available and where the tow-hook should be placed.

Although I knew where several different kinds of tow-hooks could be purchased, I decided to check out a couple of the local hobby shops in my area to see what I could find in the way of commercial tow hooks. In my hunt, I could only find a few, but I am sure that there are a lot more out there. What I did find was a good selection of different types: retractable, adjustable and non-adjustable.

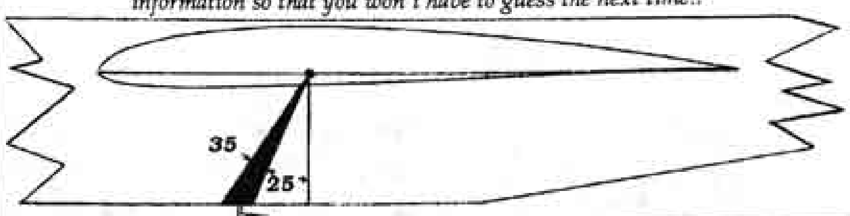
As you can see in Photo #1, the retractable tow-hook requires quite a bit of extra space inside the fuselage for its installation; plus, it also requires an extra servo for its operation. Or, what a lot of flyers may do, is to install an extra pushrod or pull string on the elevator servo to activate the tow-hook release with the elevator servo by operating full down elevator at the time of release at the top of the launch.

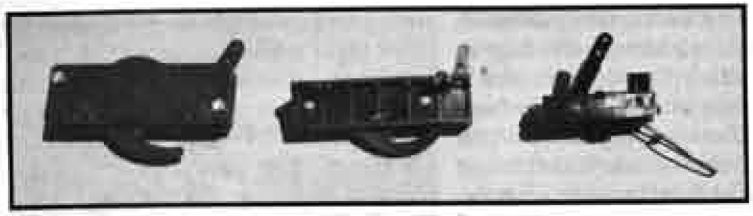
The adjustable tow-hook is easy to install and mounts on the outside of the fuselage. All that is required is to drill two holes in the bottom of the fuselage, bolt the tow hook in place, and adjust. The non-adjustable tow hook is precisely that. You drill one hole and install the non-adjustable tow-hook. If it's not in the precise position, any adjustments will require drilling another hole and positioning again.

Which tow hook to use? Whatever type you prefer. But, like I said before, if you elect to use a retractable tow-hook, you will need a somewhat larger fuselage for its installation. There are pros and cons that go along with the use of a retractable tow-hook. There will be extra work required to install the retractable tow-hook and, because it's a mechanical device, there is "Murphy's Law", which says that if anything can go wrong, it will. But on the positive side, the retractable tow-hook will look great, and it cleans off the bottom of the glider, will have a little less drag, and will only be seen by you and those who go around looking at glider bottoms. The adjustable tow-hook will not fit onto a round bottom fiberglass fuselage; it will require about a 3 inch flat spot to bolt onto. It's ideally designed to fit onto a built up flat-bottom fuselage. The non-adjustable tow-hook, with its single bolt for mounting, will mount on just about anything. There is one thing to remember: be sure to have a good plywood or fiberglass reinforced base to mount your tow-hook onto, as it could be somewhat embarrassing if not dangerous to have your tow-hook come out through the bottom of your glider while it's on tow.

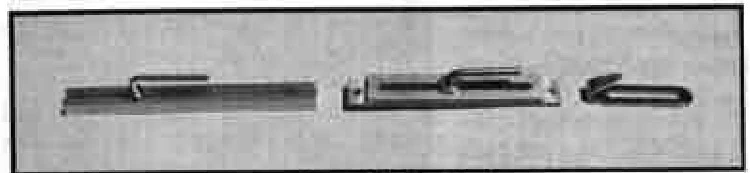
Where to position the tow hook? The safest position is 25° - 35° in front of the center of gravity as shown in figure 1. I read about this suggested position in books in years gone by. I can't remember exactly where, but I have always applied this rule of thumb, and find that it works well.

The safest position in which to install the tow-hook is approximately 25° - 35° in front of the center of gravity. Use a protractor to find this location. Record the information so that you won't have to guess the next time..

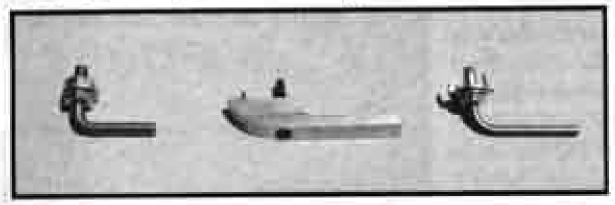




Retractable Tow-Hook
(L-R) Graupner, Fourmost Products, Rocket City



Adjustable Tow-Hook
(L-R) Airtronics, Sheldon's Hobby, Great Northern Model Engineering Co.



Non-adjustable Tow-Hook
(L-R) Sheldon's Hobby, John Clarke, Viking Models, U.S.A.

Johannes Graupner
D—7312 Kirchheim/Teck
Rep. of West Germany

Fourmost Products
4040 24th Ave.
Forest Grove, OR. 97116

Rocket City Specialties
103 Wholesale Ave. N.E.
Huntsville, AL. 35811

Airtronics, Inc.
11 Autry
Irvine, CA. 92718

John F. Clarke
911 Covert Ave.
N.H.P., NY. 11040

Great Northern Model Engineering
P.O. Box 9145
North St. Paul, MN. 55101

Sheldon's Hobby
2135 Old Oakland Road
San Jose, CA. 95131

Viking Models, USA
2026 Spring Lake Drive
Martinez, CA. 94553 ■

Correction to the July Issue

The following letter is from one of the readers and I wish to thank him for taking the time to send in the correction. I will try to be more careful with my choice of words in the future. Keep me honest!

Dear Jerry,

Your article on Designing a Sailplane - Part II (July, 1991) has some technical errors I would like to clear up. You use the term "angle of attack" incorrectly in your explanation of airplane design, but correctly in reference to "up" air or "down" air. "Angle of attack" is the angle formed between the airfoil cord line and the relative wind. "Angle of incidence" is the angle formed between the cord line and longitudinal axis of the airplane. They are completely different. When you refer to adding "a few degrees of angle of attack to a design", this is wrong. "Angle of incidence" is fixed when the airplane is flying (except in the case of "pitcheron" control) and "angle of attack (AOA)" is variable. For example, at high speeds, a smaller AOA will give level flight than required for slow flight where a greater AOA is necessary to achieve enough lift. In both cases the "angle of incidence" is exactly the same. O.K.? Keep putting out an excellent *Digest*; I enjoy it.

Sincerely, (signed) Garth Collins, Tulsa, Oklahoma ■

Soaring the Low Country

...by Ashley Davis
168 Cunningham Rd., Travelers Rest, South Carolina 29690

Dorchester is a small town a few miles N.E of Charleston S.C. surrounded by swamps and spanish moss.

The flying site used for this contest was once a land fill and is now a beautiful field of several hundred acres maintained by the Dorchester County R/C club. A closely mowed strip about 150 feet wide and 500 feet long runs almost north/south and is surrounded by plenty of room for set-up and parking.

Galon Williams and I arrived at the field late Friday afternoon of what was actually the first day of summer, hoping for some practice flying. Heavy showers earlier had the flat field totally saturated, but after some deliberation Roger Crabtree set his winch up and allowed several of us out-of-towners to get a feel for this wonderful site. After about an hour another storm approached ominously so we left to find a room for the night.

Waking early Saturday with expectations of rain such as that experienced all week we were pleasantly surprised with fair skies. Winds out of the northwest of about 15 knots dried the field rather quickly. Flying began at 9:00 with a seven minute duration and precision landing task. The high winds made lift very scarce during the first round of OPEN class flying but a row of trees immediately to the west of take-off did provide opportunity for some 5-6 minute flights. Second round task was the same for 2 meter gliders. Persistent tail winds raised the possibility of turning the winch around, but after a vote during the lunch break it was decided not to change as everyone had to deal with the same handicap.

Boots Blanton and WINDSONG

Sam Smith and Bernie Coleman – "LUMINAS"

Bernie Coleman and LOVESONG

Galon Williams and RED DYE #7f

Tailwind was not the only handicap as the extreme heat and humidity plagued the entire contest. The only escape from its intensity was underneath a grove of oaks at the F-A-R end of the field. (You're not surprised are you?) The Dorchester R/C club catered hotdogs and hamburgers grilled on-site along with plenty of cold drinks.

After lunch flying resumed with alternating OPEN and 2-meter rounds. The lift got better as the day progressed but the winds made it the territory of the stout-hearted. A glider can cover a lot of distance fast over these huge flat expanses and several went to the limits of visibility, or at least the limits of my visibility. My last launch of the day was right into good lift and in less than 3 minutes it was at the limit of my controllability. The rest of the flight was spent desperately trying to get the plane down to a manageable altitude. My timer Randy Bullard, Buddy Roos and Bob Drussell provided invaluable help in keeping the plane in sight - Thanks guys. Landing with 7 minutes 58 second I missed the circle!

After the scores were tabulated awards were given to forth place in each category. Open class: Roger Crabtree - LOVESONG 1541, Larry Lemel - CUMIC 1478, Paul Morrow - SAGITTA 1343, Rich Madden - WINDSONG 1324. 2-meter: Howard Keller - Moonfaker 1316, Paul Morrow - SAGITTA 1163, Bernie Coleman - LUMINA 1067, Rich Madden - R.O.8 1024.

Sunday's flying began with higher winds but the winch faced into the prevailing westerlies. Task for the day was 10 minute triathlon, one class. The same trees made enough lift for a few near perfect flights the first round. Galon Williams landed at 7:58 but most flights were in the 2 to 4 minute range. Paul Morrow was getting consistently good flights much to everyone's amazement until his secret was revealed. Paul was soaring the lift off his R/V. Next time we won't let him get such a good parking place. Seriously, Paul is a superb flyer and always seems to place in the finals. The inimitable Howard Keller put on a show later while setting up for a landing at about 3 minutes and 40 feet high when he found lift and performed an almost perfect flight. Tom Long made a flight to the edge and went overtime by a couple of minutes and still managed to place.

High winds made for exciting action until the last round was over at about 2:00. This gave out-of-towners a chance to hit the road for home early. Aileron planes dominated this meet, having the required control to negotiate the turbulent landings: WINDSONGS mostly with a couple of LUMINAS doing well. A couple of CUMICS, OLY II's and assorted originals were also visible.

Sunday's results were: Paul Morrow - SAGITTA 3138, Sam Smith - LOVESONG 2418, Chuch Woolridge - CUMIC 2354, Tom (The sleeper) Long - LOVESONG 2335, Boots Blanton - WINDSONG 2190.

Many thanks to C.D. Ken Gulliford for all his hard work and great preparations especially since most of his regular help was not available, Dorchester County R/C for the field, Ron and wife (I forgot your last names) for tireless scorekeeping, Bernie Coleman for photography and the Atlanta gang for helping me get my bird back. Great meet folks, lets do it again in September. ■

R/C Soaring Digest Subscription Form

❑ Please enter my subscription to the R/C Soaring Digest.
Enclosed is my check or money order in U.S. funds for ______.

USA:	$19 Bulk/Third Class	Europe/U.K.:	$36 Air
	$26 First Class		$22 Surface
(CA residents, please add $1.57 Tax)		Asia/Pacific:	$42 Air
Canada & Mexico: $26		/Middle East	$22 Surface

❑ Please send information on the availability of back issues.

Name______________________

Address______________________

____

____

Return to:
R/C Soaring Digest
P.O. Box 6680
Concord, CA 94524
U.S.A.

Understanding Thermal Soaring Sailplanes

Part 4 of 4 Parts Continued

(This column began in January, 1990. Each part covers several months.)

...by Martin Simons

Martin Simons, 13 Loch Street, Stepney, South Australia 5069

Stabiliser profiles

It is probably already clear that large savings in drag cannot be expected by variations in the stabiliser, or fin, profiles. Certainly, the tail profiles should be thin and they will operate most of the time close to zero angles of attack, so they should normally be symmetrical. The symmetrical profile gives least drag when it is at zero angle of attack, but slight variations up or down, over the range of angles normally required for a tail unit, make little difference.

