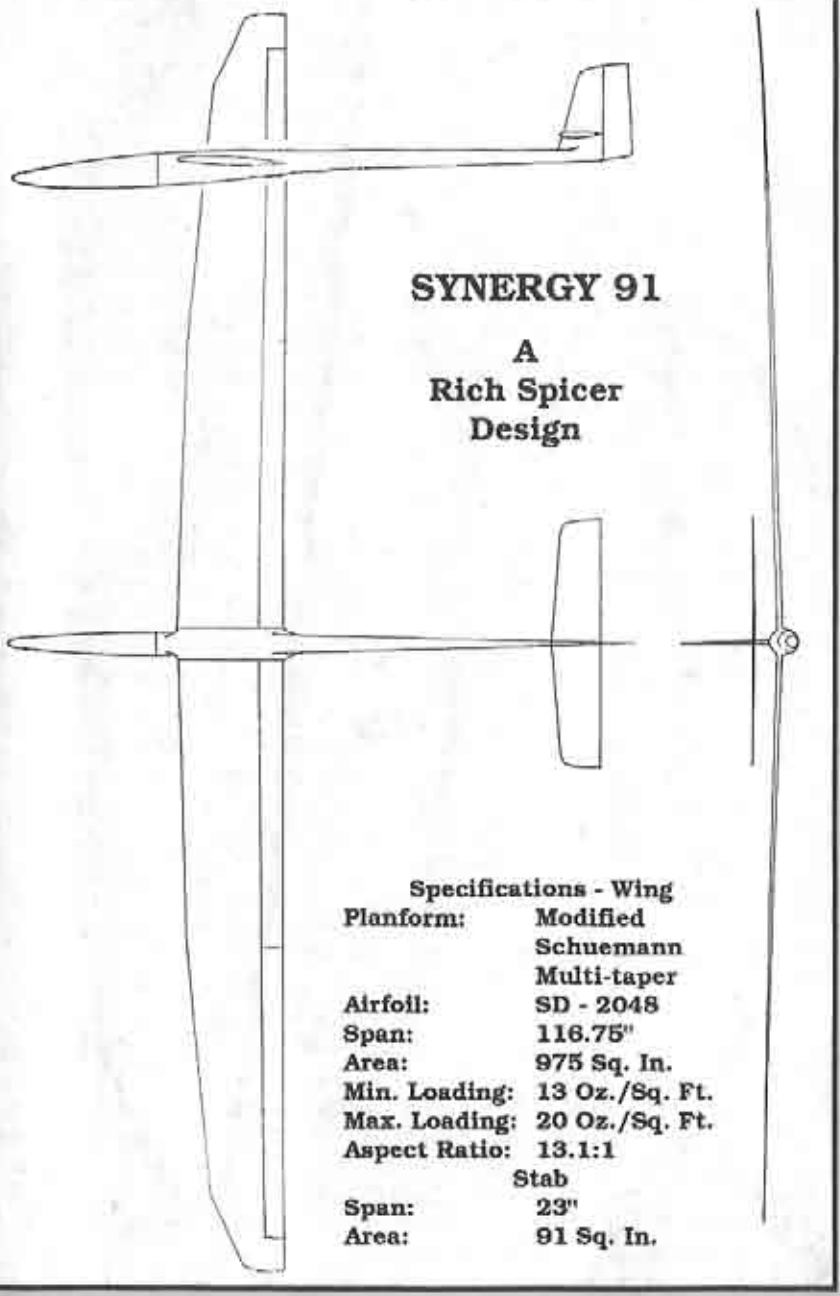
R/C Soaring Digest

January, 1991
Vol. 8, No. 1



SYNERGY 91

A
Rich Spicer
Design

Specifications - Wing

Planform:	Modified Schuemann Multi-taper
Airfoil:	SD - 2048
Span:	116.75"
Area:	975 Sq. In.
Min. Loading:	13 Oz./Sq. Ft.
Max. Loading:	20 Oz./Sq. Ft.
Aspect Ratio:	13.1:1
	Stab
Span:	23"
Area:	91 Sq. In.

