

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

F3B/USA
The Newsletter
for the
Multi-Task Soaring
Enthusiast

Subscriptions:
\$12 / Year / Six Issues

Write: F3B/USA
Randy Reynolds
122 East Utah
Colorado Springs, CO
80903
(719) 471-3160

You are invited to join the
NATIONAL SOARING SOCIETY
OFFICIAL AMA SOARING "SPECIAL INTEREST GROUP"

- YEARLY NSS "SOAR-IN" TOURNAMENTS
- NATION-WIDE "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 AMANATS (INCLUDING AWARDS BANQUET)
- YEARLY DUES ARE \$12 (SPECIAL FAMILY RATES)
- NSS OFFICERS ARE FROM ALL 11 DISTRICTS

For Information, Contact:
NSS Secretary/Treasurer
Cliff Oliver
8151 Broadway
San Antonio, TX 78209

Vol. 7

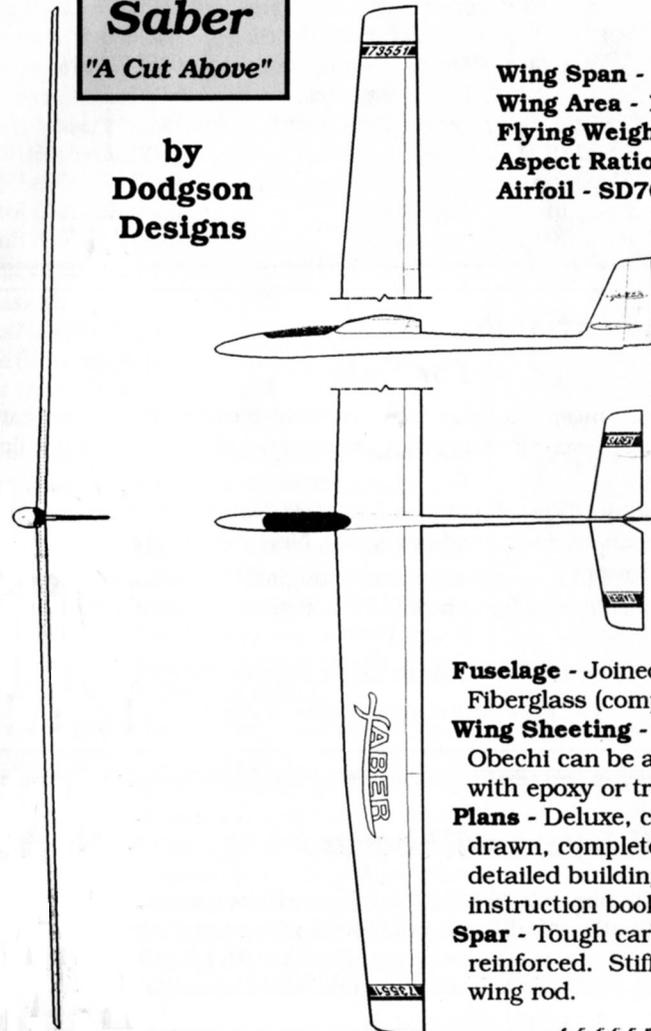
No. 9

September, 1990

Saber
"A Cut Above"

by
Dodgson Designs

Wing Span - 121"
Wing Area - 1030 sq. in.
Flying Weight - 70 oz.
Aspect Ratio - 14 to 1
Airfoil - SD7037



Fuselage - Joined
Fiberglass (complete)
Wing Sheeting - Full-size
Obechi can be applied
with epoxy or transfer tape.
Plans - Deluxe, computer
drawn, complete with
detailed building
instruction booklet
Spar - Tough carbon fiber
reinforced. Stiff, 3/8" dia.
wing rod.

© 1990 R/C Soaring Digest printed monthly twelve issues per year. Published by Judy A. Slates, 2026 Spring Lake Drive, Martinez, CA 94553. Telephone number (415) 689-0766. Subscriptions \$17 (third class) & \$22 (first class) per year in the USA; \$22 U.S. per year in Canada & Mexico; \$28 U.S. per year via Air Mail in Europe in U.K. \$19 U.S. surface mail; and \$28 U.S. per year via Air Mail in Asia, Pacific and Middle East (\$19 U.S. surface mail). All rights reserved. Reproduction with permission of Publisher allowed. R/C Soaring Digest, R/CSD, Radio Control Soaring Digest and Soaring Digest are registered names. The right to use R/C in place of R/C is reserved and registered for all above names.

RC SOARING DIGEST
P.O. BOX 6680
CONCORD, CA 94529

ADDRESS CORRECTIONS REQUESTED
FORWARDING POSTAGE GUARANTEED

DATED MATERIAL

Schedule of Special Events

Date	Event	Location	Contact
Sept. 22	Cross Country	Cornelius, OR	M. Bamberg (503) 640-5926
Sept. 22	Slope Challenge	Northfield, MN	T. Rent (612) 435-2792
Sept. 23	2 Meter, Standard & Unlimited - Thermal	Davison, MI	C. Smith (313) 694-4790
Sept. 30	Hand Launch	Canby, OR	B. Nelson (503) 645-5313
Oct. ___	Regional Slope Race	Santa Maria, CA	Rich Beardsley (805) 934-3191
Oct. 7	Flying Wing Annual Northrop	Taft, CA	C. Hatrak (213) 676-2833
Oct. 5-9	F3F Viking Race 1990	Buxton, North West Derbyshire England	Nic Wright 0352 720516
Oct. 14	2 Meter/Unlimited Thermal	San Diego, CA	B. Anderson (619) 286-8366
May 24-26 1991	Slope Race Mid Columbia Cup	Richland, WA	(509) 627-5224 Wil (509) 627-2603 John (509) 525-7066 Roy

Classified Advertising:

For Sale

- Brilliant E Electric-Powered Sailplane; wings ready to cover. With 2 new battery packs, Mabuchi Motor, several folding props, speed control, etc. All new. Never flown. \$300/B.O.
- Brand new Airtronics "Vision" radio on 53.5 MHz "hamband", with transmitter, receiver, 4 standard servos, charger and accessories. New. Never out of box. \$600/B.O.
- "New" Soarcraft LIBELLE — scale sailplane kit, original box with instructions, great wood, etc. This is an oldtimer from the mid 70's. Perfect condition and never built. \$200/B.O.

Jim Gray, 210 East Chateau Circle, Payson, AZ 85541
(602) 474-5015 (Call any time of day.)

Wil Byers will be moving, soon!

You can still reach him at (509) 627-5224, but he will be somewhere in-between the new house (that isn't built, yet) and the old address at 632 Meadows Dr. E. His ad in this issue shows the new house address at Rt. 4 Box 9544 in Richland, WA. Wil is a new advertiser this month: Mid Columbia R/C.

The Soaring Site

Exactly one year ago, today, the format of the *Digest* was changed and, now, we find that it is time to change, again.

In the last few months, the number of articles and information received has increased to the point where the size of the *Digest* must increase if we want to print all of it. So, effective with the October issue we intend to increase the size a modest 50%.

This is a big step for us. It means that there will not only be over 50% more work (Oh, my!), but a 50% increase in printing (no coded paper & no color) and postal costs, as well! Well, we took a deep breath and began analyzing all the costs and the different ways to apply these costs. The following is a breakdown on the subscription portion of the costs:

	Current	Effective 10-1-90
3RD Class/Bulk Mail	\$17	\$19
1ST Class Mail U.S.	\$22	\$26
Canada/Mexico (Air)	\$22	\$26
Surface (Europe/Asia)	\$19	\$22
Europe (Air)	\$28	\$36
Asia (Air)	\$28	\$42

Two dollars of each increase is due to the increase in printing. The additional cost is due to airmail & 1ST class postage costs!

The additional printing costs will be reflected in the advertising rate increases which will be effective December 1, 1990. It is assumed that part of the increase, of course, will be picked up by new advertisers. If you are a current advertiser, the new rate sheets will be sent to you within the next month.

What can you do to help? Well, many of you know that the *R/C Soaring Digest* is a cottage industry of two — Jerry & Judy. We will be sending you, effective with the October issue, a much larger *Digest*, but the subscription renewal forms will go out after we have begun to incur the increased costs. So, please return the latest renewal forms you receive. And, of course, keep the articles, information and computer disks coming!

Read & Enjoy, Jerry & Judy

About RCSD...

RCSD is a reader written-publication. The articles & letters are freely contributed to RCSD in order to provide:

"The widest possible dissemination of information vital to R/C soaring to enthusiasts all over the world."

It is the policy of RCSD to provide accurate information, but if we print a factual error, we want to make it right. Please let us know of any error in RCSD that significantly affects the meaning of a story. The opinions expressed are not necessarily those of RCSD. Please see the back cover for subscription costs and additional information.

R/C Soaring Digest Staff

Jim Gray — Founder, Lecturer, Technical Consultant
• High Start
602-474-5015
210 East Chateau Circle
Payson, AZ 85541

Jerry Slates — Technical Editor
• Jer's Workbench
• Articles & Letters
• Announcements
• Advertising
• Club Newsletters
415-689-0766
P.O. Box 6680
Concord, CA 94524

Judy Slates - Editor & Publisher
• Subscriptions & Address Changes
• Submission of Articles & Letters Via Disk (Macintosh or IBM) or Modem
J. Morgan Graphics - Printing
(415) 674-9952

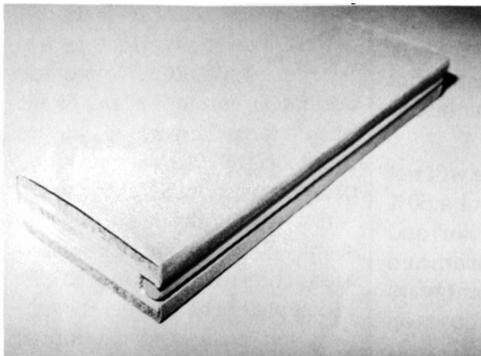
Jer's Workbench



Mike Mellor's Sanding Block

The sanding block may appear to be an insignificant nothing laying on the back side of your workbench, but it is one of the most frequently used tools in our hobby. Unfortunately, it is also one of the most overlooked.

I have been using a somewhat flat board as a sanding block for as long as I can remember. Imagine my surprise when I received two beautiful sanding blocks in the mail from Michael Mellor of Eugene Oregon. I am so pleased with how well they work, that I wanted to share his construction of the blocks with you.