For a stabiliser to have an upward cambered section is actually a disadvantage. With c.g. forward, and hence the smallest practicable tail area, the load actually on the tail will be downwards and any upward camber will be the wrong way round. It is quite possible then to cause a large increase of tail profile drag since the section will probably be forced to operate outside its most efficient, low drag range or 'drag bucket'. The horizontal stabiliser section, if not perfectly symmetrical, might be better with a **negative** camber. (Some very successful model sailplanes, for example Sean Bannister's original *Algebra*, have flown with this kind of stabiliser.) However, the amount of negative camber required is very small, less than 1%, and in practice it is unlikely that any real drag saving will be noticeable compared with the symmetrical section.

The stabiliser dead spot

It is sometimes suggested that a thick tail section, rather than a very thin one or a flat plate, makes for smoother control response. The author's experience does not support this. Models fitted experimentally with alternative thick and thin tail sections respond very much alike providing the centre of gravity is in exactly the same position on each occasion. Of course, if the c.g. creeps one way or another, the difference in elevator sensitivity is immediately apparent.

There are, however, some symmetrical sections which behave badly at angles of attack close to zero. This is caused by the formation, near the leading edge of the profile, of separation bubbles. At zero angle of attack, a bubble may develop on both upper and lower sides. The profile behaves symmetrically and no lift is produced, as would be expected. However, at a slightly positive angle of attack, the bubbles tend to shift position and the one on the lower surface may actually disappear. The effect is to make the symmetrical profile behave as if it had a slight inverted camber. The main flow on the under side follows the solid contour of the profile closely, but on the upper side passes round the bubble. Instead of producing lift as the angle of attack increases, such a profile may actually produce a downward force. This does not persist for long. As the angle of attack increases further, the flow changes and positive lift is developed. On the standard wind tunnel test charts, such sections show a lift curve which takes a distinct S shape, the curve actually slanting downwards from left to right through the zero point instead of upwards (Figure 48). This effect has been measured, and is apparently most likely to occur in its extreme form, on an 18% thick profile which is not likely to be chosen for the tail of any model sailplane.[1]

Nonetheless, a good many thinner symmetrical profiles at the low Reynolds

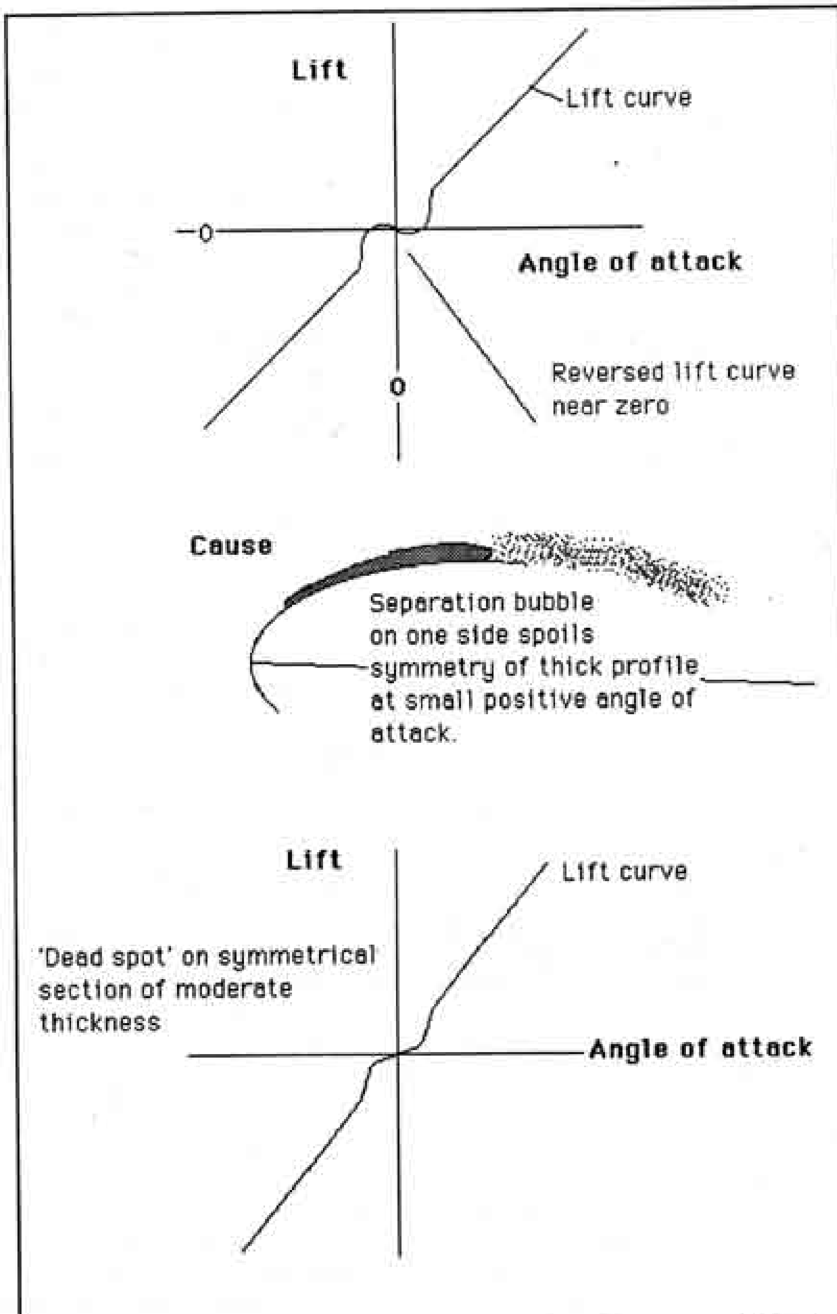


Figure 48 'S' shaped lift curve of thick symmetrical profiles near zero angle of attack may cause 'dead spot' in control response.

numbers appropriate to model tail units, show some irregularity near the zero angle of attack. In a bad case the profile may exhibit a distinct 'flat' in the lift curve, so that when the pilot trims forward or aft from this point, nothing seems to happen, a definite 'dead spot' is noticed. This apparent insensitivity may be combined with slop in the control system of the sailplane and imprecise centering of the servo gearing, so can become quite serious.

Several points may be made. First, the 'dead spot' does not occur with all profiles, and it seems that the thinnest sections, such as flat plates, are not seriously affected. The flat plate is basically a turbulent flow profile, and even with the 18% thick section, roughening the skin to produce a turbulent boundary layer, cured the problem.

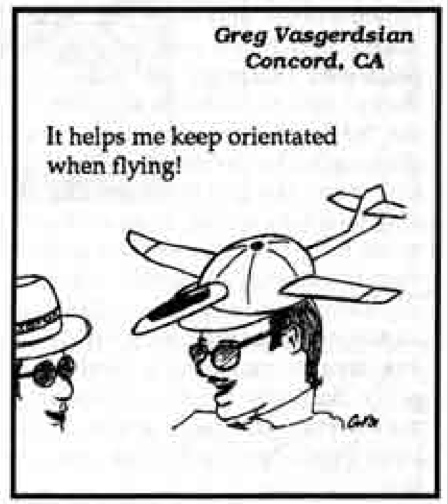
Secondly, the dead spot is most noticeable when the symmetrical section is at, or very close to zero lift. Thus the hiatus in control is likely to be more noticeable if model is rigged with c.g. close to the 30 - 35% position which corresponds, roughly, to the zero tail load balance mentioned above. The tailplane with the 'dead spot' close to zero, will not produce the control or stabilising forces required until the departure from zero angle of attack is fairly marked. If the c.g. is forward, as recommended, the stabiliser will normally be clear of the dead spot around zero. Fine control will be smoother and more reliable, although as the model manoeuvres, the stabiliser will still sometimes pass briefly through the bad zone.

Thirdly, if the stabiliser profile is cambered slightly, although the problem may not disappear entirely, the separation bubbles on the two surfaces will not be alike and there is much less likelihood of actual reversal of the lift curve near aerodynamic zero. As suggested above, if any camber at all is present in the tailplane, it should be very slightly negative.

Slab stabilisers

The all moving, slab or, as older texts often termed it, the 'pendulum' elevator, may show a very slight theoretical saving in drag against the fixed tailplane with hinged elevator, chiefly because there is less likelihood of the profile being made to operate outside its low drag range as the trim setting varies at different flight speeds. Flow separation and leakage at the hinge line of an elevator can occur, as with any hinged control or flap. There may, however, be equally serious leakages at the un-sealed root of an all moving elevator. The difference is not likely to be apparent in practice. In terms of sensitivity, the hinged elevator achieves control response just as good as the pendulum type, providing the control throws or angular movements are correctly adjusted. The fixed tailplane is perhaps less prone to flutter at high flight speeds. The popularity of the all moving elevator is probably due mainly to its relative simplicity in construction, rather than any real aerodynamic superiority.

[1] See AIAA Journal, Vol 20, No. 4, April 1982, pp 457 - 463, article by Mueller and Batill. ■



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)

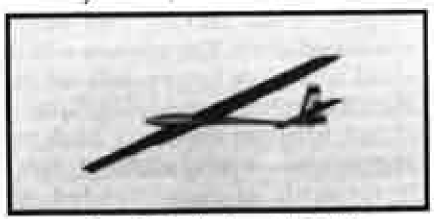
Many of us slope flyers are also avid aerobatic enthusiasts. We like flying our models at the slope, because it is an environment where the lift allows for continuous aerobatics. Thus, not only can we turn the aircraft upside down, but we can fly our model through maneuvers such as loops, rolls, Cuban eights, split S's, and all the aerobatics maneuvers normally reserved for power models.

During the recently past Mid-Columbia slope races, an entrant from jolly old England put on a spectacular demonstration. He was a fellow by the name of Dave Woods. Dave has apparently been flying aerobatics for a very long time and obviously practices a great deal as demonstrated by his aerobatic flying skill. The maneuvers he performed were without a doubt some of best ever witnessed. Many a "looker on" also insisted they were witness to a very impressive performance. His model aerobatics included continuous rolls followed immediately by inverted laps, then exited for beautiful wing overs, plus much, much more. Keep in mind: the inverted laps were performed amazingly just inches from the lip of the hill. I should also point out that he could not only roll his model continually, but he could do this from almost any position including immediately following launch. To add difficulty to his rolls, he didn't hesitate at doing them in point fashion, either. Additionally, Dave could force his model to dance on its rudder, and then quickly transition into another maneuver smoothly and easily. So easily did he perform these maneuvers that, as with any really polished flyer, Dave made it all look very easy.

Now, some pilots might think that this was dangerous flying. Let me assure you, that was far from the truth. We've all on occasion witnessed the glider pilot doing aerobatics and not completely in control. That type of flying most assuredly is dangerous, but Dave could without a doubt control his model inverted as well or better than most of us can right side up. Honestly, his flying skill had to be seen to be believed. I'm sure if his race model had not unfortunately suffered structural damage he would have taken one of the top slots in the race because he was also a superb race pilot. Suffice it to say he was an all around flyer and an extremely good aerobatic pilot.

As with any impressive design or flight one is driven to ask what type of construction, design philosophy, and airfoil did the model use? I had the good fortune to have a long talk about models with Dave. He passed on some very useful information. I will attempt to share that info with you here.

First, Dave's model was nothing extraordinary. It did, however, utilize a wo-



Dave Wood's Aerobatic Ship

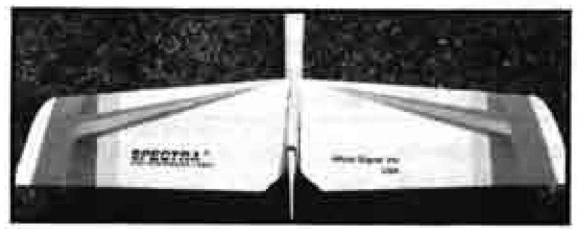
ven graphite fabric vacuum bagged skin over blue foam. (I'm not sure the weight of the foam.) This provided him with an extremely light wing, which was, of course, very strong. A light wing in aerobatics is important since one does not want to have a model with a wing that yields a high moment of inertia. The wing itself was very close to 100 inches in span and had quite large ailerons as a percentage of total wing area. I'm not sure exactly how large the ailerons were, but by looking at them they appeared to

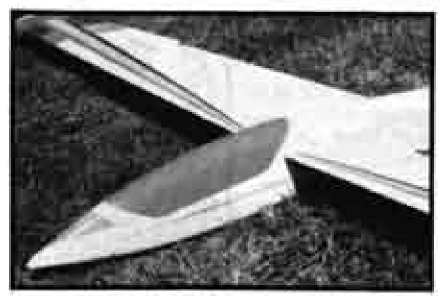
be about 15% of total wing area. The airfoil section for the wing was a Ritz 1-30-10, which is an airfoil that has one percent camber, has a maximum thickness at 30%, and is 10% thick. The elevator he was using appeared to be about 10 to 12 per cent of the total wing area. Dave also utilized a fairly large rudder on his model. It was at least 50% of the total fin area. Lastly, the model's fuselage was very similar to the fuselage you might see on any F3B model.