Schedule of Special Events

Date	Event	Location	Contact
Jan. 11-13	International Modeler Show	Pasadena, CA Inf. - outside:	CA (714) 548-4700 (800) 243-9593
Jan. 19	Barks 3rd Annual Show & Swap	Graham, NC	B. Booth (919) 228-6977
Jan. 19-20	Thermal/Open Unlimited — Southwest Regionals	Casa Grande, AZ	Vern Poehls (602) 945-1957
Feb. 17	2 Meter/Standard Unlimited - Snow Fly	Plymouth, MI	A. Slagle (313) 451-0730
Apr. 27-28	2 Meter & Unlimited - Spring Soaring Festival	Pasadena, CA	B. Matsumoto (818) 798-1662
May 24-26	Slope Race Mid Columbia Cup	Richland, WA	(509) 627-5224 Wil (509) 627-2603 John (509) 525-7066 Roy
June 2	Hand Launch 8TH Annual	Riverside, CA (Call after 6:00)	Ian Douglas (714) 621-2522

Proposed SMT Rules for 1991...by Jerry Slates

Sportsman Multi-Task Soaring (SMT) was originally introduced in 1989 as a new event representing a "Middle Ground" between AMA Thermal and F3B competition events. A 75 ounce gross weight, which was proposed at the time, was tried and based upon all the input that has been received to date, was reevaluated by the Board of Directors of the F3B/USA as they developed an improved set of recommended rules for 1991. A wing loading restriction has been recommended to replace the gross rule weight. The recommendations are:

- 12.5 oz./sq. ft. maximum wing loading. (This is the only rule on the aircraft.)
- No ballast changing within a round. (A round may be speed, distance, duration, or any two, but the aircraft weight may be changed only between rounds.)
- Modified scoring systems (speed and distance tasks) to keep scores "tighter".
  - Modified rules for speed scoring would give 125 points for completing each of the 4 legs of a 2 circuit course, or 500 points for just completing the speed run. The remaining 500 points of a 1000 point maximum are normalized as opposed to the entire 1000 points being normalized as they have in the past.
  - Modified rules for distance scoring would give you 500 points for starting the task with the remaining 500 points being normalized as opposed to the 1000 points that were normalized in the past.
- Simplified F3B rules used for all tasks. (Re-launches are not allowed, unless it is caused by something like a winch failure, and the use of club winches only should even things out a bit more.)

Although there is nothing official about these recommendations, the Board would appreciate you're giving them a try and letting them know how they work for you. The *F3B/USA* newsletter is $12 a year for 6 issues and can be obtained by writing Randy Reynolds, 122 E. Uintah, Colorado Springs, CO 80903; (719) 471-3160. Randy just did a great job on a big double issue of the *F3B/USA* covering the recent team selection finals.

About RCSD...

RCSD is a reader written monthly publication. The articles & letters are contributed to *RCSD* in order to provide: "The widest possible dissemination of information vital to R/C soaring to enthusiasts all over the world." All material submitted must be exclusive and original and does not infringe upon the copyrights of others. It is the policy of *RCSD* to provide accurate information. 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. 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 in January, 1984. Today, he is lecturer and technical consultant and can be reached at: 210 East Chateau Circle, Payson, AZ 85541; (602) 474-5015.

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R/C Soaring Digest Staff

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- Judy Slates Publisher/Submission of Mat'l Via Disk (MAC or IBM 5 1/4") or Modem
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- Feature Columnists & Technical Editors — Martin Simons, Bill & Bunny Kuhlman (B^2), Gordon Jones, Wil Byers

The Soaring Site

In the December issue of *RCSD* we printed an article on the MAGIC which was written by one of the readers, Frank Weston, who is also the kit manufacturer. The accompanying chart was done by Frank and has not been validated by *RCSD*. The chart has been challenged by David Fraser, who has done his own independent analysis. Since it is not our intent to mislead anyone, as David suggests, or cause anyone to feel that they have been slighted in any way, please consider the chart and the sentence on wind tunnel tests the subject of an advertiser's claims.

Our sincere apologies are extended to all the parties involved, as each made extremely valid points, which have left us rather perplexed. We find ourselves amazed that we are viewed by many as a full-size, fully staffed publication as opposed to the reader written publication that *RCSD* was intended to be.

Over the last year, we've been asked, on an increasingly frequent basis, "Can I FAX it to you?" Or, "Can you FAX it to me?" Our answer until now has always been, "Unfortunately, no."

Well, we have finally purchased a FAX so, for those of you who wish to FAX us announcements, late breaking news, or check ad copy, etc., the (415) 689-0766 number will accept either FAX or voice incoming transmissions. We'll be adding a second telephone line soon and, at that time, we'll switch the FAX over to the new number.