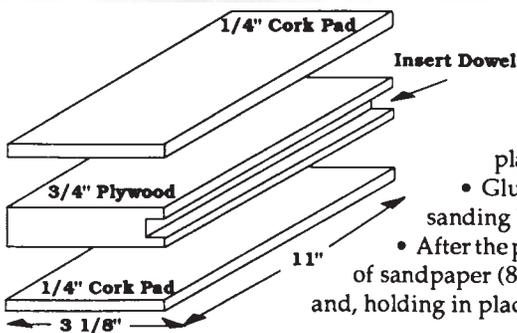


There are two special qualities about this sanding block:

- It uses a full sheet of sandpaper. Hence, there is no cutting or trimming required!
- Because of its size, it is perfect for sanding sheeted wings.

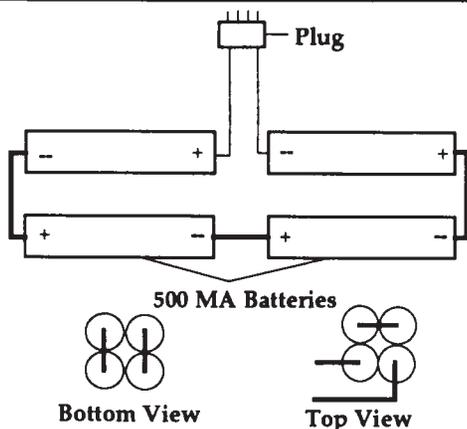
So, before you start your next project, let's take some time out to build a long-lasting sanding block. The block is constructed as follows:

- Obtain 3/4" plywood. Cut 3 1/8" wide by 11" long.
 - Cut a 3/8" square groove down one side.
 - Insert a 3/8" dowel. The dowel will be used to hold the sandpaper in place.
 - Glue 1/4" cork pads to the flat sides of the sanding block.
 - After the pads have cured, wrap with a full sheet of sandpaper (8 1/2 X 11) starting at the groove edge and, holding in place, insert dowel into groove.



Ever forget how to wire a battery pack? The following diagram is a handy reference for the shop wall or reference notebook.

Gordon Jones
214 Sunflower Drive
Garland, Texas 75041



Yes, the proper sunglasses for one's eyes plays a vital role in our ability to see our planes at altitude. It must be noted, as mentioned in earlier articles, that you should consult with an optometrist to get the best type or color for your eyes. I wear prescription glasses and have a problem with light to begin with so, early on, I talked at some length with an ophthalmologist (who was also into flying RC craft) and, after a very thorough check, came up with the best prescription for my eyes. It happens that my eyes react to a dark gray coating better than the green or yellow tints. The bottom line here is that you need to have your own specific requirements analyzed by a professional in order to obtain the best results for your eyes.

VISIBILITY

...by Gordon Jones

We have all read articles over the years that pertain to visibility of our sailplanes in flight and the best sunglasses or patterns to use in order to see our craft better. Well let me add to the list with a slightly different perspective on the subject.

The next item that a great many people overlook for a long time is the color of the covering on the plane they are flying. While that neat color scheme looks great on the ground a few feet away you may not be able to see it in the air as well as you would have wished. It can sometimes be a disaster to get into trouble by not recognizing the attitude of the aircraft. If you have noticed this happening to you at some point, you might take some time to watch a variety of planes flying on a clear day. Write down the ones that you can see the best. Then do the same thing on a cloudy or overcast day. Compare the two lists and see which colors will be best for you.

Every eye has a different reaction to color to some degree. The dark colors (black, blue, charcoal, green and red) show up very well for some people, while the lighter colors (yellow, white, tan and orange) are easier for others to see. Some people scoff at the choice of a particular color (I'm always getting flack over my basic orange and white color schemes.), but visibility is in the eye of the flyer. And, visibility is the key to keeping planes right side up and going where we want them to go.

Another point to pay attention to is the pattern of the colors you choose. Many people put a couple of bands of an alternate color on the bottom of the wing to increase visibility. Others prefer a band or bands on the top of the wing to distinguish the altitude of the aircraft. Once again, look at other airplanes before you cover that new bird and find out what you can see best prior to covering. In one article I read some time back, one flyer was changing colors and adding patterns on one of his airplanes until he found the right combination. Personally, I think that looking at what is already there will do the trick for most of us, unless you have a fetish about covering.

Gordon Jones
214 Sunflower Drive
Garland, Texas 75041

F3B Patches, Pins & Decals

Additional 1989 team patches, pins & decals are available from team manager Don Edberg, 4922 Rochelle Ave., Irvine, CA 92714. Patches & pins are \$2.00 each, and decals are 3 for \$1.00. Please include a \$.25 postage for each patch, pin, or 3 decals ordered. Proceeds will go to the 1991 Team Fund. A limited number of 1987 Official World Championships pins are also available for \$2.00 (includes postage).

Walter began his talk with some slides; a short history of the origins of the Flying Rainbows, followed by photos of his 'wings in the air. "Magnificent" is the only word to describe them. Other photos showed some of the experimental configurations Walter has tried, plus some good closeups of present design features. One outstanding characteristic of Walter's 'wings is the pattern of their brilliant colors — truly "Flying Rainbows"!

The more technical portion of Walter's talk began with an explanation of the similarity between conventional tailed aircraft and flying wings: that is, the flying wing does have a horizontal stabilizer — it is at the wing tips! The same stabilizing loads produced by the tail of a conventional aircraft are also produced by the ends of the wings for a tailless aircraft. Once this idea becomes a part of your thinking everything to be known about flying wing pitch stability becomes quite obvious.

Walter gave the "magic formula" for wing twist. This computation involves such things as the aspect ratio, moment coefficients of the airfoils used, taper ratio, and stability factor. The end result is the geometric twist needed for stability. He then led the symposium participants through an example which made everything clear.

On The Wing ...by B²

The first part of November, 1989, saw us in Madison, Wisconsin, for the Madison Area Radio Control Society's National Sailplane Symposium. MARCS '89 enjoyed a very large number of attendees, and all of the speakers were superb. Of particular interest to flying wing enthusiasts was the presentation given by Walter Panknin, the originator of the "Flying Rainbow" series of flying wing sailplanes. This month's column will be devoted to a synopsis of Walter's presentation, "Flying Rainbows; Basics, Building and Beauty of Flying Wings".

New Product News Release

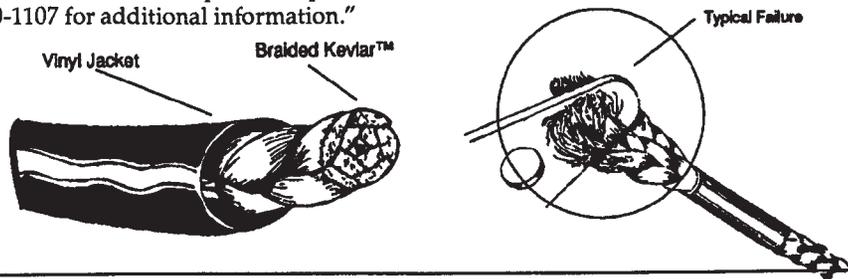
Kev-Cord®...from Aerospace Composite Products

"Aerospace Composite Products proudly announces the development of a totally new concept for control cables for model aircraft. Kev-Cord® is composed of an eight strand braided Kevlar™ filament inner core, surrounded with a high density vinyl jacket.

"This combination provides a control linkage cable which absolutely will not stretch, and is protected from fraying by the vinyl coating. Ideal for any Radio Control or other model application which requires a precise, pull-cord actuator. Kev-Cord® may be used with pulleys, threaded through guide tubes (such as Ny-Rod™ tubing), or used in tension, unsupported.

"Kev-Cord® is available in two sizes... .038" dia. (85 pound test tensile strength) or .054" dia. (215 pound tensile strength). Kev-Cord® is packaged in 20 foot lengths, and sells for \$7.00 per package (.038) and \$9.00 per package (.054). Like all Aerospace Composite Products, Kev-Cord® is available direct from ACP or from selected dealers.

"Call or write to Aerospace Composite Products, P.O. Box 16621, Irvine, CA 92714; (714) 250-1107 for additional information."



As a general recommendation, use the Eppler 222 at the root and the Eppler 230 at the tip. A wing root chord of 14 inches should give enough room for the receiver and a large battery pack (1200mah). A span of 110 to 140 inches and a tip chord of 9 inches gives a lot of wing area. The geometric twist used is determined by the "magic formula". Control of pitch and roll is by elevons which extend over the outer one third of the semi-span, while speed range is increased by use of spoilers or flaps. Servos must be put into the wings themselves so that they are directly linked to the control surfaces. Construction should be of foam with balsa skins to provide a strong, stiff structure that will have excellent performance. This excellent performance was demonstrated by both mathematical modeling and results of actual flight testing against conventional tailed aircraft.

Of special interest to us were Walter's ideas concerning winglets. While not needed for flight, they are recommended as aids to visibility — as Walter so aptly said, "Out of sight, still in mind, comes the crash!"

The harmonic oscillations that can occur during high wing load maneuvers were also mentioned. Walter's solution involves maintaining a relatively large root chord.

Walter's presentation concluded with the five steps to success: (1) Understand what you do; (2) Build it stiff, not only strong; (3) No play in the linkages; (4) Precise location of the CG; and (5) Have confidence that it will fly. He then issued a challenge to the symposium attendees: "Would you try it?"

A complete transcript of Walter Panknin's presentation, along with all of the pertinent drawings, will be published by MARCS the latter part of 1990. It should be in every tailless fan's library! The usual selling price for the complete Proceedings of the MARCS Symposiums is \$10.00 plus \$1.00 to cover mailing costs. Contact Walt Seaborg, 1517 Forest Glen Road, Oregon WI 53575, for date of availability and final cost.

If you have access to a Commodore 64 computer and Simon's BASIC, you may be interested in obtaining a copy of Walter's Flying Rainbow computer program which can assist you in designing your own flying wings. Contact Lee Murray, LJM Associates, 1300 Bay Ridge Road, Appleton WI 54915, for more information.

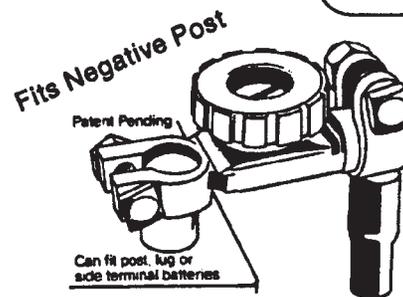
Bill & Bunny
Kuhlman
P.O. Box 975
Olalla, WA
98359-0975

Battery Master Switch

...from Ray McGowan

Ray says that this switch is handy to have! He uses it himself and is providing us the information on how to obtain one.