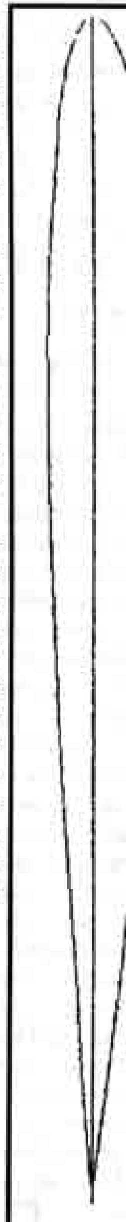
It is probably fair to say that the performance he put on was mostly pilot ability and not so much model. However, maybe some of you can use this information for a new ship you have on the design board.

I'm including a picture of Dave's model. Also, I have been fortunate enough to have a short note and some pictures passed on from Dave's brother, Graham Woods, which I will share with you, also. Graham is in the same league as his brother when it comes to flying aerobatics. Therefore, one can build design ideas just by looking at the pictures of these models.

The construction of Graham's model is very similar to his brother's. This model utilizes the latest in cloth technologies, a Spectra "Smoothie" fuselage built by Viking Models. (Spectra is a brand name for an aramid fiber engineered and made by Allied Signal.) This cloth is supposed to be stronger than Kevlar for the same weight, which means the model is bullet proof, really. The wing is also graphite and utilizes the same Ritz section that Dave uses. (If you have a good section, why change.) One difference in the wing construction is that this wing has a 1 ounce cloth "veil" on the outside and has no spar. I can only guess at why the "veil" was used, but it was probably for sanding purposes. Graham has also gone to Spectra for his rudder and stabs. The model's all up flying weight is 4 lbs 8 ounces, thus yielding a 13







Airfoil of the Month

You guessed it: the Ritz 1-30-10.

ounce per sq/ft wing loading.

I hope you enjoy the pictures. It is unfortunate they will only be in black and white because the model is quite attractive in its fluorescent pink, yellow, green, and purple colors. Note also the nice detailing that Graham has done along the fuse and stabs.

Slope Race Video

For those of you who would like to do a little arm chair racing, Del Brengman has put together a race video. This video includes the Mid-Columbia Cup and I believe some California racing. Del has spent a fair amount of time putting this video together and he tells me that it is quite action packed. Apparently, the video even includes some mid-air crashes and some models exceeding their designed limits. If you are interested you should contact Del at 6054 Emlyn Ct., San Jose, CA 95123; (408) 629-1325. ■

On The Wing

...by B ²

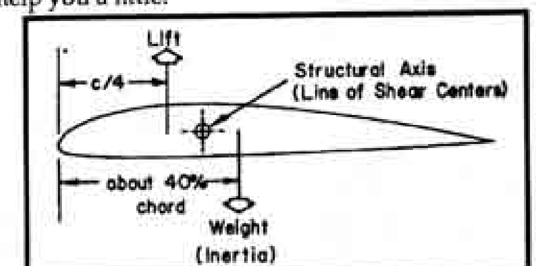
Bill & Bunny Kuhlman, P.O. Box 975
Olalla, Washington 98359-0975

The description of Project Penumbra which appeared in the October 1990 issue of *RCSD* elicited several requests for the Penumbra.1 and Penumbra.2 sketches. Additionally, we've received a couple of pieces of correspondence from Bill Kubiak outlining the causes of flutter and offering some possible solutions. (If you'll remember, Penumbra.2 seemed to be very prone to flutter during launch. So severe was the flutter that one launch saw the right winglet shake off!) Bill's explanation is very clear and is applicable to conventional aircraft as well as our tailless creations, so we decided to reprint it here in our column.

"I also am interested in 'wings, dating back to '49 when I was at Northrop and did a small job on the YB-49 and the Snark. My modeling of 'wings, however, is limited to hand launch gliders of various configurations.

"You seem to be concerned with the higher speed of the 'wings and with flutter and other structural considerations. Well, let me throw out a few remarks to see if I can help you a little.

"Consider:



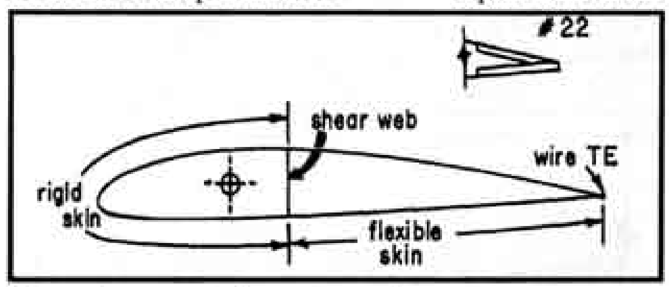
"The structural axis is a point through which you can apply a load without twisting the wing. Up loads ahead of the structural axis cause the wing to twist leading edge up; up loads aft of the structural axis cause the wing to twist leading edge down. The location of the structural axis varies with the design but generally, for enclosed sections, is at or near the centroid of the enclosed area. (The centroid is the center of mass of an object having a constant density. If a wing were composed of foam only, for example, the centroid would be at the CG of the wing.) So it usually happens that the centroid is located as shown above. Since inertia is always opposite to the lift we always have a couple tending to twist the wing about the structural axis.

"The location of the lift vector is pretty well fixed, so the thing to do is move the structural axis forward toward the lift and to move the inertia forward. This would reduce the destabilizing couple. If you went to extremes you might even get the centroid and structural axis ahead of the lift.

"I'm sure you are familiar with balancing an aileron or elevator at its hingeline (or maybe a little ahead) to prevent flutter. The same thing applies to a wing. The structural axis is the hinge line that the wing twists about. If you can get the inertia ahead of the structural axis then an up gust will give a leading edge down twist to the wing, relieving the gust twist.

"As an aside: In the '50's I was at McDonnell Aircraft in the structures department. John Meyer, Chief of Structures, wrote a memo about wing design and flutter. He said that the F3H Demon wing had about 1500 lbs. of structure beyond what was required to take shear and bending loads, just to make that thin sweptback wing flutter resistant. In comparison, an examination of a captured MiG-15 showed that Mikoyan and Gurevich had accomplished the same thing by installing A 60 Lbs. weight in the leading edge of each wing tip. The weight moved the wing CG ahead of the structural axis to reduce or prevent flutter. While it is deliberate heresy to consider ballast weight in an airplane, this is one case of one pound of ballast replacing over 12 lbs. of structure.

"I know that D-tube leading edges are in disrepute because of aerodynamic reasons concerning the discontinuity of curvature at the rear edge of the "D". But, a D-tube leading edge really makes sense from a structural point of view.



"If a wing were to be constructed as shown above, with a D-tube leading edge having a skin rigid enough to carry the shear load and a rear portion consisting of a flexible (Monokote) skin and a wire trailing edge (ala WWI airplanes) the structural axis could be at the C/4. The weight also could be forward so that we could have a very flutter resistant design.

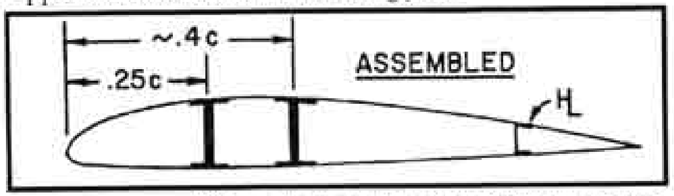
"My canard design #22 for John Borlaug was along these lines except that I didn't use a wire trailing edge. I used two 1/16" thick strips along the trailing edge. These strips are flexible in the vertical direction but are stiff horizontally to carry the Monokote loads. I can attest to the wing being flutter proof. I saw John perform a few horrendous dives without any sign of flutter. #22 met its demise while John was learning how to slope soar. He learned to never turn into the hill!

"I think part of your problem (with Penumbra.2) relates to the fact that you have a foam and fiberglass structure. I prefer open structures of balsa with a translucent covering because its so beautiful against the sky. I've never considered foam and opaque skin until now. So here comes a bunch of random thoughts about skin/foam structure.

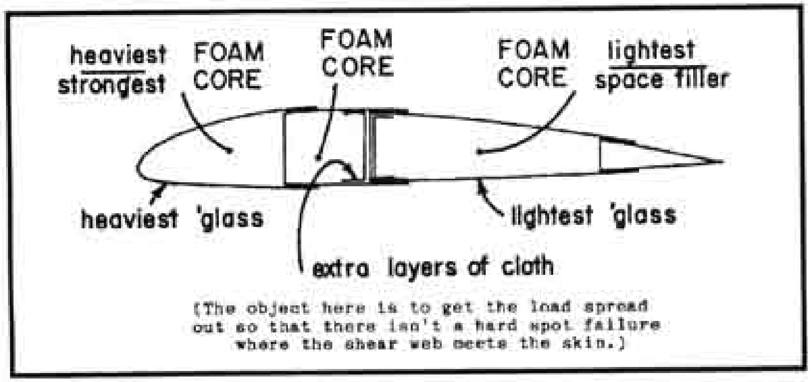
"When a wing deflects in bending the tip rises with respect to the root. The top surface is in compression and the bottom surface is in tension. When a beam deflects under load it tends to deflect in a manner to relieve the load. In a wing the top surface and the bottom surface want to deflect towards one another to decrease the depth of the beam. This reduces the strength of the beam so it can deflect to relieve the load.

"The tensile and compressive strength of fiberglass is about 200,000 lbs./in^2 until it buckles. The strength of foam is only about 1/1000 the strength of fiberglass. I really don't think the fiberglass even knows the foam is there.

"My first thought was to cut the foam core along a given percent chord from root to tip and put in a shear web. Vertical grain balsa of course. Balsa is 10 times stronger than foam (and 10 times heavier) but it's still not nearly as strong as fiberglass, so it isn't quite what we want. I think fiberglass shear webs would be the way to go if the vertical column strength is sufficient and if the web is fastened to the upper and lower skins with a strong joint.

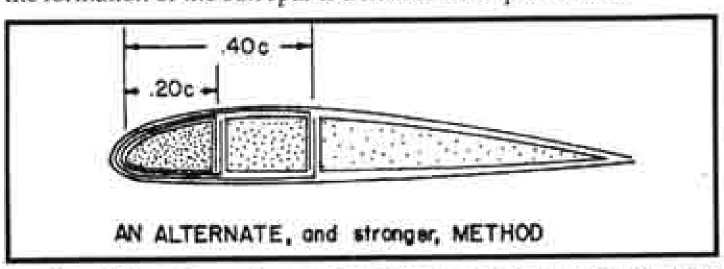


"Take a look at a Rutan Vari-EZE some time.



"The important thing to remember is that the shear web have sufficient strength to carry the compression loads tending to make the top and bottom surfaces touch."

An additional construction method using foam core(s) and fiberglass was described by Bill in a recent 'phone conversation. This is a vacuum bagged structure which provides both strength and mass in the forward portion of the wing. It is probably similar to what some of you are doing already regarding formation of the D-tube, but the formation of the box spar is a noticeable improvement.



In response to all of this information, we're redesigning the entire Penumbra structure. The major changes are as follows: (1) The spar system will be strengthened and moved forward, and unidirectional fiberglass cloth will be used to increase spanwise rigidity. (2) One layer of bidirectional fiberglass will be placed with grain at 45 degrees to the wing's leading and trailing edges in an effort to increase torsional rigidity. (3) Rigidity of the control surfaces, particularly the ailerons, will be monitored very closely, as will their own CG. (4) Servos will be chosen with regard to lack of play at the output shaft, and linkages will be rigid.

We hope that you've gained as much from reading Bill's material as we have. John Borlaug's Counsellor, the canard that Bill mentions in this article, will be described in a future column. ■

Converting Small Gliders into Electric Sailplanes

...by Ed Slegers
Route 15, Wharton, New Jersey 07885

If you fly sailplanes or electric converted sailplanes you probably already have, or have thought about getting, a small hand launch type plane to play around with.

I have a few different hand launch planes and can tell you they're lots of fun. They're small so that they can fit into the back seat or trunk of your car; they're light so that damage is kept to a minimum. You don't need a large field. They don't cost too much and, because they are small, they don't cost much to finish. Some do not need a hi tech radio, although most will require micro servos.