Happy Flying, J^2

R/C Soaring Digest
P.O. Box 6680
Concord, CA 94524
(415) 689-0766

Jer's Workbench

T-Tail Mount

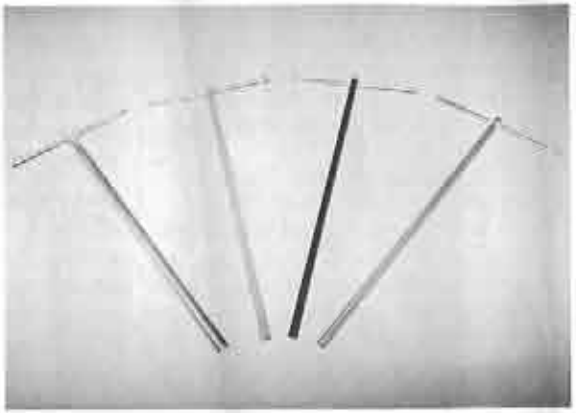
A sturdy T-Tail Mount should have a good, SOLID foundation. The question is, "What to use?"

A great deal of time can be spent constructing something exotic in the way of a T-Tail mount and, probably, come up with something that works very well. But, if you're like me, you would probably prefer to go out and purchase something over the counter and try to keep it simple.

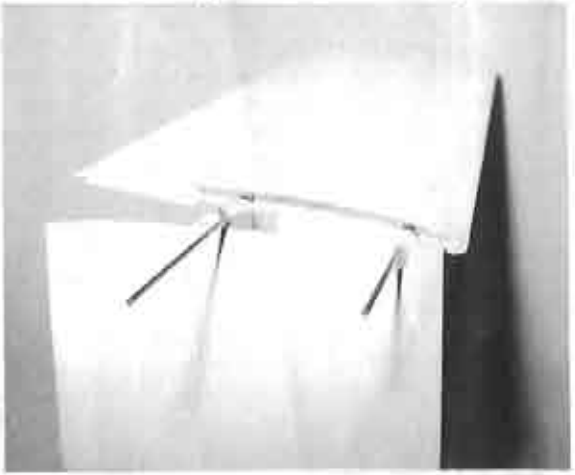
One item that has many uses and can be easily purchased is the arrow shaft. Arrow shafts not only come in wood, but they are also available in fiberglass, carbon fiber and aluminum.

The **aluminum** arrow shaft is made of a very hard aircraft-type aluminum and, usually, can only be found at an archery shop or a sporting goods store that offers an extensive line of products. The aluminum shafts usually found in most hobby shops and local hardware stores are of a softer substance and are not recommended where a good solid foundation is required. The **carbon fiber** arrow shaft, which is also very strong, can be found at the same places as the aluminum shaft, and is very expensive. The **fiberglass** arrow shafts are sometimes found in hobby shops, as they are occasionally used as push-rods by modelers who fly power planes.

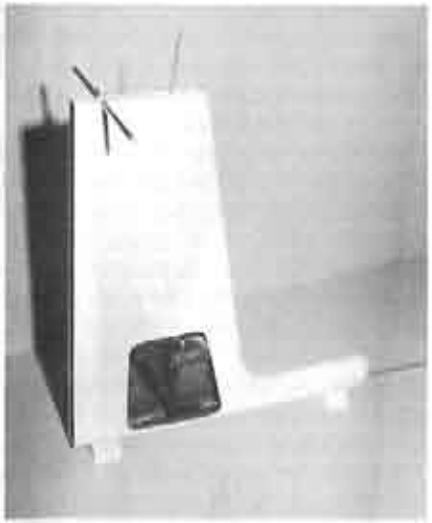
When making a decision as to what arrow shaft to use, one important factor to consider is the weight. The **aluminum** arrow shaft is about half the weight of either the fiberglass or the carbon fiber shafts. Additionally, the fiberglass and carbon fiber shafts will split and splinter if they are drilled too close to the end of the shaft. If you elect to use these two anyway, drill your hole 1 or 2 inches from the end and cut off the excess.



T-Tail Mounting Assembly shows different arrow shafts with aluminum rod installed (L - R) Aluminum Rod, Fiberglass Arrow Shaft, Carbon Fiber Arrow Shaft, Aluminum Arrow Shaft.