Ray McGowan
2661 Adrian St.
Napa, CA 94558



"Disconnects all electrical circuits with a simple turn of the knob. Attaches to battery in minutes. Heavy duty. Suitable for 12 and 24 volt batteries. Eliminates battery drain, prevents electrical fires, provides emergency cut-off. Remove knob to stop theft and unauthorized operation. \$12.95 each postpaid. (Add \$1.00 for special ADAPTOR POST when used with side terminal battery.) BATHURST, INC., Box 27, Tyrone, PA 16686, (814) 684-2603 (Quantity discounts — 12 units or more)"

The "Pivot" concept of soaring is not new to the Monarch. Besides being able to pivot, the Monarch can swing one wing forward and, while swinging the other wing rearward, can turn in very small convection cells. This allows the Monarch to turn almost within a radius of the span itself. The Monarch does indeed perform the full gambit of all soaring maneuvers. Without any detectable thermal at ground level, the Monarch can climb out of sight of even 7X50 binocular range.

Vortex

It is only natural to start with the vortex as this, of course, is the standard form found higher in the atmosphere. For this reason, it seems to be described most often. However, I find this type very little at the lower levels such as at tree height and, at this level, they are small in size and generally violent to deal with. When the air is unstable, these little twisters appear here and there and are made visible by the debris thrown into the surrounding air. When you see this, you know that the conditions are great for soaring.

These little dust devils can grow to well over 2000 feet above the ground, and I have sat on top of them in a sailplane many times. This shows that any lift of this type can be very strong, and a good roll rate is required to stay in such lift with your R/C ship. Because the lift is so organized, it is small and easy to miss, but if you see your glider react with unusual speed and motions, you may have just found one.

I have found my ship flipped over on its back before I could react. The strength of this lift requires speed in order to penetrate it, and a very tight circling ability to stay inside of it. But, once you have climbed out of it to some altitude, its size opens up and you can relax your turn more and more until you have an easy ride to the top.

This is the lift with the core so many pilots refer to, yet seldom understand in practice. As the various types of lift go to altitude, they become organized and often begin to twist into a vortex. This does not mean that any lift that you find has a core or only one core, for that matter. Often, there are three, and to define more is beyond me.

These vortexes combine as they ascend and, in so doing, eat each other up as altitude is gained until there are only giants left as can be seen in late afternoon thunderheads. The whole point here is, if there is a core to your lift, you will find it in short order. If not, be happy with it as you climb out and gain enough altitude to afford exploring.

If your lift is rotating, your ship will become faster and the bank angle will be more easily attained. The rotation can go either way as watching clouds will show. Generally speaking, vortex lift close to the ground is rare, at least where I fly. However, there is another kind of lift called the very small bubble that is similar in strength and, no doubt, I have confused one for the other in a moment's haste.

Bubbles

This is the most common kind of lift there is as far as I can see. The first thing that you see in the mornings are nice little bubbles gently rising up into spherical shells which define the small bubble, itself. As the strength increases and the vapor becomes more apparent, you can see the silver ball-like structure in the sky. This leads me to a good point about bubbles versus vortex lift.

Whereas the vortex is tall in form, the bubble is squat and has a definite bottom to it. Thus, you cannot join in with other fliers unless you are at the same altitude.

In the vortex thermal, once some altitude is gained, you can dive down through it and climb up again or leave it to return to lift even though you return at a lower altitude than you left. Of course, this can also be said for a bubble, but not to the same extent.

Soaring Tidbits for Flat Landers

Continued

...by Ray Reiffer

I'd like to refer back to the Monarch butterfly, as this guy is our instructor.

Another thing about the bubble is its lack of an organized core. Generally, there is an area of better lift, but it does not have the same core as a vortex. Flying in bubbles is slower, generally smoother, and easier than the vortex. The size of the bubbles is more important at lower altitudes than are the vortexes, and can become very large areas containing powerful small bubbles defying use. These "powerful" bubbles are very rare, and I have seen only a few. There was one in particular that I remember...

I had a 20 foot hydroplane in my driveway that I was working on and, in order to protect it from the elements, I had covered it with black plastic and laid eight foot 2X4s over it in order to prevent the wind from undoing the whole thing. It was about 11:00 A.M. in the morning, there was no breeze, and I was standing nearby when I heard a "woofing" sound not unlike that of a match being thrown onto gasoline. I turned around in time to see the 2X4s dangling about four feet off the ground! Why the bubble stuck to the hydroplane for so long before breaking loose with force is the same type of question that I have asked myself when I have encountered a very strong bubble that goes shooting to altitude very fast. Although I have run across only a few of these while flying R/C ships, I have never been able to turn into or use one for lift. This type of bubble rises so fast, that I have not been able to get in position before it was gone.

Bubbles, being convection cells, rise high into the atmosphere, and I can only guess that they eventually organize themselves into a vortex once attaining a certain altitude.

Columns

This kind of lift is easily seen at the muck farm. Although it can be found elsewhere, wherever conditions permit, it is usually hard to see, and any wind will destroy its appearance. It is not nearly as strong as a vortex thermal which continues to show itself despite windy conditions.

The shape of a column is similar to that of a cylinder. Although its diameter does not change at the lower altitudes, I do not know what it does at the much higher altitudes. The column appears to be a form that is started by a very short-cycled bubble producer that is constantly feeding in enough bubbles to create the column. I don't recall having flown in one, so I can't comment on its characteristics, but it is obviously the best of bubble and vortex. It is hard to recognize in the field on any day other than a calm one.

Feeder Air

I would think that feeder air is the result of vortex lift as it sucks up a lot debris in thermal lift-off. By watching milkweed tufts, for example, you can see the air going up, even though nothing is happening where you are standing. Although the lift is weak most of the time, it is noticeable when you are close enough to see or touch the floating objects. Of course, those flying higher wing loadings will not be able to use this type of lift, while the floater class ships can. To find this type of lift, you only need to be aware of the direction that the breeze is taking the normal thermals, and you will see that the feeder air is rushing back and forth to fill the voids.

Because of my working schedule, I am able to fly in the late afternoons when conditions are calmer. I find myself able to observe lift that I otherwise may not have seen.

Inversions

Sometimes, the air is warmer at the higher altitudes than at the lower altitudes. This is called an inversion and it stops a lot of thermals from progressing higher into the atmosphere. It often means very good soaring. I have seen it occur while flying full scale. It's a wonderful thing, as you can fly as fast as you want and the conditions permit, and you can still have a showing of "up" or climbing altitude. This often translates to flying around at speeds of 60 MPH+ when your ship would normally cruise at 45MPH. So, you can see that the air is going up enabling you to do this.

...continued on page 8

Tidbits continued...

In R/C models, I often find an inversion occurring and, once in it, you're up for some time. Of course, this can only happen once you have climbed to the required altitude. If you don't know what the weather conditions are for the day, you could call the airport for a weather briefing. I have not done it myself because when I am ready to go, I just go.

Waves & Slope Lift

There is no natural source for this type of lift on flat land, but it is surely not to be left out here. Where I fly I have a tree line for slope and a stand of pines for wave. Neither one produces great lift, but often it is the difference between going home or being able to continue to fly. Also, don't forget that while you are in this type of lift, sooner or later, a thermal will come to you on the wind and set you free, again.

The lift on the tree line is approximately 60-80 feet or so above the trees, and it is so narrow that turning must be done with as much speed as is possible to obtain a shallow dive and a turn hard back upwind in order to stay in the narrow crest of the lift. If I error in turning, then I will fall into the rotor behind the trees. If this is the case, it's on my side of the field, and I just land. I can afford to be daring flying here.

The pine trees are thick and stand on top of a very slight uprising of land, with the prevailing winds hitting the far side, which causes the wave to come at me at several hundred feet altitude. The location and height of the lift vary dependent upon the strength and direction of the wind. Nothing strange ever happens and, as in flying full scale, the wave lift is very smooth and easy to use. Just find the best area and stay there until you get tired of it or a thermal comes along to release you.

Waves and slope lift are often sort of hidden and you must go looking for them. Slope lift, most often found off the sides of buildings, must be of a size large enough to allow for a turn. Other than trees or buildings, lift can be found around construction areas where the soil has been plowed up into mounds; land fills could be used if access is available legally.

Near the local glider port there is a river valley of no great depth, yet it produces a wave about 2000-3000 feet above the ground level and it is very smooth to fly in. However, I would be surprised to find that any R/C soaring has ever been done there as it is as unknown as it is unpredictable. In order to use any slope or wave on flat land, it becomes a must to know your area very well in order to find any useful lift.

In conclusion, it seems safe to say that if thermal activity is apparent, you may expect to find any number of "up air" devices all working at the same time and the fun is finding one for yourself. Last of all, don't forget to use a good fire as a source of lift. Where the land is being cleared for housing large piles of debris are burned, and results in a good smoky-smelling lift.

Detecting a Good Soaring Day

This is like rabbit hunting. If you go hunting a lot, sooner or later you will hit a good day. Of course, there are some guidelines that will help you to read the sky. Even so, I still get fooled, as poor looking days still produce lift now and then. I think the singular thing that misguides us is the stigma judging for full scale rather than R/C flying. A beautiful day with nice chubby cumulus clouds is not a sure thing for low level thermaling success. These conditions are a positive sign, however, so let's continue with more signs that are both good and bad.

Smoke is my favorite as it is an excellent indicator of what is going on down at our level and up higher in the sky. Even on a calm day, if soaring conditions are not present, the smoke will lay on the ground or close to it. Everyone knows that when a storm is coming, the smoke hangs low. By watching how the smoke rises, you can tell how the day is progressing. When the smoke rises fast and high without dispersing into a great formless

cloud, you have a good sign. On the other hand, if the smoke lays about and rises slowly enlarging and spreading rapidly, it is likely a poor day. In between is the serpentine trail which is smoke that rises leaving an up and down trail that looks like a snake. This is not all bad, because it still allows you to judge the air for thermal activity.

There is one more type of smoke occurrence that is interesting, and that is when the smoke reaches up to a certain altitude and then spreads out very fast all over as if it hit a ceiling which, of course, it did. A thermal layer of warm air causes it to lose its buoyancy, so it just spreads out and continues to rise as if it is a layer of fog. This type of activity could mean that you have spotted an inversion layer.

By watching smoke, you can observe the angle that it makes to the ground. This is important to know so that you can intercept the lift going up to the selected cloud of your choice, or to hook up with another glider or hawk that is already in lift. Another important thing that the smoke tells us is the time of the cycles between local thermals. By simply taking note of the smoke behavior, it will not be long before you will be able to see it going up much higher than it did originally. This is the sign that a thermal has come along. Now, look at your watch and make a note of the time. The next thermal that enters the area will give you some idea of the cycle time.