The disadvantage is that you have to do what the name implies; and that is, hand launch it. This means that you need a pretty good arm and not everyone does. Even if you have a good arm it can still get tiring throwing a plane 15-20 times in an hour, in 90 degree heat. Some of the manufacturers must also know this. For example, the Chuperosa, and some others, come with a tow hook. Of course, this takes away some of the advantage of just getting your plane out and flying. Now you have to find a field large enough to handle a hi start and you have to spend time setting the hi start up. If you don't want to throw your arm out or get involved with a hi start, try converting your small plane into electric.

If you do not have a small plane yet and want to get one to convert into electric, there are two types to consider: a thermal rudder/elevator polyhedral type for some great easy flying or a slope type plane for more aerobatic type flying. Or, maybe, both so that you could fly no matter what the wind conditions are.

I mentioned the advantages of a small plane, but with electric conversions this advantage of small can turn into a disadvantage. So, special construction and equipment is needed to get all the components into the fuselage.

The first thing to remember is to keep it light. An FAI 05 7 cell in a two meter plane a couple of ounces heavy will still fly good. But, in a small 60 inch hand launch, a couple of ounces will make the difference between having a really great flying plane or a no flying plane.

The first thing to do is inspect all the wood. If you find any hard and heavy pieces, replace them. I use only CA glue for all my construction. Maybe cut out some holes in the rudder and elevator. I've even cut holes in the wing if it's a balsa covered foam wing. Don't add too much, if any, trim, on your covering. On some models, to save weight, I did not cover the fuselage. Do what's called hard wiring. That means, use as few connectors as possible by soldering directly to the motor and speed controller. I use only one connector (between the battery and speed controller). Use small connectors (Deans work well). Use small batteries. Remember these are small planes

Weasel

Chuperosa

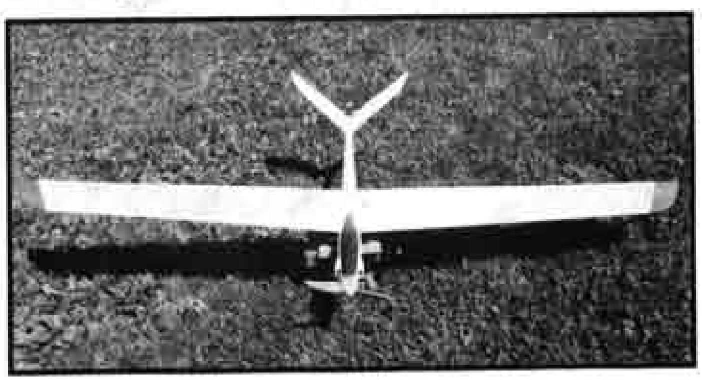
and do not take long to get high enough so that they are hard to see. Small, light speed controllers are a must. You can see that it is not all that difficult to keep the plane light, but pay attention to the weight. Believe me, it will make all the difference as to how well your plane will fly.

I'll describe a few of the planes that I've converted into electric and I think with this information you can adapt these procedures to other planes.

A plane that makes an excellent electric sailplane is the Chuperosa by Culpepper Models. I've found the best motor to be the Astro Flight .035 on 5 cells with a 6x6 folding prop. The fuselage has to be widened about 1/2 inch. Two holes will have to be cut in the fuselage for the brushes to stick out of. The wing on the stock plane is held on with one bolt in the center. This gets in the way of the battery pack. Change to a dowel in the front and a bolt in the rear of the wing. I used a Benson speed controller and a Futaba Radio.

The next plane is the Weasel from DCU. This is a really neat little pod and boom plane. The pod is fiberglass with a slip on nose cone. The wing is a built-up balsa polyhedral or foam. (You can order either.) I used the built-up balsa because it's lighter. The Weasel is a little more difficult to convert because the pod is very small, but well worth the effort. IT flies great.

The best combination I've found is to use the Hiline ELF50 motor on 5 cell with a 7x3 prop. I also used a Benson speed controller. The Weasel is a V tail so you will need a computer radio to mix rudder and elevator. A small disadvantage of the Weasel, or for that matter any electric plane with a slip-on nose cone, is that you have to remove the prop to get the cone off. To avoid this, make sure to put all your connectors and switch under the wing.



Swift 400

Another good plane to covert is the Vertigo by Flite Lite. This is the plane that Brian Agnew won the recent NATS with. The Vertigo is a V tail balsa covered foam wing and stabs. The Vertigo builds very light making it perfect for electric. Again, you will have to widen the fuselage a little. A computer radio is needed for V tail mixing. I used the same equipment as the Weasel.

Other planes I've converted using the same type of construction are the Flinger, Gnome and the Dixie. All these are available from Northeast Sailplane Products. Remember, these are slow, gentle flying planes that were converted to eliminate hand launching.

If you want a high performance small electric sailplane try the Swift 400 from Flite Lite. The Swift is a fiberglass fuselage foam wing, already covered with balsa, V tail slope soarer. This is an aileron, elevator plane so you do not need a computer radio. This is one of the few small fiberglass fuselage slope type planes that a motor and battery pack will fit into. Most are too small. I have one Swift with a cobalt FAI 05 7 cell which I only recommend for the experienced builder and flyer. The performance gets close to the 7 cell F3E. The set-up that works well for sport flyers is the cobalt .035 on 6 cell. This gives you a little more room to work with and the flight performance is a little milder. In both cases, you will have to cut a hole in the side of the fuselage for the brushes to fit. On the .035 6 cell I use the Futaba S133 servos and the MCR-4A receiver/throttle. On the FAI 05 I used S133 servos a four channel Futaba and a Benson speed controller. On the .035 I used a 6x6 prop and on FAI a 8x4.5. Both versions of the Swift make excellent electric planes.

Remember to keep it light and plan ahead, there is not much room for all the equipment .

Last month I wrote about the WACO 7-570 from Weston Aerodesign and said it has great potential. Well, it does. Mike Lachowski borrowed one that was three days old and got third place at the NATS.

If you have any questions on electric that you would like to see covered in *RCSD* let me know.

Great flying! ■

Winches....

and the Gentle Art of Caring for Them!

...by Taylor Collins
9140 Guadalupe Trail N.W., Albuquerque, New Mexico 87114

(Taylor originally wrote this article for the Albuquerque Soaring Association Newsletter. He has a Rahm Winch/ Retriever. Ed.)

Electric Winches have been a part of R/C Soaring since the late 1960's..... and like it or not, they are THE STANDARD means of launching a sailplane in the United States.

Unfortunately, most everyone seems to learn to fly off a high start. High starts are simple to operate, they are cheap, they are compact, and they are light weight. However, high starts are not very powerful, they deteriorate over time, and there can be a tremendous difference in pulling power, even between "identical" high starts. High starts have one distinct disadvantage....Once you turn loose of your airplane, you are at the high start's mercy....If you stall, and snap roll into the ground, the high-start will unceremoniously drag the wreckage of your airplane the length of the field....NOT A PRETTY SIGHT! Enough said....If you are going to fly in major contests, winches are a fact of life. Hopefully, some of the following will be helpful in making the transition from high start launches to winch launches.

Launching

If you have NEVER launched on a winch before, it is helpful to get someone experienced to "run" the winch for you. The piloting part of a winch launch is not much different than a high start launch. Once you have a few successful tows with someone else tapping the footswitch, you can start to do your own winching.

There are a few key points which may not be obvious. After the plane is hooked up to the winch line....MAKE ABSOLUTELY CERTAIN that the radio is turned on....The winchmaster should ask to see a "wiggle" of controls. The winch footswitch should be tapped a couple of times to take the slack out of the line. Then, when the pilot is ready to go, give the switch one firm pulse. The weight of the plane will determine how long to hold down the switch on that first pulse... Small, lightweight planes like Gentle Ladies don't need nearly as much initial horsepower as a Falcon 880. When the line tension has built up adequately...THROW the airplane into the air. You should throw it hard enough to assure flying speed, no matter what the winch does. If the line breaks, the winch malfunctions, or anything else happens....you want to be certain the plane has flying speed... Gliders without flying speed drop like bombs and break. THROW the airplane when you launch it!

As soon as the airplane is out of your hand, begin a steady rhythm of tapping on the switch. If the plane is accelerating too fast, hold the switch down less on each tap... If you need more power, hold the switch down longer. DON'T try to hold the switch down in longer pulses.... You'll set up an oscillation of "TOO MUCH"...."TOO LITTLE"...."TOO MUCH"...This erratic application of power will cause the plane to zoom, swoop, and do lots of hard to control, bad things. Just tap your foot like you were at a country hoe-down. As the plane nears the top of the launch, you can slow down the tapping rhythm. In a strong wind, you can actually "kite" the airplane up, spooling line off the winch drum. BE SURE TO LET THE WINCH MASTER KNOW WHEN YOU ARE OFF THE LINE. He may be watching the machinery, and not your airplane. He can then actuate the retriever, or pull the line on down to the turnaround if there is not a retriever in use.

When you become experienced at winch launches, and you have a strong enough airplane, you can try "Zoom" launches. The idea here is to accelerate the airplane at the top of the tow, even applying down elevator to build speed, while holding the winch switch down to increase line speed, then pulling the airplane up, off the towline, and "zooming", turning airspeed and momentum into additional altitude. Done properly, this technique can get a lot of extra altitude. DONE IMPROPERLY (like probably 50% of the people who attempt it!) you will dive down too far, zoom off, and not get back as high as you would have from a "NON-ZOOM" launch. Another neat (but dumb) trick is to get a good zoom, and then stall four times in the recovery, falling below where you would have been without the "Zoom". Like most everything else in R/C Soaring....liberal application of the "P" word is essential. PRACTICE!

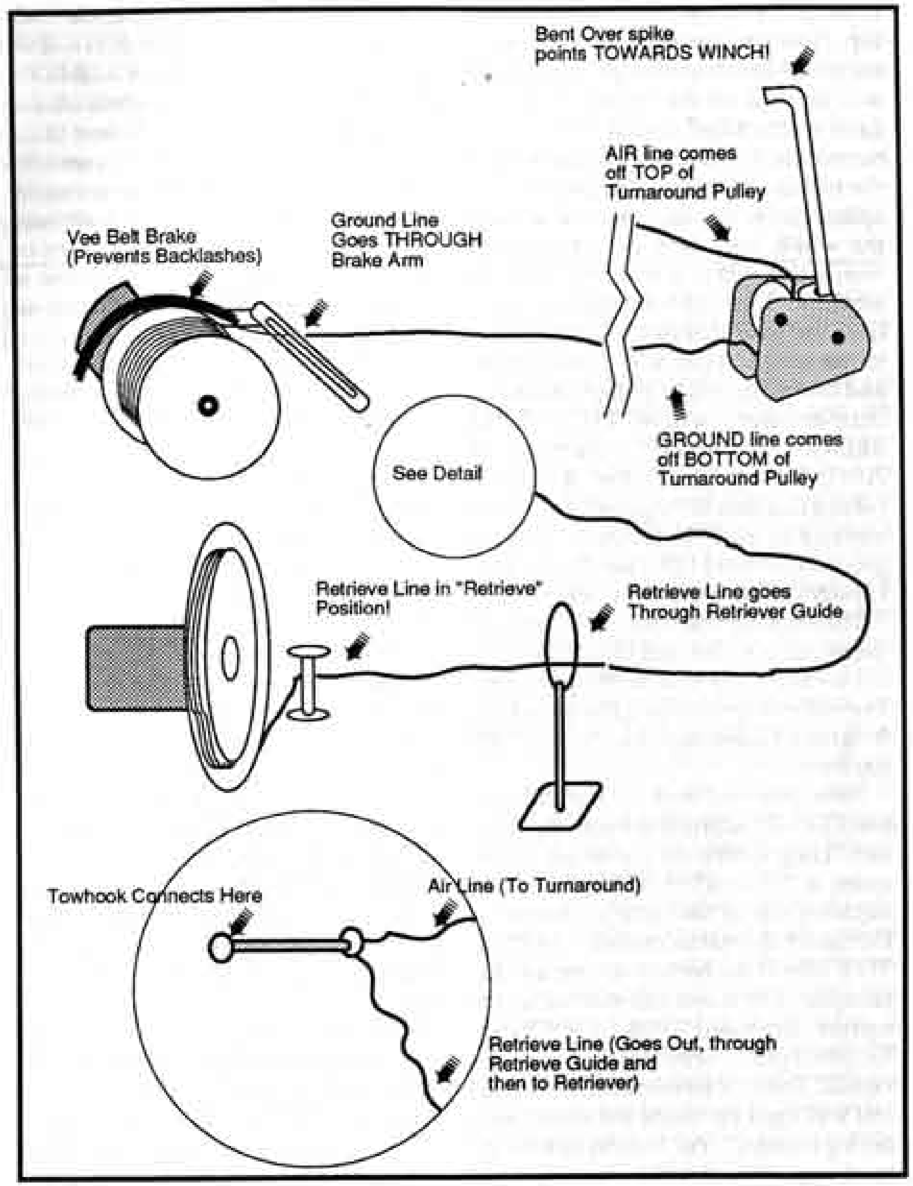
When you get to the transition point, and are ready to start "winching" your own launches, remember....YOU CAN ALWAYS BACK OUT... unlike a high start... IF YOU GET IN TROUBLE....step back from the pedal, and fly the airplane wherever you happen to be. A twenty foot launch is always better than a thousand foot CRASH!