3/8" aluminum rod is glued to the rudder post.



The completed T-Tail Mount

The first step in the construction of a T-Tail Mount is to select which arrow shaft will suit your needs. Having made that decision, obtain a 1/8" music wire (pivot rod), which is probably available at your local hobby shop. The size of the wire will vary dependent upon the size of the model in which it will be installed. Drill the hole in the arrow shaft, insert the music wire, and epoxy permanently in place.

The aluminum rod (music wire/pivot rod) selected for the T-Tail Mount that you see in the photos is a 2024T3 that was purchased from the Aircraft Spruce & Specialty Company. This 3/8" aluminum rod is only 3" long and, as shown in the photos, is glued to the rudder post. There is no need to run the full length of the rudder, as it only adds weight to the plane.

Now for the tricky part. Install your horizontal stabilizer onto the pivot rod, and insert the T-Tail Mounting into the vertical stabilizer of the fuselage. Carefully align the mounting into the correct position and tack the post or foundation in place. DO NOT USE A LOT OF GLUE! Use only a very small amount. The key here is to "tack", only. After the glue has cured and you are completely satisfied that your alignment is exactly where you want it to be, remove your horizontal stabilizer and permanently glue your new T-Tail Mount in place.

Be patient on getting the alignment exactly where you want it, and I think you'll find that the time is well spent. The finished mount shown in the photos does not wobble, as the foundation is now solid.

+ + +

Last month, we told you about the video tapes that John Clarke is offering. Well, he is putting the finishing touches on another video that he says is for the novice who has just shown up at the field looking to fly his/her first plane. John says, "The video is not intended to provide step-by-step instructions, but rather is intended to show a series of building tips and techniques that are not covered in enough detail in most sailplane plans, such as proper methods of gluing, proper method of installing the control tubing and how to avoid problems. Later, after the plane is built, it shows how to balance the plane, that first hand toss and the first flight. The ending has a twilight afterburner fly-by by an F14 Tomcat with a climb-out straight up into the clouds. The tape is called FIRST STEP."

In talking to John, we find that he is making transmitter bags that will help keep a transmitter cooler in the summer time. As John says, "Many a transmitter, especially a black one like the Vision 8, has shown the funnies after being left in the sun."

John is also working on low-priced wing bags and, in mid-January, he intends to provide a strong non-releasable tow hook that will not break or turn off center. John has not worked out his

...continued on page 28

On The Wing

...by B²

A correspondent of ours used one of the Post Office's new dinosaur stamps, the Pteranodon, on his letter. Under the stamp he'd written, "What me? - Tailless?"

Another DU 86-084/18 Turbulator Source

In the July, 1990 issue of *RCSD*, we described the DU 86-084/18 airfoil. The DU 86-084/18 is a high performance section designed for F3B flying. As noted in our article, the DU 86-084/18 requires turbulation to work properly. Many readers sent in a SASE for more information, and we included the following foreign source for a zig-zag turbulator in the packet we mailed out. A length of 14 meters (nearly 46 ft.) costs 63,-DM (about US $42.00 at the current exchange rate) from this source:

Glasfaser-Flugzeugbau
Hafner Weg
7431 Grabenstetten
Germany

We were recently notified of a domestic source for zig-zag turbulators - Hobby Lobby!

Hobby Lobby International, Inc.
5614 Franklin Pike Circle
Brentwood TN 37027

The material from Hobby Lobby comes in two different styles and four different colors (white, black, red, or yellow). Each package contains 47" of 1/8" wide zig-zag strip, and 24" of 2" wide material which is zig-zag cut at one edge and straight on the other. The narrow "Z band" is as used on the DU 86-084/18 section, while the wider is described as being a combination turbulator and hinge gap cover. For $5.45 you can get both turbulators, as described above, in a single package. Some reports indicate that a zig-zag turbulator is more efficient (better turbulation for less drag) than a "trip strip". Those of you who have been flying with a turbulated Eppler 214 and see an improvement in flying characteristics may want to experiment with this new turbulator material.

Corrections and Additions to the ASM-LRN-007 Data

Two errors crept into the coordinates listing for the ASM-LRN-007 airfoil published in the December issue of *RCSD*. (1) At the 2.50% chord station the lower surface is -0.2055, not the positive number previously given. (2) The value of the X ordinate for the lower surface at 35% chord is 0.3083, not the smaller value shown in the table. The corrected coordinates are shown below.