Before I jump into the car and head out, I watch the sky for awhile to see if there is any activity. If the breeze comes and goes and the birds are flying around, then you know that things are looking good. Sometimes, however, when a storm is coming and the birds are not flying, good soaring conditions may still exist. When I say that a storm is coming, I do not mean that it has been coming for several days but, rather, that it will arrive within a few hours. This is usually a good time to find lift, as a pressure wave comes along with the front as it passes, and the air does different things at this time. By watching the barometer, you will often see it rise as the bad weather arrives. and that it drops as the weather does its thing. It is the time just before the rain that is good flying, and often on into the rain, although I don't care to fly in these conditions.

I often read that soaring conditions can be determined by watching the birds. Yet, it is never explained and I wonder what everyone is thinking. I have concluded that it is a good sign if the birds are flying about and having fun. But some birds don't goof off at all. Hawks and buzzards are a very good indicator of where the lift is, but the most fun are the swallows, as they do not mind sharing their thermal with you. They will follow your glider around and look at it, all the while showing you the exact size and location of the lift zone. They are often in flocks of hundreds, and they fill the sky thereby clearly showing the thermal lift while hunting air borne insects.

Don't forget to watch for the Monarch butterfly. And, look to the sun angle to see thermals and the wisp of condensation forming, hopefully, low clouds. A day with a low ceiling means lots of small activities, whereas a high day means larger more isolated thermals. In general, it's safe to say that a slight overcast day with a whitish sky is very good, especially if the clouds are present and the air is moving. Of course, any day where the air is flat, no matter how pretty, is not going to do anything for you.

This can be wrapped up as we started by saying that a beautiful sky as in full scale is not necessarily the best for R/C soaring.

Getting Some Lift for Yourself

There are likely more things to avoid than there are good things when one is looking for lift. With this thought, I'll list some of the things to stay away from.

- Never launch without knowing where you are going. In order words, have a flight plan in mind every time.
- When you get off the tow line, do not hang around. Get

...continued on page 10

Tidbits continued...

moving towards that pre-planned spot. If lift is encountered while on launch, so much the better.

- Do not fly slow while looking for lift. The idea here is to cover as much territory as is possible.
- Do not crisscross the sky. Your "plan" should be to avoid this.
- Do not take your hunt down wind.
- Do not make any turns that are not required, as each one will pull you down a little.
- Do not be fooled by stick thermals!
- Do not be fooled by wind shear and turns up wind that tend to blow your ship upwards and only look good momentarily.
- Do not be fooled by a sudden drop of a wing, as it may appear that the other wing has risen.
- If it is rather windy, do not attempt to penetrate directly up wind, but rather take a tacking course.

Now that you know some of the things to avoid, lets go find some lift. The most important instruction is to "pay very close attention to what your ship is doing", as everything else will be based on this. As you follow your flight plan, watch intently for it to rise which will mean that you have found some green air. Exactly when and how to turn will take some practice. However, if you're really low, go for it in an aggressive manner, while not becoming careless. You must turn in a controlled fashion, or you will very shortly lose your newly found lift. The quicker that you can assess the size and the strength of the lift, the better that you will be able to handle it. This meaning, do not over turn in a weak but large thermal. On any normal or good flying day, several signs will be showing either one at a time or all at once.

- The ship will rise noticeably.
- The nose will come up and the ship will slow down.
- One wing will rise abruptly.
- The ship will come up hard and be turned away.
- The wings will shake. This says that you have flown into green air and that the ship should rise with a little hunting for the best spot.

Now, just turn into the lift. The direction may be very important and the movements of the ship beforehand will show you which side to turn towards. Staying on location is all important, and doing what has to be done to stay in the lift is the directive. Strength is the deciding factor in handling the thermal. If you encounter a very strong core, it may effectively throw you out. In this case, you must increase your speed in order to penetrate it and support the hard bank angle you now have to live with in order to stay in the core.

Centering Your Efforts

The outer zone of thermals, especially the vortex type, have very broken air along with a lot of down-going currents. Generally, the air will be smoother and more reliable, with your ship flying itself once you have found the center of the lift. A lot of times, while flying full scale, the cores seem almost laminar, and it becomes very quiet. Upon opening the side window, you can hear a hissing-type sound. The air is smooth, yet strongly moving upwards. At times, it can also be very bumpy and roly, causing much concern. I see the same thing in R/C soaring.

To try and tell someone how to fly in lift is another subject for discussion, as everyone believes in his or her own version of what is happening up there but, still, there are some things to be said.

I like to feel out the thermal as soon as possible. Yet, if you are very low when you pick

up an indication of lift, you are not in a good position to experiment too much. Learn things as each turn is completed, and make adjustments, accordingly. The wonderful thing about soaring is that it never gets boring because the atmosphere is always doing something different each time that you go flying. As conditions change, you must change with it and, when circling in your lift, you must be very observant to insure that your flown circle is in staying with the better part of the lift. As the wind takes the lift and your ship with it, that does not mean that you can just continue to circle and all will be fine. The lift will be distorted and displaced and, if it is a vortex, it will have a long serpentine-looking body. So, as you can see, you never get to fully relax unless the conditions at the time allow it. With all the turning overhead, it can become confusing, and to make things worse, there are people and many other distractions to keep you from doing your best. I use the sun to help me avoid these distractions, as it allows me to be constantly oriented to my ship and improves centering efforts at the same time. Here's how I use this method:

In order to find the core of your thermal, or at least the better zone, you must shift your circle in respect to the previous one and in respect to the lift itself. Of course, you can do a multitude of things to shift the circle, but keeping in your mind just where the sun is in the sky helps a lot. As your eyes are skyward, you need to know the wind drift angle, and the position of the sun allows you to put all of these things together and, thus, as your ship comes around in its circle, you now have a reference point in the sky to work from. To adjust the turn, you pick a solar point advantageous to the wind angle to make the correction of turn. Now, you can experiment within the lift by going to different parts of it and returning without becoming confused.

This method is harder to explain than it is to do. I use this method while flying full scale, because you can't watch the ground, yaw string or other aircraft all at the same time and still shift the circle as you fly. By knowing the sun's location, you can keep your eyes available for other duties.

Leaving the Thermal

When you have climbed high enough to test your eyesight or nerves, you can leave the thermal at any time. However, there are times when you should consider other things, such as low down wind.

As I've mentioned earlier, the outside areas of the thermal, and likely the air in between thermals, is a sink zone that you should cross with speed. To do this calls for a dive which uses up your altitude. In order to avoid this situation, you must first know where you want to go when you leave the thermal. Stay in the lift until you reach the opposite side of the thermal from the direction that you want to go. Now, do your diving to gain a lot of speed while in the lift. This will minimize your loss of altitude to a great extent while you are crossing the diameter of the thermal. Now, with your great speed, you can dash off to that next thermal sitting out there waiting for you.

Conclusion

Although I have avoided anything that is book related and have stayed within my personal experiences in the field, there is an excellent book covering more than any R/C pilot would ever need to know. This book also explains things like thermals that kick off from within the air itself rather than from the heating of the ground. It explains other subjects such as how to predict the height of thermals for the day. There are a host of other goodies, as well. The book is entitled *Meteorology for Glider Pilots* by C. Wallington. I purchased my copy about eight years ago, and it is certainly worth looking for.

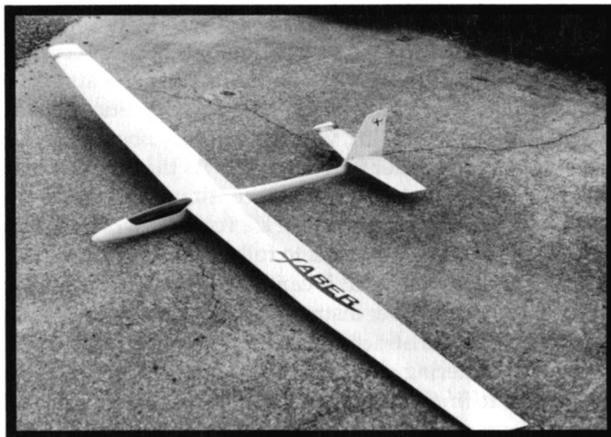


Ray Reiffer
9060 80th Ave.
Zeeland, MI 49464

The SABER

...by Bob Dodgson

Our goal in designing the Saber was to make a multi-channel glider that could match or nearly match the thermal competition performance of the Lovesong in light lift, match or nearly match its maximum L/D of nearly 26 to 1, offer even better performance in the top end and construct in about half the time!



The Airfoil

In order to come close to matching the minimum sinking speed of the Lovesong, our choice of airfoils was very limited. The tripped Eppler 214 is possibly the best airfoil available for carrying weight well and still offering the lowest minimum sinking speed possible. It is also among the best airfoils when it comes to offering the best maximum L/D. There is one new airfoil, however, the unheralded SD7037 that nearly matches the minimum sinking speed of the tripped E214 and offers at least as good a maximum L/D. While the reflexible E214 is a versatile airfoil and offers a good speed range, the SD7037 offers even better performance at the high-speed end. In fact, the SD7037 offers high Speed performance that nearly matches the faster sinking airfoils designed primarily for high speed performance like the S3021.

Surprisingly, the Princeton tests totally omitted any testing of the SD7037 with TE camber change. From computer projections and from our field experience, it appears that with 2 to 3 degrees of reflex, the SD7037 will match the high-end performance of the thicker and less versatile S3021 and it clearly leaves the SD7032 in the dust. It also appears that with about 2 degrees of positive camber, the SD7037's minimum sinking speed can be improved. Therefore, it seems that the SD7037 soundly outperforms the S3021 in minimum sinking speed and in maximum L/D and can match it at the high-speed end. This is just the performance envelope that we were looking for.

The Fuselage and Linkages

It was decided that to save as much construction time as possible, that a fully formed and joined fiberglass fuselage was a must. One disadvantage of a fully formed fiberglass fuselage (as opposed to our standard taco shell approach) is that there is no access into the fuselage to provide pushrod support and to install complex linkages. It was therefore decided that the Saber would be designed for computer radio installation only, with the flap and aileron servos in the wings. This not only eliminates the need for linkage access, it saves construction time in setting up and adjusting the linkages. For those who do not yet own and who do not want to buy a new computer radio like the Airtronics Vision, we recommend the Lovesong, which can still do everything mechanically!