Advise for Would-Be Winchmasters

Rule number one.... If you don't know what you're doing... Don't do anything at all! Winches and retrievers appear deceptively simple...but there is a real learning curve.... and a rhythm to the successful operation of them. Some of the key points are outlined below.

Setting up the Winch & Retriever

Obviously, the best direction to string



out the winch is INTO THE WIND. Many times, though, this isn't possible. Arroyo Del Oso Park does not lend itself to launching in a North-South direction. Fortunately, with a retriever, this isn't a major problem....we can align the winch diagonally across the field, somewhat into the wind, and retrieve the winch line before it blows across the trees, fences, etc.

Position the winch on the field. The line can be run through the turn-around, and the parachute end of the line can be secured to the winch. Make absolutely certain that the groundline (the one that runs on the ground all the time) is going through the turn-around from bottom to top. Now you can walk the turn-around out to the desired point upwind. The line will unwind off the drum. When you have reached the desired point for the turn-around... spike it into the ground. If the turnaround uses a "bent-over" type spike....point the bent portion towards the winch, so that it cannot catch the winch line when it falls free from the airplane. Now, pick up the two winch lines and walk them out all the way back to the winch. They will twist together, and the twists will be pulled toward the turn-around, where THEY WILL BREAK!.... if you don't walk them out. HINT: I always pick up the "Air Line"... the one that goes to the parachute and the airplane in my RIGHT hand.... and the ground line in my LEFT hand. That way, I always know which is which.

The retriever line must be run through the retriever guide, and then attached to the swivel at the base of the parachute. The retriever guide should be staked into the ground about eight feet in front of the retriever.

Now, you can hook up the batteries. MAKE CERTAIN that the polarity is correct. Long shaft Ford starter motors require a NEGATIVE GROUND...(the negative side of the battery connects to the case of the starter motor). The POSITIVE side of the battery connects to the solenoid. The motor will run fine (in the correct direction) FOR ABOUT SIX LAUNCHES.... with the polarity reversed. Then the connections to the field coil will burn up inside the motor, rendering it useless. Yes, I found this out the hard way!

Plug the phone jack plug on the winch switch into the socket on the winch panel. The footswitch should be located on the ground on the retriever side of the winch cart. This gets the retriever line away from the winch.

O.K. - You're going to be Winchmaster. The pilot has his plane hooked up to the line.... Make sure that his radio is ON!. MAKE SURE THAT THE RETRIEVE LINE IS OFF THE RETRIEVE PULLEY....so the line will spool off the face of the retrieve drum! Failure to do this will break the retrieve line, and result in a launch of about five feet of altitude! Make certain that the retrieve line is not going to catch on anything or anybody. Make sure that no one is flying in the launch area.... and that all pedestrians, kids, cats and dogs are out of the way. Make sure that the main battery switch is ON.... that the primary solenoid switch is ON. Now you can tell the pilot that he is free to launch.

The pilot should tell you that he is off the tow.... Immediately reach down, grab the retrieve line, and hook it around the retrieve pulley. The line feeds onto the large drum from the BOTTOM of the drum. Hold the line in place across the retrieve pulley with one hand, and actuate the retriever switch with the other. The retriever runs off a six volt battery, which is slow enough that you can run the parachute back WITHOUT PULSING the retriever switch. Don't be timid. It's noisy, but safe. If you start pulsing the retriever switch, the winch line goes slack enough that the automatic brake on the winch engages and disengages, causing a lot of chirping and squawking, and undue strain on the winch and retriever lines.

When the parachute (or yellow strap) reaches a point about thirty feet in front of the retriever guide.... release the retriever switch. If it looks like the parachute is going to come through the guide, you can stop the retriever drum by grabbing it with your hand.

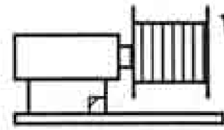
Safety Aspects

Electric winches and retrievers are powerful machines.... fast moving nylon line can cut like a bandsaw. The immediate area around the winch is no place for a club meeting... and particularly not a place for small children. As winchmaster,

area. When the retriever is energized, it makes a violent pass forward through the area. Make sure that the pilot, timer, etc. are aware of the problem. Everyone else should be well clear of the area regardless of the wind.

The solenoid on the winch can weld itself in the "On" position. If this happens, there is an emergency cutoff switch which will disconnect the power to the winch. EVERYONE should be aware of where this switch is and how it works.

Final Point.... If in doubt, ASK! Properly used, the winch and retriever can make for a lot of a happy flying. Improperly used, it can make for a lot of grief, injuries, and broken aircraft. ■



Winch Line
...by Gordon Jones

Gordon Jones, 214 Sunflower Drive, Garland, Texas 75041; (214) 840-8116

I have watched with mixed emotion over the years as the "local expert" attempted to teach a beginner to fly. In most cases everything worked out well but, in some cases, an entrant into the hobby was turned off during his initial instruction on the art of glider guiding. There are many reasons why this happens, and I think it begins on the ground. Prior to teaching in the air, the instructor should provide a ground school on the basics of flight, and provide instruction on what the controls have on the aircraft. This gives the student an idea of why he has to provide different types of control inputs. It gives him an understanding of the principals of flight and what he should be trying to accomplish while in the air. A program for each flight should be a prelude to the flight itself so the student will understand what he is trying to accomplish. With this accomplished, the instructor can get the student where he wants to be in the first place...in the air. Once in the air, this program or flight plan should be followed closely so as not to confuse the student. Depending on the level of understanding on the part of the student, some variation is acceptable. By regimenting the flight instruction and accomplishing a variety of tasks in a logical order of progression, the skill and self confidence of the student is enhanced with each flight. I have seen both the random approach and the logical approach work, but the logical approach will speed the process in every instance.

Some points that seem to work well are to teach turns from both right and left hand, as opposed to just one way. Another is to teach the student to land as quickly as possible, and then continue to work on the landing sequence with each flight thereafter. Don't put the plane up at 10,000 feet and five miles away and expect the student to see it well enough to be able to understand what is going on up there. Teach what to look for when the student encounters lift and what actions he should take to get into the thermal. Conversely, teach him how to get out of lift if he is specking out and is having trouble getting down or seeing what is going on. (We don't want him to blow up his pride and joy.)

I have a mental list of things that I want the new flyer to accomplish during every session and, with a little preflight discussion and some inflight work, these are usually accomplished in short order. I even go so far as to plan a time to talk the student through a loop (usually without telling him what is going to happen for that unexpected surprise). This is usually a real confidence builder.

There is one last point that is worth mentioning. Try to figure out what approach works best with each student. There are some that require a calm voice and gentle words. Others need the 2x4 approach to get the point across. I even brought a 2x4 to the field once for a real hard headed guy. It did get my point across very effectively. ■

More on Catapulting Sailplanes

...By Frank Deis
Pikes Peak Soaring Society
2680 Fairway Dr., Colorado Springs, CO 80909-1026

(The June issue of *RCSD* contains Frank's initial article on catapulting. Frank plans to, "Submit a rules proposal during the 1992/1993 rules' cycle establishing a catapult launching category for R/C sailplanes." Ed.)

In case I did not get your attention the first time, I am here to try again. This time I have some "techie stuff" but the rest of you are welcome to play along too - this is pretty straight forward. Be forewarned, however, the numbers will look a little strange when compared to the ones you usually see in RCSD.

I have been doing a little serious design work to determine what a good catapult sailplane should look like. I thought I would provide some basic data in case you would like to try as well. This discussion covers the basic performance calculations for the launch and climb to altitude. The rest of the flight is a standard thermal soaring problem so I will not dwell on that phase here.

Because catapult sailplanes will be small, they will be at a basic performance disadvantage. (See Martin Simon's articles on sailplane performance.) Therefore, I need a sailplane that will get at least as high on a catapult as a traditional sailplane does on a winch. For design purposes I am shooting - pardon the pun - for a roll-out altitude of 800 ft. Because I only know where I want to be at the end of the launch phase, I have to work the problem backwards to determine how to start.

First, I assumed that the sailplane starts at zero altitude, flying straight up at some initial velocity. (This will be converted to the catapult exit velocity later.) The sailplane will continue upward until a combination of aerodynamic drag and gravity slow it to a stop and then it will fall back toward the ground. For this part of the design study I needed to determine how high the sailplane will go for various combinations of drag and initial velocity. As you might expect, the only difficult part of this problem is accounting for the drag. This is easy to do if you understand the concept of the "ballistic coefficient". The ballistic coefficient is defined as:

- **BALLISTIC COEFFICIENT (lbs/sq ft) = WEIGHT (lbs) / [C_D * REFERENCE AREA (sq ft)].**

The drag acceleration - some might call this a deceleration - is then:

- **DRAG ACCELERATION (gs) = (DYNAMIC PRESSURE)/(BALLISTIC COEFFICIENT)**

where:

DYNAMIC PRESSURE = .00125 * [VELOCITY (ft/sec)]^2.

The total acceleration is then the sum of drag and gravity and is given by the equation:

ACCELERATION TOTAL (ft/sec^2) = - (32.2)*(.00125 * (VELOCITY)^2 + 1).

Using these equations you can set up a spread sheet to calculate the climb performance. (For you computer jockeys, I set up a row in the spread sheet for each time interval and just numerically integrated the difference equations for velocity and position time step by time step. I used a time step of 0.1 seconds and it seemed to work pretty well.) The only remaining problem is what to use for the ballistic coefficient. To estimate the ballistic coefficient, I ran MaxSoar for several different Sailplanes I have and printed out a hidden table that contains all of the data used in plotting the performance charts. From the table it is easy to get the C_D data for the whole design (not just for the wing) and from the summary data I could get the weight and the wing area. With this data it was a snap to calculate the ballistic coefficient. The range seems to be 20 to 50 lbs per square foot. I decided to use the Talon value of about 20 (it weighs 16 oz) and to carry along a value of 30 assuming 8 oz of water ballast. For the non computer jockeys I ran my spread sheet model for a few different cases and plotted the results in figure 1. It shows the relation between initial velocity and the final altitude for several ballistic coefficients. To get a Talon like sailplane with an extra 8 oz of ballast to 800 ft altitude requires an initial velocity of 350 mph. Without the ballast it will never get to 800 ft. - I warned you the numbers would be surprising!!!

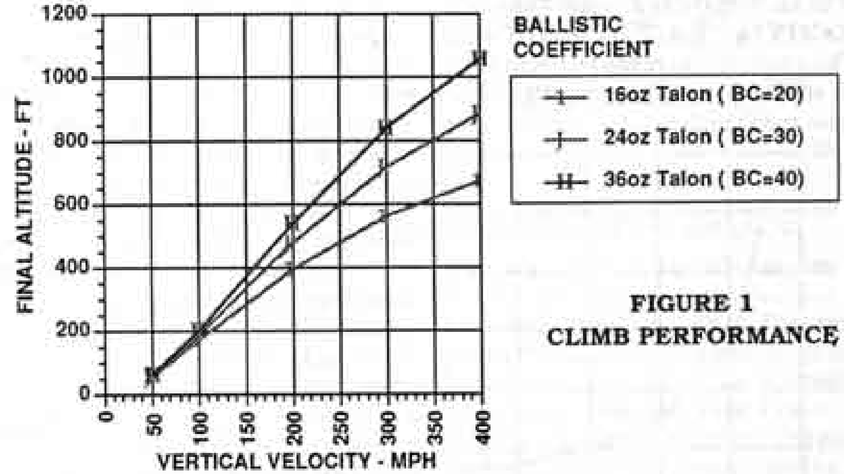


FIGURE 1
CLIMB PERFORMANCE

Continuing to work the problem backwards, the next issue is that the catapult launches the sailplane horizontally instead of vertically. Making the turn from horizontal to vertical will cost some energy. The equation I used to estimate the speed loss during this pull up maneuver is:

•FINAL VELOCITY = INITIAL VELOCITY * e ** [(-π/2)/(LIFT/DRAG)]. (This neglects the gravity losses, but they are small when you turn through 90 degrees at 350 mph.)