There was also an error in the text on page 5. Beginning in the third line of the left column of text it should read as follows: "Laminar flow to 67% chord on the upper surface is possible. Laminar separation is prevented through the use of a zig-zag turbulator strip."

Our apologies for any inconvenience these errors may have caused.

ASM-LRN-007

100.00	0.0000	0.00	0.0000
97.50	0.6166	.50	-0.4111
95.00	1.1305	1.25	-0.3597
90.00	2.5694	2.50	-0.2055*
85.00	4.0082	5.00	-0.0514
80.00	5.4471	7.50	0.0514
75.00	6.9887	10.00	0.1028
70.00	7.9137	15.00	0.0000
65.00	8.8900	20.00	-0.2055
60.00	9.5581	25.00	-0.3083
55.00	10.0206	30.00	0.0000
50.00	10.2775	35.00	0.3083*
45.00	10.3803	40.00	0.7194
40.00	10.3289	45.00	1.0277
35.00	10.1233	50.00	1.3361
30.00	9.5581	55.00	1.7472
25.00	8.9414	60.00	1.9527
20.00	8.1706	65.00	2.1069
15.00	7.0915	70.00	2.2610
10.00	5.6526	75.00	2.1583
7.50	4.8304	80.00	2.0555
5.00	3.8027	85.00	1.8499
2.50	2.4666	90.00	1.4388
1.25	1.5416	95.00	0.9250
.50	0.7194	97.50	0.4111
0.00	0.0000	100.00	0.0000

Corrections

LOBO - New (Flying Wing) Kit in Town

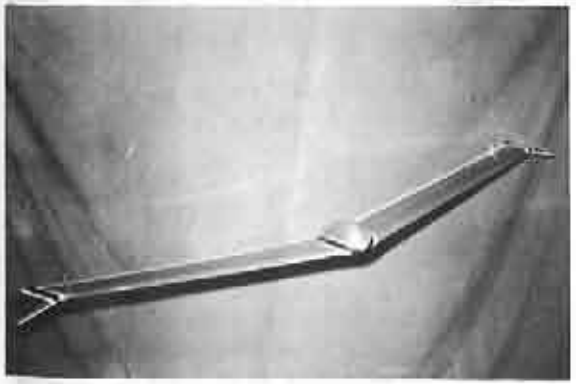
The Lobo is a new flying wing kit being put out by Steve Steidl of Albuquerque, New Mexico. Designed for slope flying in winds up to 30mph, the Lobo spans 71 inches and has 638 in^2 of wing area for a wing loading of under 8 oz/ft^2.

This 'wing has been designed with a generous canopy and separated elevator and aileron function. This allows use of a standard size no frills two channel system with no mixing required! This definitely makes the kit less intimidating and more accessible to the average modeler. If you have a radio with mixing capability you can make some minor modifications and install elevons if you wish.

Steve reports that the Lobo is very stable in all three axes, and should therefore make an excellent 'ship for the intermediate pilot seeking out a first flying wing. Steve has handed his transmitter to flyers with no flying wing experience and found they have no problems and require no assistance at all. On the other hand, the Lobo is capable of just about any aerobatics asked of it with the exception of inverted flight and good axial rolls. (Those two minor faults are side effects of its great stability.)

The Lobo kit is easy to build and comes with everything you need except hinge tape for a retail price of just $49.95! If you're interested in obtaining a kit or more information, contact Steve directly.

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



LOBO
by
Steve Steidl
Aerolab Designs
336 Utah NE
Albuquerque, NM 87108
(505) 266-6422.

A Visit in America

...by Martin Simons

My second visit in California in July/August of 1990 was to San Jose to see production of kits for the SYNERGY, one of the leading F3B multi-task competition sailplanes developed in the U.S.A. The current model is the Synergy III, but the Synergy 91 was under test at the time I saw it.

I was told by Jerry Slates, my escort on all these excursions, that what I was to see represented the highest technology being used for model building in the USA. Richard Spicer, the designer of Synergy III, and Richard Tiltman, have given up their previous employment and set up the firm RnR Products (Richard and Richard) to produce the Synergy kits. I was expecting something special and indeed I got it, but first I had to overcome my surprise at finding the entire Company contained in Richard Spicer's domestic garage. I had imagined at least a small factory. Well, I suppose it was a small factory, but in a garage. (Since I visited them, the two Richards have indeed set up a new workshop in Milpitas.)