Now, there is still the sticky problem of supporting the elevator and rudder pushrods with no access into the fuselage. The three conventional choices are: 1) Use arrow shaft control rods that do not require support. They work fine but weigh almost an ounce each adding to the dead tail weight. 2) Use flexible cable, carbon or steel rod in a sheath. It also works but it must be secured along the fuselage by elaborate means...clearly not a simple

solution. 3) Use pull-pull cables or cord. This system can work fine but requires fiddling and I hate to trust elevator control to it. In the Saber, I solved the pushrod problem by inventing a 2 in 1 system. I use an arrow shaft for the elevator pushrod. The rudder pushrod is simply our old reliable 1/16" steel pushrod that slips inside the elevator arrowshaft and its dowel end plugs. Thus the elevator arrowshaft provides its own support and it also supports the rudder pushrod. This is only 1/2 oz. heavier than two supported 1/16" steel pushrods, requires no outside support, installs in minutes and is very reliable and solid.

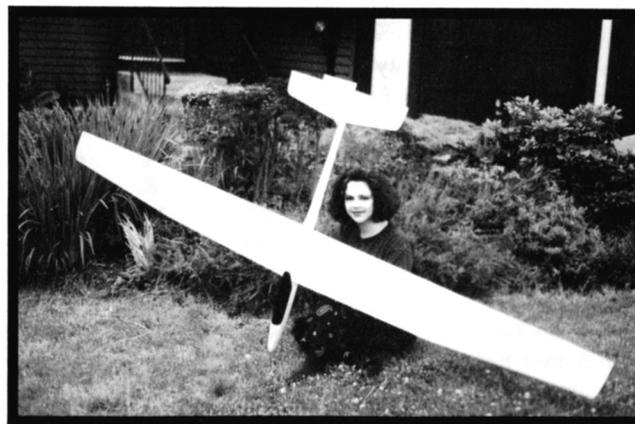
In designing the fiberglass fuselage shape, we wanted the canopy opening and the nose to be extremely strong in both compression and torsion even without any servo tray installation. Thus the canopy starts quite high on the fuselage, and utilizes a unique curved lip inside the canopy opening that provides strength similar to using a solid cone in the nose with no opening. The canopy is carefully fitted into a molded recess to provide a smooth air flow. As with our other kits, the wing saddle portion of the fuselage matches the wing contour, eliminating one entire wing to fuselage intersection and its related drag. The cloth lay-up is carefully graduated for great strength and minimum weight. We engineered the fuselage to be maintenance free, even under consistently hard contest landings. It even has the wood wing support molded in place.

The Saber fuselage is strong, the pushrod installation is a snap and the fuselage is complete and ready to prime and paint! Oh yes, as with our other kits, the fuselage and the wing location are designed so that when you have the flaps fully deployed they do not extend down below the bottom of the fuselage.

The Wings

The entire wing can be built very quickly using UFO CA glues (they don't attack foam!), 5 minute epoxy and sheeting transfer tape or epoxy. The UFO is really a boon to foam wing construction!

Since the SD7037 airfoil is very thin (9.2 percent thick) we have had to employ carbon fiber in the spar in order to achieve the kind of strength that we wanted. We have, however, utilized it in such a way that it becomes an integral part of the spar, is easy to apply and does not complicate construction significantly. We provide accurately cut foam cores with the spar slots pre-cut. For speed and ease of construction, we have eliminated sheeting splicing by providing Obechi sheeting that can be applied full size and in one piece to each side of each wing panel. The sheeting can be applied either with the transfer tape method as with



Megan Dodgson & SABER 1990

our other kits or it can be applied with epoxy. These wings do not require that you mess around with vacuum bagging or other tedious building processes, but you can vacuum bag them if you want to. The TE is so straight and trouble-free with the Obechi sheeting that no further reinforcing is required, simplifying construction even further.

Surprisingly, the fin-

...continued on page 16

Before continuing the main discussion, it is worth considering first what effect it may have on model performance if the wing itself, as built, is not very accurate. In full sized sailplane manufacture it is usual now to lay up the reinforced plastic components in female moulds of very high precision. The aircraft is built from the outermost skin inwards. Even so, new wings emerging from the factory commonly depart measurably from the designed ordinates and, in service, the resins and adhesives tend to shift slightly, producing further errors, especially small waves, humps and hollows. These may be large enough to affect flight performance. Owners sometimes spend hundreds of hours sanding and filling the profiles to try to overcome these defects. With model wings, a small wave or bump represents a relatively larger error.

The sections tested at Princeton were made by model fliers and each was measured accurately by a special instrument to see how far it departed from the intended profile. These measurements

demonstrated that only the best test pieces fitted the ordinates everywhere within + or - 0.1 millimetres (.004 inches See Soartech 8, p 90.). Many of the samples showed errors, especially near trailing and leading edges, of more than 0.75 mm (.03 ins). It is very easy to build a wing much worse than this. For example, the Eppler 193 section as tested proved to be closer to Eppler 205 than to its own ordinates. It was also found that some nominally different sections actually differed less from one another than each differed from its own ordinates.

This should at least give food for thought when model fliers claim that this or that airfoil section has been used.

To achieve precision equal to the better test sections used in the Princeton tunnel, if a wing section is drawn on paper by a modern computer-controlled plotter with a 0.2 mm draughting pen, the outline profile of the actual wing as built should not depart visibly from that 0.2 mm line at any point.

However, modellers with less than excellent skills need not despair. Perhaps because low Re number theory is still somewhat underdeveloped, a slightly inaccurate wing profile may not in fact turn out badly in flight. Figures 23 and 24, with the accompa-

Understanding Thermal Soaring Sailplanes

Part 3

...by Martin Simons

© Copyright by Martin Simons

All Rights Reserved

Accuracy in building

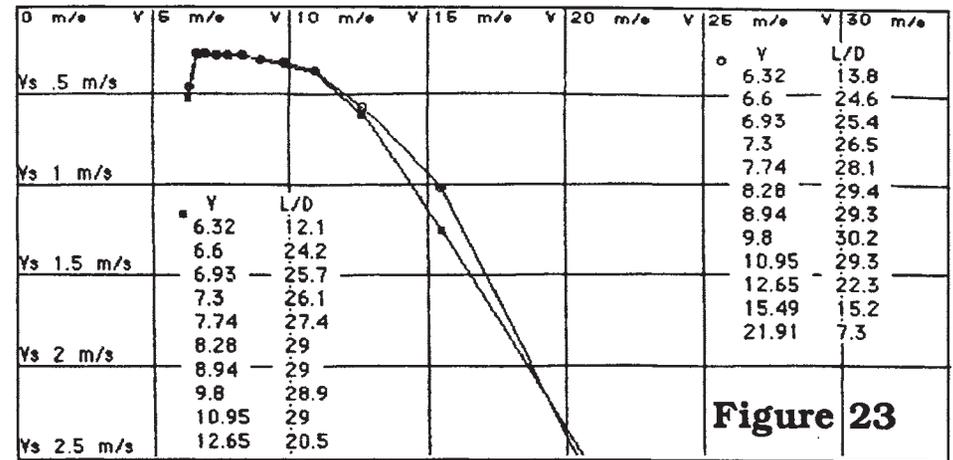


Figure 23

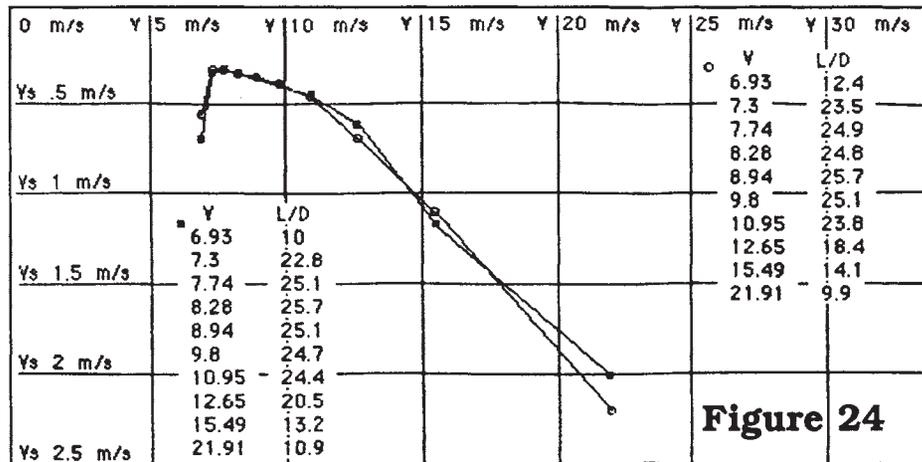


Figure 24

Performance Polar for Wing

Eppler 374 B-PT			Eppler 374 B Wavy		
Velocity Metres/Sec	Sink M/Sec	L/D Ratio	Sink M/Sec	L/D Ratio	
21.92	2.204	9.95	2.003	10.94	
15.50	1.099	14.11	1.167	13.28	
12.65	0.686	18.44	0.615	20.58	
10.96	0.460	23.84	0.449	24.42	
9.80	0.390	25.11	0.397	24.70	
8.95	0.347	25.77 MAX	0.356	25.12	
8.28	0.333	24.89	0.321	25.79 MAX	
7.75	0.311	24.91	0.308 MIN	25.19	
7.31	0.311 MIN	23.50	0.320	22.81	
6.93	0.556	12.46	0.691	10.03	

Performance Polar for Wing

Selig — Donovan 6080			SD 6080 Thick T.E.		
Velocity Metres/Sec	Sink M/Sec	L/D Ratio	Sink M/Sec	L/D Ratio	
21.92	2.970	7.38	2.815	7.79	
15.50	1.019	15.21	1.254	12.36	
12.65	0.567	22.32	0.615	20.59	
10.96	0.373	29.37	0.377	29.06 MAX	
9.80	0.324	30.24 MAX	0.338	28.97	
8.95	0.305	29.31	0.308	29.02	
8.28	0.281	29.47	0.285	29.07	
7.75	0.275	28.15	0.282	27.48	
7.31	0.275	26.55	0.279	26.18	
6.93	0.273	25.43	0.269 MIN	25.78	
6.61	0.268 MIN	24.63	0.273	24.22	
6.33	0.456	13.87	0.522	12.11	

nying tables, illustrate this.

The profile, SD 6080 was designed by Selig and Donovan for sailplanes. It was tested in an accurate form (average departure from ordinates 0.13 mm, 0.0052 in) and was then altered deliberately by thickening the trailing edge. Probably most model sailplanes actually flown do not have a perfect knife edge at the rear. It has frequently been argued that the T.E. needs to be very sharp and many modellers have indeed spent much effort trying to achieve this.

The two wing polars in Figure 23, with the accompanying comparative tables of sink rates and L/D ratios, suggest that such a fault might not be very serious in practice. At low speeds, there is so little difference that it is negligible: the minimum rate of sink differs by only .001 metres per second, i.e., 1 mm. The thick trailing edge is slightly more than one point poorer in best glide ratio. Curiously, at high speeds the two curves approach one another again and even cross over.