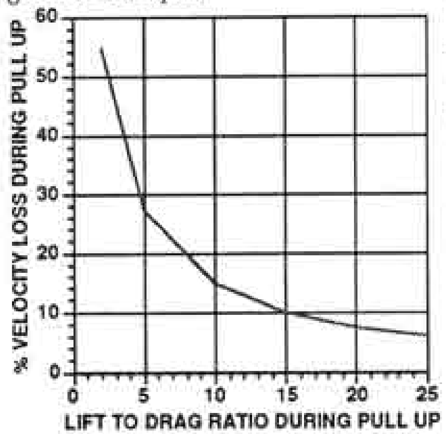


FIGURE 2 VELOCITY LOSS DURING PULL UP

Using this relationship, a 90 degree turn at an L/D of 10 will result in a velocity loss of 15% as shown in figure 2. This means the catapult exit velocity must be 410 mph to leave the 350 mph after the pull up necessary to coast to 800 ft roll-out altitude.

The last step is to determine the characteristics of the catapult. I did this with another spread sheet model very similar to the climb performance one described above. I used the ballistic coefficient approach to account for drag as before and only had to develop the equation for the acceleration due to the catapult. (Things happened pretty fast during the launch, so I had to use a 20 millisecond time step in my spread sheet model.) The trick here is to get the "force constant" for the catapult. (Some of you may recognize this as the spring constant.) I have a medium strength Magnum HighStart so I worked with it. I hooked a fish weighing scale to the ring on the end of the high start rubber and measured a one foot length. I stretched it to double its relaxed length - 2 feet - and noted the reading on the fish scale. It was about 8 lbs. Hence, doubling the length of the rubber tubing produces 8 lbs of pull or a force constant of 8. The rubber is pretty linear out to 4 times its relaxed length. It takes 16 lbs to stretch it to three times its relaxed length - 3 feet - and 24 lbs to reach 4 feet. Stretching it more than this gives non-linear results and eventually breaks the rubber! Within this range the spring constant can be used to calculate the pull if you know the stretched length.

The catapult spread sheet key equations are given below:

• CATAPULT ACCELERATION (gs) = (CATAPULT LENGTH (ft)/ RELAXED LENGTH (ft) - 1) * [FORCE CONSTANT (LBS)/ (SAILPLANE WEIGHT (LBS))]

• DRAG ACCELERATION (gs)= .001125 * [VELOCITY (ft/sec)^2] / BALLISTIC COEFFICIENT (lbs/sq ft)

• TOTAL ACCELERATION (gs) = CATAPULT ACCELERATION (gs) - DRAG ACCELERATION (gs)

I ran this model for several force constants (i.e. number of strands of high start rubber tubing), ballistic coefficient values and sailplane weights. Representative results are shown in figure 3. There is some sensitivity to catapult relaxed length that favors longer catapults so I stuck with the 10 meter (32.8 ft) standard length. As you can see, a non-ballasted "Talon like" sailplane achieves a higher catapult exit velocity, but recall from figure 1 that the low ballistic coefficient keeps it from reaching the 800 ft altitude objective. The ballasted Talon

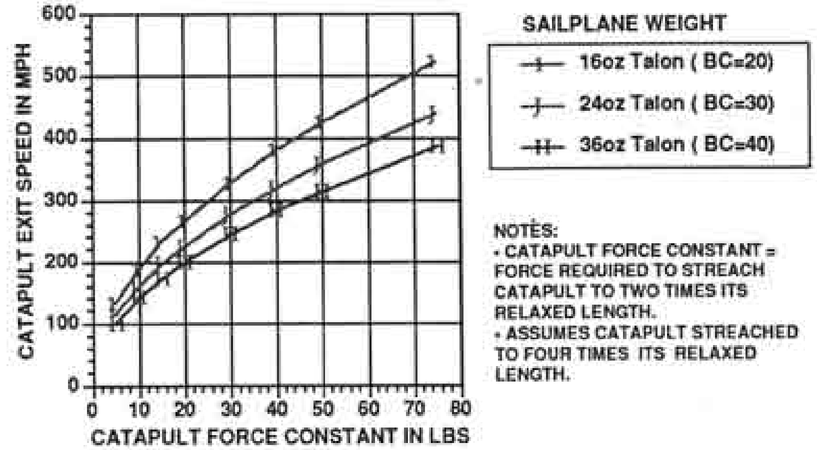


FIGURE 3 CATAPULT LAUNCH PERFORMANCE

climbs better but the extra weight reduces the catapult exit velocity. The answer seems to be to ballast the Talon and increase the number of strands of rubber on the catapult to compensate for the weight.

In summary, as promised, here is what happens during a typical flight assuming a Talon like model with 8 oz of water ballast. First hook up your model to the ballast. First hook up your model to the catapult consisting of nine strands of medium weight high start rubber ten meters long and stroll back about 90 ft where the pull is about 200 lbs. (A weight training program might be required prior to this flight.) Level the wings, set the camber for minimum drag, switch to the low rates on your dual rate transmitter - you won't want much control throw -, hold your breath and release the model. It accelerates initially at about 140 gs and all of the components in your receiver lean back as though they are in a strong wind. As the sailplane gains speed the catapult length shortens and the pull diminishes. About one quarter of a second - (Yes, that is .25 seconds!) after release the catapult falls free, the speed is just over 400 mph and the acceleration is now negative 9 gs due entirely to the drag forces - and all of the receiver components are now leaning the other way. You apply the slightest bit of up elevator and begin a perfect pull up at a lift to drag ratio of 10 : 1. The wings gently flex under the 90 g load of the pull up maneuver and you begin a 100 ft radius turn. (The next time I do this I gotta increase this turn radius!) The flight path pulls up to the vertical and the air speed falls off to a more reasonable 350 mph. You have now been airborne for about 1 second and can relax as the sailplane climbs by itself for the next 6 seconds to its cruise altitude of 800 feet. (Victory rolls during phase show a lack of breeding as does uncontrolled out bursts of Wheeeee, YaHOOO, Holy ..., etc.). You roll out at altitude, drop the 8 oz of water ballast, set the camber for maximum lift/drag and begin your standard search pattern on the way to another max. You still have to fly a perfect 10 minutes and spot land. If your heart is still beating, your sailplane is still in one piece and you can see something this small at that distance, getting the max should be easy.

All kidding aside, I warned you the numbers would be surprising compared to the ones you normally see in *RCSD*. We are probably a few years away from a flight like this because many new construction techniques must be developed and proven. I don't think building the wings will be a problem. They are pretty small and vacuum bagging produces plenty of strength. Building a light, low drag fuselage capable of withstanding the initial pull of 200 lbs will require care. Handling the concentrated loads at the tow hook and at the tail where you hold it prior to release will require some innovative design work as will the wing attachment. The radio equipment installation will require some new techniques to protect it against the broad range of accelerations fore and aft as well as vertical. I believe the first technical hurtle to be overcome is the design of the tail surfaces. They must be strong thin structures that will not flutter at speeds approaching 400 MPH. A similar innovation will be required to avoid "aileron buzz". The control linkage must be very tight and precise. The high accelerations probably rules out pushrods and forces us toward cables and perhaps pull only type systems. If solved, Sailplaners could lay claim to the broadest speed range in modeling - nothing would fly as fast or as slow (out doors at least) - and all without an engine. (A fellow club member suggested a flying wing design ...Hmmmmm.) Think of all the time we could save over time consuming winch launches. (BE CAREFUL—HAVE FUN!)

Perhaps we could talk *RCSD* into holding a design competition. Those interested could chip in $10 or $20 to enter and the designs could be submitted for evaluation in 12 months. The objective would be to get a design that would catapult well and then really soar... no arrows please. Judging would be based on MaxSoar estimates of performance (L/D ratio, sink rate and speed range) and certified demonstrations of actual performance to establish launch height. I would suggest a maximum ballasted weight of 2 pounds, an unballasted wing loading of no more than 8 oz/sq ft and a maximum catapult length of 10 meters attached to a pole no more than six ft high. Any one game to push back those frontiers?? Contact *RCSD* and let them know what you think. ■

Frank tells us that he has been building models since he was a kid and received his BS in aeronautical engineering from Purdue University and a masters in engineering from the University of Florida. For those of you interested in talking to Frank about the calculations and assumptions contained in this article, we suggest that you contact him direct and that weekends are best if you decide to call. Ed. ■

A Press Release

...from Bob Steele, President, League of Silent Flight

Extensive changes have been made to the LSF operating structure in the first half of 1991. For the past 12-15 years LSF has had a paid "operating secretary" in the Chicago vicinity performing the day-to-day work of the organization. That's why LSF mailing addresses were always Chicago area P.O. boxes. Some years back, LSF converted its operation from one that worked with pieces of paper and filing cabinets to a computerized system. The computer system was what is termed a "main frame" system, a VAX computer made by Digital Equipment Corporation. The entire system worked well as the operating secretary had a terminal in her home.

However, as time passes, people and responsibilities change and suddenly the LSF work didn't have the same priority it once did. This exposed the fatal flaw in the existing system. That flaw was that the LSF officers, no matter who they were, had no direct control over the computerized files. As the day to day work of LSF slowed to a crawl, the frustration of members and officers alike became more and more intense. Something had to be done. After much thought, talk, and soul searching the only possible answer became obvious and has now been implemented.

LSF has purchased its own IBM clone 286 processor computer with a 40 million byte hard drive, both standard types of diskette drives, and a near industrial quality printer. The file containing information on over 6500 members was transferred to the new computer and we are now ready to tackle the future.

The other necessary change was made by moving the LSF mailing address to a new, permanent address. ALL LSF correspondence should now be sent to: League of Silent Flight, 10173 St. Joe Rd., Ft. Wayne, IN 46835. The old Winfield, IL P.O. box will continue to forward mail to the new address for one year only. After that you'll get it back. This change is effective August 15,1991. In addition, if you have a special problem, you may call AC 219 485-1145 days or evenings and we'll try to help you out.

The effect of these changes on the LSF organization will be dramatic. The LSF officers, upon election, will receive the LSF computer along with the usual bank accounts and other papers, thus giving them immediate direct control over the day to day work in process. We know of several. past officers who will be delighted to see this happen! The officers, of course, don't have to do the work themselves, they can pay someone else to do it for them, but they will always be in control.

What does this mean to the average member? It means that when you bring a problem to an LSF officer you will know that he can do something to resolve the difficulty. Most importantly, it means that turnaround time for LSF mail will be back down to the 7-14 days that it once was. These changes have been expensive and very difficult to make but your current officers feel sure that in a very short time you'll agree it was worth it. ■

This drawing was done by Curt Nehring for Ed Popko, Hudson Valley Soaring Society, to use as their membership card. Curt says, "The H.V.S.S. is a NEW soaring club out of New York."

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*.

Modi 900

...from Greco Technologies

One of the hottest developments in model airplane building these days is composite, vacuum bagged wing construction. Even with as much discussion as there is about it, it still seems to be shrouded in a veil of mystery, in part due to the high-tech nature of this technique. While there are many articles written about the process it is still beyond many builders to create an airplane from scratch due to several factors: the cost of start-up materials, finding materials, and obtaining the additional knowledge not found in articles required to create a quality, high-performance aircraft.