Although not perhaps the ideal choice for a thermal sailplane, the Eppler 374 section has been used for some successful cross ...continued on page 16

Understanding Thermal Soaring Sailplanes ...continued

country soarers. This profile was tested in a highly accurate form (E 374B, average departure from contour .016 mm (.0063 ins) and then modelling clay was laid on the leading edge to make the front 15% of the wing distinctly wavy, more so than any normal model wing would be. In Figure 24 the polars of clean and wavy-clay wings of 4.5 metre span are compared. The table with this chart shows the rate of sink and glide ratio at each flight speed (still ignoring fuselage and tail drag). As before, the low speed end of the curves are virtually the same. If any advantage is detectable, it is actually the wavy leading edged profile that does fractionally better. At the higher velocities the wavy leading edge profile again shows a very slight advantage, though the curves cross over twice.

Such outcomes should not be taken to apply to every wing section or to every kind of model. The result may be anomalous or peculiar to these particular profiles. Nevertheless, although general inaccuracies in building can hardly be advantageous in the long run, there is very little evidence so far to suggest that a perfectly accurate wing, on which much time and energy has to be spent, will necessarily perform better on a thermal soaring sailplane than one which has been produced with a more moderate effort.

Martin Simons
13 Loch Street
Stepney
South Australia 5069

SABER...continued

ished wing panels with servos installed weigh only about 16 oz. each! The Saber has a total wing area of about 1030 square inches, a span of 121" and a total flying weight of 70 ounces. It carries 20 oz. of ballast with ease.

The wing planform is similar to that of our old Maestro Megan and Maestro Caliente multi-channel gliders that we kitted in the 1970s. This planform has since become known as a modified Schumann planform. We employed it in the Saber, for the same reason that we used it in the Megan and Caliente, to get the Center of Gravity more rearward on the fuselage to minimize the amount of nose weight required to balance the plane. Many Schumann and modified Schumann winged gliders have had serious tip stall problems and require performance eating tip washout. I am happy to report that the design of the Saber eliminates both any tip stall tendency and the need for tip washout.

The Stabs/Rudder

The stab utilizes quick and easy foam core construction and the new SD8020 airfoil. It is fully sheeted and requires no TE reinforcing. The stabs can be built in a flash, are lightweight and extremely strong and flutter free. The rudder is also foam core and is sheeted with 1/32" balsa.

Controls

The controls are Flaps, Ailerons, Crow, Full TE camber both positive and negative, Rudder and Elevator. A computer radio is required. The plans show an Airtronics Vision radio installation.

Performance

Light-lift low altitude thermaling ability is similar to the Lovesong. The maximum L/D is nearly as high as that of a Lovesong (over 25 to 1). In reflex, it has a top end similar to the faster sinking gliders using the S3021 airfoil. In short, the Saber combines a blend of minimum sinking speed, maximum L/D and high-speed performance.

Bob Dodgson
21230 Damson Road
Bothell, WA 98021

Some thoughts on "Understanding Thermal Soaring Sailplanes"...by Greg Harding

"I really liked the Martin Simons article in the March issue of RCSD concerning the effects of wing loading. I thought, however, that in the discussion of its effects on turning radius, one rather basic element was left out or over-simplified.

"Mr. Simons says that "at any given angle of bank the radius of the turn, ballasted, will be larger than for the lightly loaded model." I thought it might be worth pointing out that wing loading by itself does not effect turning radius at all. In fact, the only things that determine turning radius (or rate of turn, for that matter) are the angle of bank (already mentioned) and the airspeed. Of course, this means that Mr. Simons was, for all practical purposes, correct because the heavier glider will have to fly faster in order to maintain its minimum sink speed. However, if the two gliders were flying at the same speed and angle of bank, their radii of turn would have to be identical no matter how they were loaded.

"As a matter of fact, that radius is pretty easy to figure out if you know the speed and bank angle. The radius equals the speed times itself divided by 11.26 times the tangent of the bank angle or: $r = V^2 / (11.26 \tan \theta)$ where r =radius in feet, V =true airspeed in knots, and θ =the angle of bank. For example, a glider flying at 25 knots and turning in a 35 degree bank will have a turning radius of 79.271 feet. In a 45 degree bank at the same speed, the radius goes down to 55.5 feet. And it doesn't matter a lick what the wing loading is at all. (The rate of turn in degrees per sec. = $(1091 \tan \theta) / V$.)

"This can be a startling revelation if you've never thought about it before. It was for me. It means that a Piper Cub and a 747 will have the same turn radius if they fly at the same bank angle and speed. Of course, I don't think it's possible for them to fly at the same speed. Either the 747 would stall and fall down or the Cub would rip its wings off. To a certain extent, the same will be true for differently loaded models. While you could probably fly a 6 oz. per sq. ft. HLG and a 20 oz. per sq. ft. slope racer at the same speed, one or both of them wouldn't be flying very well. So, again, Mr. Simons is right and probably all I'm doing is complicating the issue."

Greg Harding, P.O. Box 103 RD 1, Reading, PA 19607

Response: "Greg Harding is, of course, quite right. The radius of turn is not directly determined by the wing loading. The relationship between radius, velocity and bank angle is, as he says,

$$R = V^2 / \tan \theta g$$

So, since for a given θ , g and V , the radius is the same whatever the size or mass of the aircraft. I didn't make that clear enough.

But, as Greg also appreciates, to maintain a turn at a given bank angle requires a lift force from the wing and the wing structure has to be capable of withstanding the 'g' loads of acceleration which also depend on the bank angle (and not on velocity). In practice, to make a turn with least loss of height with a glider, the speed is adjusted to maintain efficiency, so the radius is larger with the ballasted model since the airspeed is (normally) greater."

Martin Simons

California Slope Racers Present

Santa Maria (One Day Regional) Slope Race in October, 1990
Santa Maria Soaring Society - Advance Registration is requested - No deadline
C.D.: Rich Beardsley, 2401 Country Lane, Santa Maria, CA 93455
(805) 934-3191

The 1990 AMA NATS

...by D.O. Darnell

Just returned from the AMA NATS up in Vincennes, Indiana and had a ball! The TRI-CITY AEROMODELERS did a great job of running the meet. With the MCV Falcon, I was lucky enough to place a respectable 6th (out of 118) in unlimited class sailplane!

ING MID-AMERICA — THE '90 AMA NATS", is two hours in length, and covers all six soaring classes: Scale, F3B, Hand-Launch, 2-Meter, Standard and Unlimited. The tape accents the pilots and their antics and activities: Launching styles, landings, conversations, etc. There are also a lot of "color" shots which will give the viewer the look and feel of big contest activities.

We saw a lot of old friends such as Dave Thornburg, Bob Gill, Julien Tamez, and Robert Elliot. We shot Dave working a thermal about 50 feet high at 2 minutes into a 7-minute flight until he could get over to the cooling towers, catch the up draft and eventually not only max, but also get a 100-point landing! (Sickening!) Yeah, I read his book! Dave also ran — and I do mean ran — transmitters back to the impound to speed things up.

We also met some new folks! Brian Agnew, last years champ, is a very impressive young man as well as a super flyer! He is very focused during flight, but very relaxed and easy going in-between rounds. We also met Ed Burton (Mariah designer) with whom we had a nice conversation and who has incorporated many changes into the Mariah kit. (The instructions are also being rewritten.) We saw the new version and it's really great! There were a lot of Mariahs there. We also met Blaine Chastain, his mother Jane, and dad Roger. Blaine carted home his usual truckload of trophies again this year, with Jason George nipping at his heels. Bob Gill's son Bryan copped junior honors flying some of Bob's antique ships!

Unlike in previous years, the site and the weather were great, and a good time was had by almost everyone unless they were on channel 58. Steve Kudson and another guy were shot down due to some off-field interference. The awards banquet was held Friday night after a weeks worth of flying and was well attended by about five hundred people! Since there were a lot of entries, there were a lot of trophies (sponsored by AIRTRONICS), but the big attraction, aside from Jim Thomas winning about everything, was the after dinner seminar by none other than Michael Selig and John Donovan.

John and Michael are both interesting fellows and great speakers. John's portion dealt with their program in general including an overview of the Princeton tunnel and the instrumentation involved, how data was gathered and what the scope of the project was,

I also flew in F3B sportsman and was in first place after the first round, but crossed the center line and thus got a big fat zero on the speed flight which put me out of the running. I was turning 18 laps in distance, however, and continue to be amazed by the 880's superb performance!

We shot a lot of video tape at the NATS and will have two new entries which I am writing you about. The first, titled "SOAR-

while Michael's portion covered various ways to improve performance in a model. The good news is that MCV was there and you can get it all on tape! That's right! The second tape (80 minutes), titled "AN EVENING WITH MICHAEL SELIG and JOHN DONOVAN" is also available. MCV is paying a royalty to Mike and John so, if you purchase this tape, a substantial portion of the purchase price goes to our lads who have given us those marvelous new shapes to tinker with! The price of either tape is still a reasonable \$29.00 post paid.

We would also like to announce that Tim Renaud promises us our LEGEND kit next week (pant, drool), so we will be shooting that tape reel soon (Building the AIRTRONICS LEGEND). While we're at it, the new Airtronics 4141 servos are awesome! Thanks, Tim! See ya at Visalia! Also, much in evidence was the VISION 8SP radio! Almost half of the pilots were using them!

Thanks to our many customers, MCV is doing very well with its first two tapes (Mariah and Falcon), and this has allowed us to purchase some additional equipment which will enhance the quality our future projects. Interestingly enough, the tapes are selling equally well and are within a couple of percent, quantity wise, in volume! We would also like to thank both Ed Burton and Mark Allen for their cooperation.

D. O. Darnell
Model Construction Videos
4227 E. 83rd St.
Tulsa, Ok. 74137

Classified Advertising:

Wanted

Plans or Kit for "ZEUS" 100"
Sailplane circa 1960's.
James M. Blum, 64 Park Ave.,
Danville, N.Y. 14437, (716) 335-5134

Books on Electrics

...by Myron Cagan

As far as domestic books on electric flight are concerned I can offer the following comments.

I own two books on the subject. The most useful has been Building and Flying Electric Powered Model Aircraft by Mitch Poling (Kalmbach Books, 1984, 76 pages, about \$10).

The first chapter is an introduction and the second discusses the types of kits that were available in '84 for electric flight and gives some general construction pointers. The chapter on Power Packages includes a discussion of engine size designations, mounting recommendations (both engine and batteries), electronic throttles, and a brief discussion of motor overhaul. This chapter is somewhat awkward as the discussions of motors, building techniques (motor mounting), and throttles are not clearly separated. The chapter on Fast Charging covers both batteries (which should have been a separate chapter) and charging. The technical information in this chapter is as important to the beginner as the chapter on engines. Most of the charger hardware discussion remains valid though a few of the units are no longer available. The other chapters are Let's Fly, Your Next Electric Airplane, Free Flight & Control Line, and Advanced Electrics. Since the book was written, more electric kits for beginners have become available, and electric motors have improved. This latter point has increased the number of gas kits that can be converted to electric. This is important as the number of advanced electric kits is still small.

The second book that I own is *Electric Flight* by Dave Day (Argus Books Ltd., 1983, 95 pages, about \$8). The organization of this book is better than Poling's (History, The Model, Motors, Batteries, Charging, Commercial Systems, Connecting the Electrics, Installation, Almost Ready to Fly Models, Commercial and Individual Examples). The Motors chapter ...continued on pg21

Classified Advertising: For Sale

140" THUNDERBIRD • Vacuum formed wings, stab & fuse • Kevlar & HP sheeting was used on the wings • All control surfaces fully arrow shaft hinged • Never flown • \$800.00

Pair of Kevlar (blue foam) sheeted EPPLER 214 WINDSONG WINGS • Urethane hinged flaps & wings • \$200.00

Hans Wiederkehr, 4 Gary Place, Seldon, NY 11784, (518) 696-3361

TRI CITY SOARERS

AMA CHARTER #2345

1000 COLUMBIA

CUP

1009 24,25,26, 1000

A

SLOPE SOARERS

RACE!!!

FEATURING
THE HIGHEST OF HIGH PERFORMANCE R/C SAILPLANES
ADHERING TO F.A.I. 24 OZ WING LOADING LIMIT
IN MAN ON MAN PYLON FORMAT

LOCATED AT:

RICHLAND, WASHINGTON'S
EAGLE OR KIONA BUTTE

**MINIMUM \$2,000 CASH PURSE, TROPHIES, &
PRIZES!!**

ENTRY FEE \$80 U.S.

"SPACE LIMITED TO THE FIRST 50

APPLICANTS"

!!!PREREGISTRATION ONLY!!!

FOR INFORMATION CONTACT:
TRI CITY SOARERS

RT 4 BOX 9544, W. RICHLAND, WA. 99352

John 509-627-2603, wil 509-627-5224, roy 509-525-7066

HELPERS AND SPECTATORS ARE WELCOME
HELPERS WILL BE ELIGIBLE FOR A SPECIAL WORKERS RAFFLE

PREREGISTRATION FORM ON BACK

We'll include the registration form in the next issue!

Electrics...continued

contains motor performance curves (efficiency, power & torque as functions of RPM) for a number of motors, some of which are either not available in the US or are no longer made. I'm not sure if the remaining data (US and German motors) is out of date. The chapters on batteries, charging and motor installation are less complete than Poling. Many of the British motors, chargers and aircraft that are discussed do not seem to be available in the US (they are not discussed in the hobby press). Though better organized, this book is not as useful to the beginner as is Poling. It might be of value for a second book though most of the product discussions seem to be out of date.

Finally, I should mention Bob Boucher's *The Quiet Revolution: The Complete Manual of Electric Propulsion Systems*. This is supposed to be the first book on electric flight (available from either Astro Flight or Zenith Books, 70 pages, about \$13).

Boucher founded Astro Flight, an important domestic manufacturer of motors for electric flight. I have not purchased this book as most of the hardware & kit comments may be out of date. The technical comments are probably of value.

German Books

In the April and May 90 issues of *Model Builder Magazine*, Mitch Poling mentions a number of books about electric flight in his column "Electric Power". All of the books are in German. They are published by either Verlag fur Technik und Handwerk (VTH) or Neckar-Verlag GmbH (NV).

The books published by VTH are:

Solar Modellflug (Solar Model Planes), *Electroflug-Modellbau* (Building Electric Model Planes), *Experten-Tips Electroflug* (Expert Tips for Electric Flight), *Der Akku im Modellbau* (The Batteries in Model Building), *Electroflug fur Ein-und Umsteiger* (Electric Flight for RC Fliers and Beginners), *RC Electroflug* (Survey of RC Electric Flight), *Electro-Segelflugmodelle* (Electric Sailplane Models), *FMT Bauplar 1990* (Building Plans from FMT).

The books published by NV are:

Drehzahlregler (Speed Controls), *Akkus una Ladegerate* (Batteries and Chargers), *RC Electroflug Modellbau-Electric Leichtgemnacht* (Electric Model Building Made Easy), *Electroflug Muss Nicht Teuer Sein* (Electroflight Doesn't Have to Be Expensive).

* * *

Having to read these books with a German dictionary and/or bothering friends who speak German would be tedious. I feel that the English speaking audience for these books would be significant if translations were available. Are any of the publishers or equipment suppliers that you have contact with interested in such a project? Readers: Can anyone provide some suggestions on this subject? Jerry

Myron Cagan
5962 Friar Ct.
San Jose, CA 95129

Building and Flying Electric-Powered Model Aircraft is available from Zenith Books, P.O. Box 1, Osceola, WI 54020; (800) 826-6600 (WI, Canada & Overseas orders call 715-294-4448)...\$9.95 plus S&H and applicable tax. (You might want to check your local hobby Shop book section.) Jerry

SCALE R/C VINTAGE SAILPLANES KITS	
 DFS REIHER	
1/8 SCALE**124 INCH WINGSPAN**\$205	
 KIRBY KITE	
1/8 SCALE**111 INCH WINGSPAN**\$230	
BOTH KITS FEATURE:	
*fiberglass fuselage*built-up wing & tail*pre-cut wood parts*	
*complete hardware*instruction book*rolled plans*	
add \$12 for shipping & handling	
TRITON MODELS	box 103 RD 1 Reading, PA. 19607 send for free brochure!

Now available from Mid Columbia R/C: A State-Of-The-Art 3-in-1
7-Channel Computer Radio System for the
Glider, Helicopter or Airplane Enthusiast!
Glider Version Introductory Price:



\$425.00 U.S.

(Plus S&H. WA Res. Add 7.8% Tax.)

Additional Specially Priced Receivers: \$106.50

Also offering the phenomenal 3035 MINI SERVO (glider version) featuring coreless, cobalt, ball bearing, 41.66 oz./in., weighing .86 oz. for \$49.25.

MID COLUMBIA R/C

**Rt. 4, Box 9544
W. Richland, WA 99352
(509) 627-5224**

Beautiful bright R/C Soaring T-shirts featuring MINI-MOA, GROB-2, HORTON IV Wing, U-2, F-16 & A-10!
(Send LSASE for price list for other versions & T-shirts.)

WING AND T x COVERS
QUILTED COVERS FOR YOUR SAILPLANE AND TRANSMITTER

UNLIMITED \$29.95
STANDARD 27.95
2-METER 25.95
HL 23.95
T x COVER 4.95

T x CASE \$16.95
Holds 2 transmitters!
Hard cover T x case. 12x16x6.

SOARING SPECIALTIES

1403 LINCOLNSHIRE RD
OKC, OK 73159
(405) 692-1122

Add \$3.05 S&H per order
Buy 2 or more sets, shipping is free!
Wing covers with stab pocket, add \$5.00 per set
Please include wing and stab dimensions with order.
Covers over 140", send S.A.S.E. with dimensions for quote.

Hi Performance Sailplanes

16650 Redmond Way Redmond, WA 98052
(206) 882-2556

Kit: \$225.00
Kit with Pre-sheated
Wings: \$370.00



**WARRIOR
SERIES**
138" Eagle 1200
120" Skyliner
100" Sundance

• Optional T-Tail or Low Tail • Includes 3-View of the T-Tail Version
• White or Blue foam (If using double sided tape, ask for the new white foam series with Hot 7037 or 7032 airfoils.) • Obechi Sheeting • Heat Cured Epoxy S Glass Fuselages • Send \$1.00 LSASE for New Brochure

Also Available: • 2 Meter WARRIOR, with 78" Wing Span, for \$119.95. Pre-sheated Kits are \$179.95. • New Thunderbirds with Nose Cone & Keel, 7032 & 8020 Stabs., Optional White Foam Cores.

MaxSoar/PC-Soar

Sailplane Performance Analysis Programs for
the Macintosh and PC compatible computers.

Features:

- Improved on-line documentation.
- Now Plots and overlays airfoil polar data.
- Use polars and sailplanes provided or enter own.
- Multiple Reynolds Numbers on Airfoil Polars.
- English / Metric input capability.
- Plots sink rate & lift / drag versus flying speed.
- Overlay plots to compare aircraft performance.
- Calculates standard design parameters such as: areas, aspect ratios, aerodynamic centers, average chords, tail volumes, instability factors equivalent dihedral, recommended C.G. limits and more.

Polars Included:
E193, E205, E214, E392,
FX60-100, FX60-126,
HQ2.5/8, HQ2.5/9, S3021,
S4061

Sailplanes Included:
Falcon880, Prodigy,
Sagitta 600, Sagitta 900,
Sagitta XC

MaxSoar Price: \$49.95

MaxSoar V2.0 Requirements:

Apple Macintosh with two disks or a hard disk
(recommended) and HyperCard Version 1.2.2 is required.

PC-Soar Price: \$39.95

PC-Soar V3.0 Requirements:

IBM PC, XT, AT, PS-2 or Compatible Computer, 5.1/4" or 3.5" Floppy Drive, CGA, EGA, VGA or Hercules Graphics Adapter, Monochrome or Color Graphics, Graphics Compatible Printer or Printer Driver.

**Expanded Airfoil Polar and Sailplane Design
Libraries for MaxSoar and PC-Soar!**

Sailplane Design Library includes 34 popular sailplane designs of various types.
Airfoil Polar Library includes over 225 wind tunnel and theoretical polars from MTB, SoarTech, Althaus volume 1, Althaus volume 2 and Princeton.

**Price: \$29.95 Each or
Get both libraries for \$29.95 by
ordering with MaxSoar or PC-Soar.**

MaxSoar or PC-Soar are required.

Also Available From LJM Associates:

Laser Cut Airfoil Templates for precise wing sections with foam or builtup construction. Now available in one and two piece styles with heat resistant Teflon™ surfaces. **Prices as low as \$35.00**

Airfoil Plotting Service starting at \$5.00 for as many as 4 chord sizes. Special features available.