One company, Greco Technologies, is looking to change that by developing a new line of radio controlled airplane kits. This engineering and technical consulting firm based in Pasadena, California is using its expertise to create a new line of planes. The first plane in the series, the *Modi 900*, an open-class competition airplane has a 50 inch fiberglass and Kevlar fuselage, with RG15, triple taper cut wings made out of blue foam, glass, and lots of carbon fiber vacuum bagged together; and is now available to the public in kit form. The development of this unique airplane was undertaken by Greco's staff of aerospace engineers/sailplane enthusiast, allowing them insight into both the technical aspects of aerodynamics and the wants and needs of the hobbyist. Their objective was simple... to use the latest advances in technology and proven design techniques to create an aerodynamically sound sailplane that excelled in speed, duration, and thermaling. Thus, engineering a plane that is excellent for F3B, SCSC, and Sportsman competition; in addition to just plain having fun with a well crafted, high-performance aircraft. With an RG-15 airfoil this plane zips across the sky with little loss in altitude. The *Modi 900* can leap from one thermal to the next while most others are struggling with the headwinds. No, you can't expect to relax behind the stick of this plane, things happen way too fast. Looking down to trim this airplane is not a good idea. The *Modi* is sensitive, and built to fly fast. This sailplane does rolls and loops with almost no loss of energy in the translation. Flying your first *Modi* will be an exciting experience, and a great way to test the limits of your piloting abilities. Please, no beginners.

The *Modi 900*sets itself apart from the competition with its attention to the strength and durability. Every layer of the aircraft was designed and built with strength verses weight considerations in mind. The wings start with a RG15 airfoil made of PRB blue foam, that withstands 25 psi. This is over laid with a full layer, top and bottom, of 4.5 oz. carbon fiber cloth, plus a second layer of cloth both on the top 10" and the bottom 15" at the root of the wing. The outer layer is 1.4 oz fiberglass cloth, and epoxyed throughout all the layers. The root ribs and sub ribs are made of 1/4" plywood, laminated with strips of carbon fiber to insure endurance. The wing joiner rod is a 1/2" carbon fiber rod laminated within a brass tube giving it the tinsel strength of steel at a fraction of the weight. Aluminum shaft hinges for the flaps and ailerons are included, this design withstands much more pressure than the standard method of tape and mylar. The fuselage is fiberglass with two strips of Kevlar in the boom for added strength and to help reduce stress fractures.

During strength testing of the airplane, the wings withstood up to 375 foot pounds of pressure before fatigue. Which means a standard F3B winch will not break the *Modi 900*. Other vital statistics of the *Modi 900* include: Span: 110 in. wing, 50 in. fuse; Wing Area: 902.6 sq.in.; Weight: 78 oz.; Wing loading: 12.46 oz./sq. ft.; Aspect ratio. 13.1:1; Airfoils: RG15 wing, SD8020 stabilizer.

The *Modi 900* comes with all the features you would expect from a quality kit. The instructions are well laid out and include complete construction plans with detailed drawings and pictures, all written in easy to understand English. The entire plane can be built with standard tools found in most shops. However the use of some electric power tools speed up the construction process, and these techniques are discussed in the plans. All the hardware needed to build the plane is included in the kit, which eliminates trips to the local hobby store. The *Modi 900* kit comes in two forms Pre-Bagged and Almost-Ready-to-Fly.

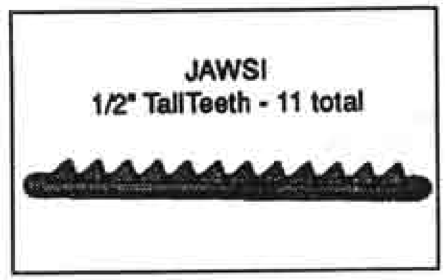
The Pre-Bagged kit consist of wings in their rough stage, just out of the bag. To insure quality the excess carbon cloth and fiberglass cloth, leftover from the bagging process, is cut from the leading and trailing edge. The same pre-cutting is done for the vacuum bagged stabilator and rudder. The major work to be done on this kit is sanding. No major tools are necessary although a scroll saw is handy. The kit takes approximately 30 to 80 hours to complete, and retails for $595. This is a great way to get into vacuum bagging without the cost and strain of trying to figure the process out for yourself.

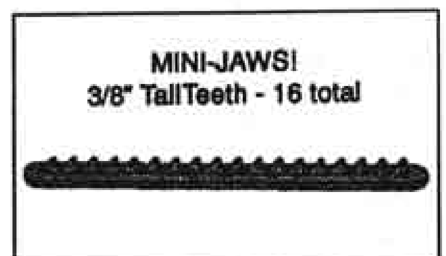
The ARF kit comes with the ailerons and flaps cut out, and the stabilator bellcrank installed. All that is left to complete the plane is to finish sanding the paint or coverings and installing the radio and servos. This version takes between 10 to 15 hours to complete and retails for $895. For more information or a catalog contact Greco Technologies at: P.O. Box 10, South Pasadena, California, 91031; or call: 1-800-34 GRECO, extension #23. ■

Soaring Accessories

...from Soaring Stuff

The **JAWS** glider skid are now available from Soaring Stuff. These multi-toothed skids are molded from high density urethane rubber (90 durometer hardness) and can be attached to the bottom of most sailplane fuselages with either cyanoacrylate adhesives or mechanically with screws. JAWS is available in 1/2" tooth and 1/4" tooth (MINI-JAWS) configurations. They are designed to stop even the heaviest sailplanes on most any surface... to maximize those all-important landing points. JAWS and MINI-JAWS sell for $3.50 (postage paid in the Continental United States). Visa, MasterCard, and American Express are all accepted by Soaring Stuff. Dealer inquiries are invited. Soaring Stuff, 9140 Gualalupe Trail N.W., Albuquerque, New Mexico 87114; (505) 898-1129.





Fabrico Inc.

Sailplane Flying Accessories

- *High Starts*
- *Retriever & Winch Line*
- *Line Swivels*
- *Building Accessories*

Send for free catalog:
Fabrico, Inc.
P.O. Box 30032
Cincinnati, Ohio 45230

GLIDER RETRACTS

Servo actuated glider retracts. Over center up/down lock. Aluminum parts made on computer-controlled milling machine from 6061-T6. These beautifully crafted retracts are made from the finest materials available, and are the best offered anywhere. Made in the USA.

1/5 SCALE 3 oz. without wheel. 1-9/16"W x 4"L x 2"H. 2¾" wheel max.

1/4 SCALE TWO TO CHOOSE FROM.
STD - FOR GLIDERS UP TO 10 LBS. 5.2 oz without wheel. 2"W x 3-7/16"L x 2¾" H. 3.5" wheel max.
HD - FOR GLIDERS OVER 10 LBS. 6.5 OZ. 2"W x 6"L x 2¾"H. 3.5" wheel max.

1/3 SCALE 8.8 OZ. without wheel. 2¾"W x 6"L x 2¾"H. 5" wheel max.

FIVE-FOOT PUSHRODS-1/16" Music Wire with casing.

Send stamped self-addressed envelope for pricing and more info to:

SCALE GLIDER COMPONENTS
7034 FERN PLACE
CARLSBAD, CA 92009
(619) 931-1438

WING RODS

➡ Bullet Proof ♦ Super Strong ⬅

Case-Hardened Tool Steel
Falcon 880 Drop-In Replacement
$10.00 Includes S&H

Other Sizes: 3/16" to 1/2" up to 24" Long
Guaranteed to NEVER set a bend on the winch or in flight!

FREE Catalog
Send SASE
or Falcon Rod
Order to:

Dave Squires
2225 Fazeli Ct.
Campbell, CA 95008
(408) 371-4789

GLIDER TOWLINE PARACHUTES

☆ Quality Crafted
☆ High Visibility 13" Nylon Canopy
☆ 8 Shroud Lines
☆ 2 Metal Attach Rings

$5.95 ea. plus $1.00 P & H
Calif. add 6% Tax

C.A. BELL CO.
P.O. BOX 1198
SAN ANDREAS, CA 95249

FAST SHIPMENT FROM STOCK

MODEL PLOTTING SOFTWARE

AIRFOIL PLOT PROGRAM...$25
Plots airfoils up to 42 in. chord
MODEL DESIGN PROGRAM...$40
Includes airfoil plot program plus wing plan program & more.

Send SASE for more details
(615) 455-5788

Chuck Anderson
P.O. Box 305
Tullahoma, TN 37388

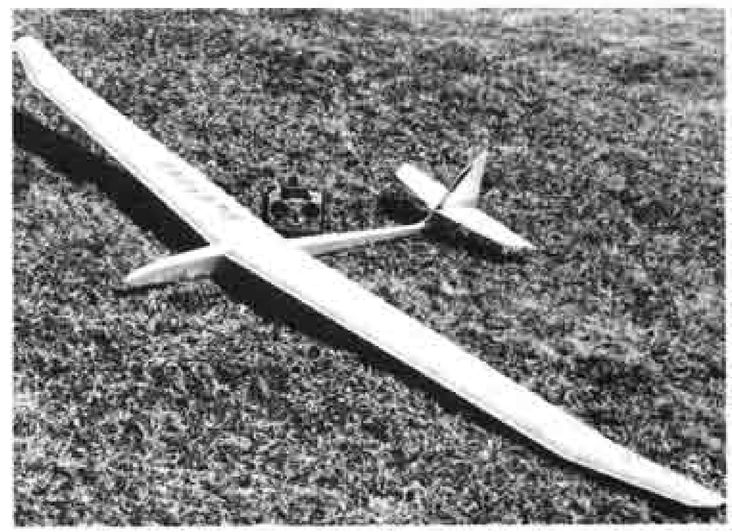
Quality & Performance

You expect excellence in these attributes when buying a kit, but how many times have you been let down? Typically either you pay through the nose to get both or you sacrifice kit quality and performance for price. Sometimes you pay through the nose and are still let down. Well, Culpepper Models has just released a kit designed to offer high quality without high kit cost, and high performance without the need to purchase a computer radio and several servos.

Introducing ALCYONE

A Leroy Satterlee design, based on the NATS Champion Chuperosa, featuring:

• A strong, light, yet elegant balsa/ply/spruce built-up fuse • Foam core wings (7032 transitioning to 7037) • A super strong spar structure which tows very well. • A special wing design offering 80-90% of the features of full trailing edge camber without the expense of four wing servos and a computer radio • Can be flown with THREE servos a STANDARD radio • Outstanding kit quality with complete hardware • A comprehensive instruction manual • Excellent flight performance



Wingspan: 121", Wing area: 975 sq. in., Weight: 60 oz., Loading: 9 oz., Airfoil: SD7032/7037

An Alcyone can be yours for $149.95. Call NSP today!

NorthEast Sailplane Products

16 Kirby Lane Williston, Vermont 05495 (802) 658-9482

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

Free instruction for beginners on construction and flight techniques. Sunday - Thursday. Bob Welch, 1247B Manet Drive, Sunnyvale, California 94087; (408) 749-1279

Fall & Winter 1 day seminars on composite construction techniques. Free with purchase of Weston Aerodesign plan set ($35.00) or kit. Frank Weston, 944 Placid Ct., Arnold, Maryland 21012; (301) 757-5199

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 $9.00, 1984 for $9.00, 1985 for $11.00, 1986 for $10.00, 1987 for $10.00, 1988 for $11.00, 1989 for $12.00. Third class postage included. For 1st class include additional $1.50 per issue. (U.S. funds) Walt Seaborg, 1517 Forest Glen Road, Oregon, WI. 53575

BBS

BBS: Slope SOAR, Southern California; (213) 866-0924, 8-N-1

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

Reference listings of *RCSD* articles & advertisers from January, 1984. Database files from a free 24 hour a day BBS. 8-N-1 Bear's Cave, (414) 727-1605, Neenah, Wisconsin, U.S.A., System Operator: Andrew Meyer

Reference listing is updated by Lee Murray. If unable to access BBS, disks may be obtained from Lee. Disks: $10 in IBM PC/PS-2 (Text or MS-Works Database), MacIntosh (Test File), Apple II (Appleworks 2.0) formats.

Lee Murray, 1300 Bay Ridge Road, Appleton, Wisconsin, 54915 U.S.A.; (414) 731-4848

Contacts & Special Interest Groups

California - California Slope Racers, Rich Beardsley (Director), 2401 Country Lane, Santa Maria, California 93455 U.S.A., (805) 934-3191

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

Eastern U.S.A. - Eastern Soaring League (Covers North Eastern U.S.A.), Frank Weston (Editor), 944 Placid Court, Arnold, Maryland 21012 U.S.A., (301) 757-5199

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

© Curt Nehring

F3B/USA

The Newsletter for the Multi-Task Soaring Enthusiast

Subscriptions: $12 / Year / Six Issues

Write: F3B/USA
Byron Blakeslee
3134 Winnebago Drive
Sedalia, CO 80135

(303) 688-9572

LSF

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

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

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

You are invited to join the

NATIONAL SOARING SOCIETY

- OFFICIAL AMA SOARING "SPECIAL INTEREST GROUP"
- YEARLY NSS "SOAR-IN" TOURNAMENTS
- NATIONWIDE "EXCELLENCE AWARDS PROGRAM"
- EXCELLENT BI-MONTHLY NEWSLETTER
- NSS FULLY SUPPORTS THE F3B SOARING TEAM & LSF SOARING PROGRAM
- NSS IS INVOLVED IN THE ORGANIZATION AND OVERSEEING OF THE SOARING PORTION OF AMA NATS (INCLUDING AWARDS BANQUET)
- YEARLY DUES ARE $12 (SPECIAL FAMILY RATES)
- NSS OFFICERS ARE FROM ALL 11 DISTRICTS

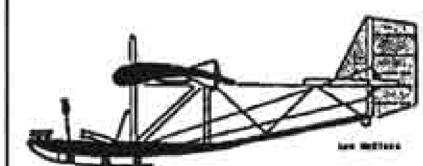
For Information, Contact:
NSS Secretary/Treasurer
Robert Massmann
282 Jodie Lane
Wilmington, OH 45177

T.W.I.T.T.