To order MaxSoar items, send price plus \$3.00 S & H to:

LJM ASSOCIATES
c/o John Hohensee
S22 W27400 Fenway Dr.
Waukesha, WI 53188
(414) 521-2472

To order PC-Soar items, Laser Templates and Airfoil Plots, send price plus \$3.00 S & H to:

LJM ASSOCIATES
c/o Lee Murray
1300 N. Bay Ridge Road
Appleton, WI 54915-2854
(414)731-4848

466 Primero Ct. Suite E
Cotati, CA 94931
(707) 792-9174



FALCON 880

Ready For
Immediate
Delivery

Designed by
Mark Allen

Now Available
with S3021,
S3014 or SD
7037 Airfoils!!

FALCON 880 Kit: \$195.00
FALCON 880 Kit with
Pre-Sheeted Wing: \$305.00
(S&H not included)

Specifications:

Wing Span: 112 "
Avg. Wing Chord: 7.86"
Wing Area: 880 Sq. In.
Aspect Ratio: 14.25
Airfoil: S3021-S3014
Weight: 60 Oz.
Wing Loading: 10 Oz./Sq. In.

Kit Features • One Piece Epoxy-Glass Fuse Reinforced with Kevlar
• Pre-Fit Canopy • Full-Size Foam Core Beds Combined with Fiberglass
(Makes a Strong, Sharp, Straight and Easy to Build Trailing Edge.)
• Accurate Machine Cut Foam Cores Cut from 1.5 Lb. Virgin Foam

A Proven Winner!

"It's the best flying plane I've ever had. It's fast, it floats, it's easy to thermal. It's the easiest plane to fly of all that I've ever flown. It has no bad habits. It launches easily. I love the airplane. Everyone I know who has one loves it."

**Daryl Perkins, Winner of the 1989 Hans Wise Memorial Slope Race,
PSC Sept. 1989 F.B.B., SWSA May 1990 Thermal Contest**

"The Falcon has been a major contributing factor to my success. Moving to the Falcon was a quantum leap in performance...Like night and day."

**Bob McGowan, Winner of 1989, 1990 Western States, 1990 Masters,
'89 LSF NATS**

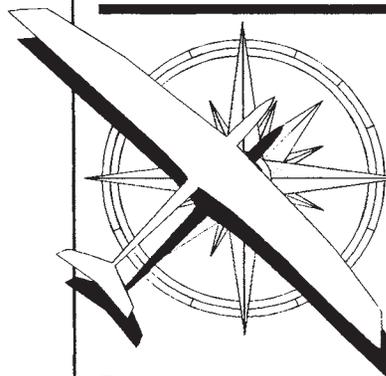
"It was circling almost like a polyhedral ship...This is the best spiral, stability I've ever seen in an aileron ship. There is no tendency to tip stall at all. Nice! I'm impressed."

Bill Forrey, Soaring Editor for Model Builder

"I've been flying my Falcon since January and can vouch for its sweet flying characteristics. It launches beautifully (both winch & hi-start), has a good speed range, and is very easy to fly. All-in-all, it's about the most fun I've had with a glider!"

Byron Blakeslee, Soaring Editor for Model Aviation

NorthEast Sailplane Products



If you love RC Soaring
order our catalog!

What you will receive is the most comprehensive catalog of RC soaring kits available. We don't just list kits, we review them and provide you with the information that you are looking for! You'll also get technical information, tips, and advice in over 60 pages of text, photos, and illustrations!

To order a catalog, send \$3 to:

NorthEast Sailplane Products
16 Kirby Lane
Williston, Vermont 05495

The \$3 will be happily deducted
from your first NSP order!

 802-658-9482

"We don't do power, the airfoil IS the airplane."

- Sal, Stan, and Jay...The NSP Gang

Classified Advertising:

For Sale

Collector's Items

Brand New & Original Packaging
Hobbie HAWK • \$300/B.O.
Graupner CIRRUS • \$150.00/B.O.
Craft Air SAILAIRE • \$150/B.O.
Soarcraft DIAMANT • \$250/B.O.
Soarcraft LIBELLE • \$300/B.O.
Mark Antry, 3680 Point of the Rocks
Drive, Colorado Springs, CO 80918,
(719) 260-0673

Classified Advertising:

Wanted

JASCO-JETCO KITS
R.W. Cartwright, 18 Southmont
Drive, Little Rock, AR 72209

Classified Advertising:

For Sale

1:10 factory drawing of ASW 22,
complete with true 1/4 scale fuselage
cross-sections & plan forms for the
wings & tail plane • Similar inf. on
PZL Krosno KR-03A Puchatek ('Pooh')
— which is a cantilever mid-wing
sailplane — and the Windex 1200
(Swedish) motor glider, as well as
highly detailed inf. & drawings of the
CMC Leopard — which is a twin engine
executive jet aircraft, suitable for ducted
fan technology • In addition to docu-
mentation, have full sets of templates
for the fuselages for the ASW 22 &
Windex (in aluminum)
Jeff Dandy, 27, Spellow Lane, Walton,
Liverpool, L4 4DE, England

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. 2 3/4" 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 2 3/4" H. 3.5" wheel max.
HD - FOR GLIDERS OVER 10 LBS. 6.5 OZ. 2"W x 5"L x 2 3/4" H. 3.5" wheel max.

1/3 SCALE 8.8 OZ. without wheel. 2 3/4"W x 6"L x 2 3/4"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

Slope Soaring News!

High-tech aerobatic designs, slope pylon racers, combat, power scale, scale sailplanes, composite building techniques.

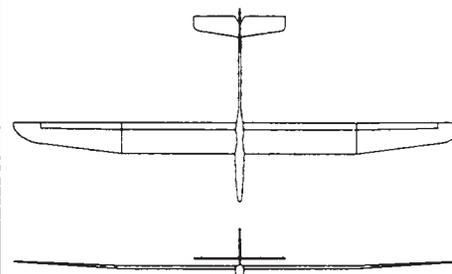
\$15.95/one year/12 issues

Slope Soaring News
 2601 E 19th St., #29
 Signal Hill, CA 90804

Check or M.O. only, please

"OUT OF THE ASHES"... INTO THE WINNER'S CIRCLE

PHOENIX



SPAN : 132"
 AREA : 1047 SQ. IN.
 WEIGHT : 72 - 76 OZ.
 AIRFOIL : S4081
 WINGLOAD : 10 OZ./SQ. FT.
 ASPECT RATIO : 18.7 : 1

COMPETITION PRODUCTS

921 BIRDIE WAY
 APOLLO BEACH, FL 33572
 813 645 5171

FOR ADDITIONAL INFORMATION SEND LSASE

MCV™

Presents
Video Tapes for the Soaring Enthusiast

Model Construction Videos went to the 1990 AMA NATS, and is pleased to offer two new video tapes to you hot off the press!

MCV welcomes your suggestions as to what kits or other projects you would like to see. Drop us a line or FAX, and THANK YOU FOR YOUR SUPPORT!

"An Evening with Selig & Donovan"
 "Soaring in Mid-America -- 1990 AMA Nats"
 "Building the Falcon 880"
 "Building the Mariah"

Coming Soon: "Building the Legend"

Order Today • All Video Tapes are
 Only \$24.95 (plus \$4.05 S&H)
 • Okla. residents add 7%

MCV • 4227 E. 83RD ST, TULSA, OK 74137 • FAX (918) 492-9153

Classified ads are free of charge provided the ad is personal in nature & does not refer to a business enterprise. They are run on a space permitting basis.

AIRCRAFT SCALE DOCUMENTATION WORLDS LARGEST COLLECTION

Antiques, Military, Civilian, Helicopters, Sailplanes
 2,700 plus color FOTO-PAAKS
 5,000 3-view drawings including KOKU-FAN
 55 page CATALOG \$3.00



SCALE MODEL RESEARCH

2334 Ticonderoga Way
 Costa Mesa, CA 92626 U.S.A.
 (714) 979-8058

VACUUM BAGGING Complete, Simple, Easy to Use System

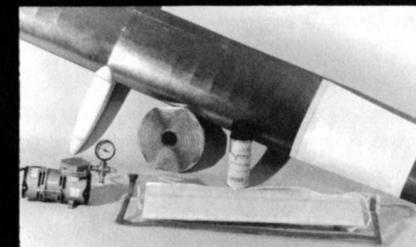
RELIABLE ELECTRIC PUMP
 With 1 Year Guarantee
 BAGGING MATERIALS & SUPPLIES
 Carbon Fiber, Rohacell, Kevlar

Dealer Inquiries Invited

CST

Composite Structures Technology

Dept. M1, P.O. Box 4615, Lancaster, CA 93539 • Phone/Fax 805/723-3783



MAGNUM HI-START

"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 mandrelled 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 7.25% 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.

GLIDER WINGS: Standard or Custom Tailored Foam Cores

Obechi Available in large sheets.
 Customized cores available upon request.
 Please call 415-462-0672 for quote.

Now Available...
 The Buzzard
 A Generic Glider
 Fuselage

Send SASE to:

Precision Foam Cores
 850 Concord Street
 Pleasanton, California 94566



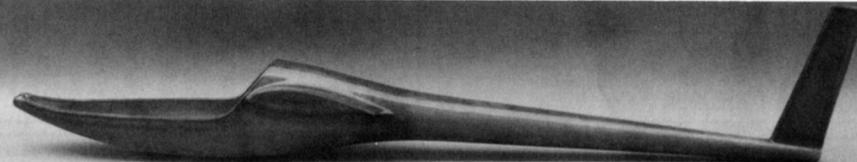
**High Quality Reinforced
 Fiberglass Fuselages (18+)**
 (for the Scratch Builder)
 &
Vacuum Formed Canopies

Viking Models USA
 2026 Spring Lake Dr.
 Martinez, Ca. 94553
 (415) 689-0766



(DG - 100/200 shown below.)

Free catalog on request



Prices range from \$45 - \$125 (plus S&H) excl. special requests.

B² Streamlines

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



**AERO L-39
 ALBATROS**
 Plans & Instructions
 \$20.00 Postage Paid

Power Scale Soaring Association Plans.....from England

BAE 'HAWK'	\$8.50	P-51D 'MUSTANG'	\$12.00
F-20 'TIGERSHARK'	\$18.00	KAWASAKI KI-61 'TONY'	\$12.00
FOCKE-WULF 152H	\$12.00	F4U-1 'CORSAIR'	\$12.00
GLOSTER 'METEOR'	\$12.00	'SPITFIRE' MK 24	\$12.00
F-86 'SABRE'	\$18.00		

(All Prices Include Postage)

Send \$1.00 for complete catalog. Refundable on first order!