(The Wing Is The Thing)

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

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



The Vintage Sailplane Association

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

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

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.

For Sale - Business

SAILPLANE DESIGNER'S + DRAG REDUCTION & STRUCTURES HANDBOOKS, $7.95 each. Size/locate stable components, many low ReyNmbr airfoils via breaking Eppler's code, define speed/glide slope, design wing structure, drag reduction techniques. Eric Lister, 2214 Regina Dr., Clarksburg, MD 20871.

VACUUM SWITCHES. A good, high quality, low differential, adjustable vacuum switch for professional-type results when bagging Glass, Balsa, Obechi, Carbon Fibre, etc...$30.00. ONE-WAY VALVE for use in the vacuum bagging system between the Reservoir Tank and the Pump, a must for a good sealed system...$3.50. Add $3.50 to cover S&H. Send SASE for list of other R/C related speciality items. Make checks payable to: Tom Overton, 1302 Arleen Ave., Sunnyvale, CA 94087; (408) 736-1568.

For Sale - Personal

Airtronics Spectra 7 PCM System. New, never used, Channel 26, 4 servos (3-635 + 1-631)...$250.00 plus shipping. Jim Thomas, (616) 399-8337.

FOKA 4, all glass 1/4 scale by Airworld Models, RG-15 airfoil, orange gelcoat, fast & aerobatic, finished and flying...$1200.00. SALTO, 1/4 scale, all glass by Fiberglasflugel, 4.25m flapped wing, finished and flying...$1200.00. SALTO, 1/4 scale, all glass by Fiberglasflugel, 4.55m flapped wing, still in kit form...$1200.00. All models unbroken and in excellent condition. Flying models available with servos for additional charge. Call Bill at (619) 931-1438.

The BEST Hi-Start. PERIOD!

PINNACLE HI-START

- Day-glo dyed braided cord.
- UV-protected rubber.
- Custom, no-tangle chute.
- Welded fittings.
- The best reel made.
- Backed by NSP service.

Pinnacle-S (Upstart) $39.95
Pinnacle-L (2-3 Meter) $69.95
Pinnacle-M (2 Meter) $59.95
Pinnacle-XL (3-4 Meter) $89.95

NorthEast Sailplane Products **802-658-9482**

VACUUM BAGGING

Complete, Simple, Easy to Use System

RELIABLE ELECTRIC PUMP
With 1 Year Guarantee
BAGGING MATERIALS & SUPPLIES
Carbon Fiber, Rohacell, Kevlar

Dealer Inquiries Invited

CST

Composite Structures Technology

Dept. MD, P.O. Box 4615, Lancaster, CA 93539 · Order Desk 1-800-338-1CST

B² Streamlines

Presents

Scale Sailplane Plans

by Jim Ealy

P.O. Box 976
Olalla, WA
98359-0976

Send $2.00 for complete catalog, deductible from purchase of $10.00 or more.

ANY DUCK FLYER WILL TELL YOU

WE HAVE MORE FUN

THE TRUE PERFORMANCE ALTERNATIVE FOR

SERIOUS CONTEST FLYERS

FINEST QUALITY DELUXE KITS • ALSO, AVAILABLE WITH SHEETED WINGS AND FORMERS INSTALLED IN FUSELAGE

2 METER KIT.....$190.00
STANDARD KIT....$210.00

SHEETED WINGS - STABS-RUDDER, ADD....$140.00
FUSE ASSEMBLED...$35.00
AVAILABLE AS TIME ALLOWS

TO ADD FUN AND PERFORMANCE TO YOUR SOARING, CONTACT:

TROY LAWICKI
5954 KARLIN RD.
INTERLOCHEN, MI 49643
616-276-9696

DUCK FACTS

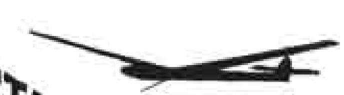
	2 METER	STANDARD
Wing Area:	78 5/8 In.	100 In.
Wing Area:	740 Sq. In.	965 Sq. In.
Flying Weight:	51-55 Oz.	63-67 Oz.
Wing Loading:	10 Oz. /Sq.'	10 Oz./Sq.'

Airfoil.....SELIG 3021 STANDARD WITH KIT
7032 OPTIONAL

DESIGNED BY 1989 AMA NATIONALS CHAMPION TROY LAWICKI, DUCKS ARE DESIGNED TO TAKE THE USE AND ABUSE OF CONTEST FLYING. ALL FLYING SURFACES ARE BALSA SHEETED FOAM. THE KITS ARE COMPLETE, BUILD VERY FAST AND DO NOT REQUIRE TECHNOLOGY BEYOND NORMAL MEANS.

FOR THOSE NOT FAMILIAR WITH MODERN FOAM CORE CONSTRUCTION, A VERSION IS AVAILABLE WITH PRE-SHEETED WINGS. FOR ALL OF ITS PERFORMANCE, THE DUCK IS A PLEASURE TO FLY.

LSF LEVEL 5, CAL POSTHUMA, SAYS, *"THE DUCK IS THE BEST PERFORMING, MOST PREDICTABLE RC SAILPLANE I HAVE EVER FLOWN."*. **4 DUCKS PLACED IN THE TOP 12 IN 2 METER AT THE 1990 AMA NATS. ONLY 4 WERE ENTERED.**



MAGNUM HI-START Co.

"We don't put you on... We put you up!"

100% Guaranteed the Best Hi-Start you've ever owned!

Tailor-made Hi-Starts for any size glider — Open Class, F3B, Cross Country or Scale. Until now, you couldn't buy a Hi-Start that would **successfully** launch that LARGER size sailplane on those light or windless days. ■ Custom designed to fit your needs using the highest quality mandreled latex tubing (not extruded tubing). ■ Designed to give superior resistance to abrasion, scuffing and tear. ■ Extremely low modulus **decay**...it won't lose its snap like extruded tubing does. ■ Kit complete with rubber, nylon line, rings, swivels, parachute, custom wind-up reel (not a spool). ■ Support items available are: standard chutes, contest chutes, custom wind-up reels, rubber, nylon line, rings, swivels. ■ ***"Special Orders Upon Request"***

Please send me the MAGNUM HI-START *I have selected:*

☐ 3-5 lb. GLIDER	☐ 5-8 lb. GLIDER	☐ 8-13 lb. GLIDER
$69.95 We suggest the MAGNUM 100	$74.95 We suggest the MAGNUM 200	$84.95 We suggest the MAGNUM 300

Name______________ Phone #__________

Address______________

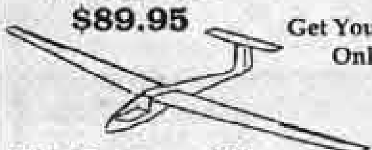
City__________ State________ Zip________

I have Enclosed a Money Order ☐ Check ☐ for $________ (Add $5.00 S&H)

All orders shipped UPS. Personal checks, allow 7 days to clear. Money orders or certified cashiers checks shipped next day.

MAGNUM HI-START CO. C&D ENTERPRISE • 5102 East Andora Drive
Scottsdale, AZ 85254 • (602) 996-1021

PHOEBUS
$89.95



Get Your Catalog -- Only $3.00!

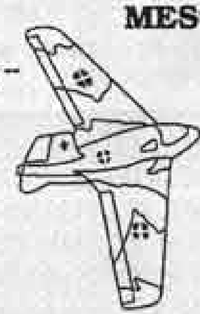
Wing Span	**48"**
Wing Area	**1 Sq. Ft.**
Weight	**10 Oz.**

2 Channel Operation
Fiberglass Fuselage
Foam Core Wing
Sheet Tail

$5.00 S&H per order
CA Res. Add 7% Tax

AMERICAN SAILPLANE DESIGNS
2626 CORONADO AVE., #89
San Diego, California 92154
(619) 575-5133

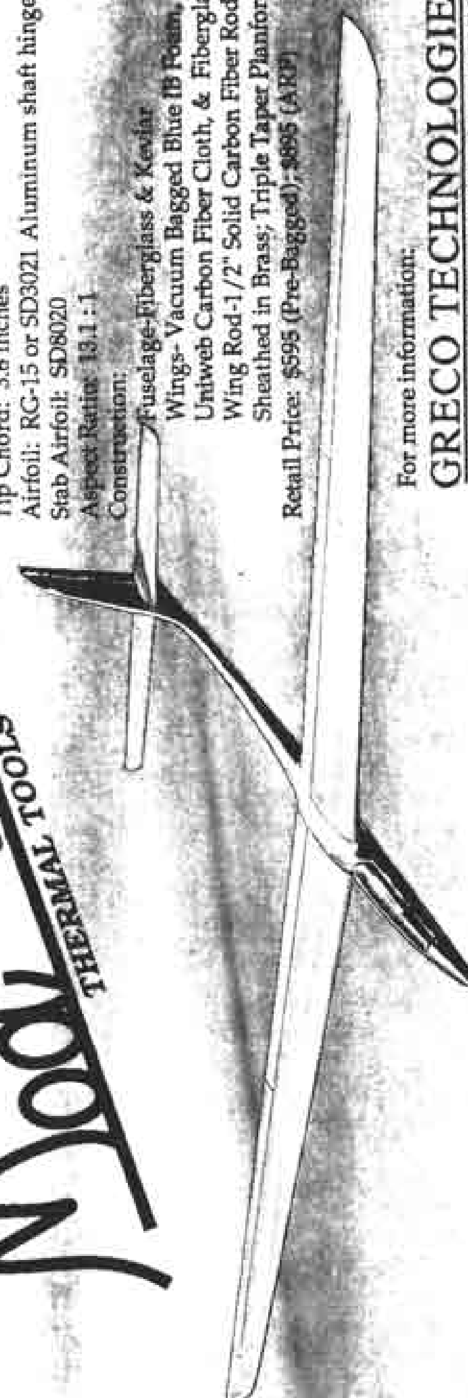
MESSERSCHMIT ME 163 KOMET
$69.95



A 1/8 scale slope soaring plane that is a ball to fly. The kit features a fiberglass fuselage and foam core wings that are to be balsa covered by the builder. Wings are detachable for ease of transportation. Specs. are 44" wing span, 300 sq. in. of wing area, and a flying weight of 34 oz. The Komet may also be fitted with an electric or glow engine for flatland flying.

SPECIFICATIONS

Type: Unlimited Class Sailplane
Wingspan: 110 inches
Wing Area: 902.6 square inches
Fuselage Length: 50 inches
Weight: 79 ounces
Wing Loading: 12.46 ounces per square foot
Root Chord: 10 inches
Tip Chord: 3.6 inches
Airfoil: RG-15 or SD3021 Aluminum shaft hinges
Stab Airfoil: SD8020
Aspect Ratio: 13.1 :1
Construction:
Fuselage-Fiberglass & Kevlar
Wings- Vacuum Bagged Blue fB Foam, Uniweb Carbon Fiber Cloth, & Fiberglass;
Wing Rod-1/2" Solid Carbon Fiber Rod Sheathed in Brass; Triple Taper Planform.
Retail Price: $595 (Pre-Bagged); $695 (ARF)



Modi 900
THERMAL TOOLS

For more information:
GRECO TECHNOLOGIES
TECHNICAL CONSULTING • ENGINEERING
Post Office Box 10
So. Pasadena, CA 91031
(213) 680-2070
1-800-34-GRECO

GRECO

The Name: The name Modi comes from Germanic and Teutonic mythology. Thor, the god of the sky had a son named Modi, a personification of his mighty strength.