Richard Tiltman (left) and Rich Spicer (right) of RnR Products. Photo by Jerry Slates

We arrived at a very good moment from my point of view as an industrial espionage agent. The two Richards were just preparing to join together the upper and lower wing shells of a Synergy centre section. (The wing is in three pieces.) The procedure is very similar to that used for full-sized sailplanes. Top and bottom wing skin sandwiches are laid up in female molds; paint layer first (colour according to customer's choice) followed by glasscloth, with Kevlar and carbon fibre reinforcings in critical areas, then a thin layer of Rohacell hard foam, the sandwich completed by more glass cloth.

The two shells were at this stage when we arrived. The internal fittings, aluminium tubes for ailerons and flap leading edges, internal reinforcements for joining the tips, servo mounts, mounting bolt in the centre, spar webs of hard, vertical grained balsa and so on, were carefully fitted and glued in while we watched.

The adhesives used were epoxy resins lightened with microballoons where necessary. The glue was dispensed from plastic bags like cake icing. As a team the Richards worked harmoniously and synchronously, interrupted occasionally by phone calls and visits such as ours, but not allowing the sailplane wing to suffer. When all the components, and there are many of them inside such a complicated wing, were in place, the two moulds were brought together with resin at leading and trailing edges and along the spar lines. The whole was bolted together to make a hollow shell with strong, full depth spar and flap tubes in place. The entire assembly then was moved under the work bench into what proved to be a long cupboard with powerful heat lamps giving temperature control. Out of the same cupboard came another mold assembly which had been curing. This was unclamped and sprung open to reveal, not a Synergy III wing, but the new one, Synergy 91.

The quality of this nearly finished wing was breathtaking. Only a little cleaning up of flash at leading and trailing edges is necessary when the kit is taken out of the box. I have often felt, when looking at some of the ordinary sailplane kits on the market, that with a little patience any ordinary model builder like me could produce something as good in the home workshop. For this reason I do not generally build from kits.

In the case of the Synergy III and Synergy 91, I know that I could never achieve such results and I succumbed to temptation, placing an order.

Richard Spicer explained that the Synergy III differs from earlier members of the series in that it is smaller in wing span and lighter. This is a response to the revised FAI launching winch rules. The span is now 120 inches or just over 3 metres and the weight close to 2.4 kg., ballasted up to 3.75 kg. for wing loadings between 13 and 22 oz./sq. ft. (4 - 6.7 kg./sq. m.).

The Synergy III is unusual in appearance because of the fuselage pylon. Such a feature, as I realised without being told, is the very devil to produce in glass and Kevlar, but it is done that way despite the problems. I doubt if anything is saved in aerodynamic drag by raising the wing above the fuselage. Wind tunnel tests of this arrangement have never, so far, shown it to be superior to the mid or shoulder wing location. The real advantage is that when the Synergy III flaps are fully down, as they are for landing, they do not touch the ground and so are safe from damage.

The fuselage has a nose sheath rather

Who are RnR Products?

...by Jerry Slates

Behind the scenes, two long time flying friends got together and formed in 1990, what is now a full-time enterprise called RnR Products. These friends, Richard Tiltman and Rich Spicer have been competitive in R/C soaring competitions for many years. Rich Spicer has been a member of the U.S.A. F3B Soaring Team in the past and can be found at most of the major contests throughout the state as can Richard Tiltman. They also enjoy the more relaxing fun fly slope soaring, as well.

Richard Tiltman's background in soaring goes back three generations to his grandfather who was one of the designers of a full-size glider called the Airspeed Tern. That was back in York, England in 1930.

Over the years, they have spent a great deal of time researching, testing and proving, with contest wins, the theories that have led them to the gliders that they currently carry in their product line: Synergy III & Synergy 91 (F3B), NOVA (Unlimited & Slope Racer), Evolution (2 meter, SMT/Thermal), and the SB/XC (Cross Country). Their kits include the latest innovations in composite construction that is available today, and the two Richards apply the techniques that have made their personal planes successful. Their techniques are applied in the construction of the fiberglass fuselages, fiberglass skinned foam core wings, hollow core constructed fiberglass wings, and the use of Rohacell and carbon fiber (i.e., carbon fiber wing joiners).

Additional information on the Synergy 91 or any of the other designs can be obtained by contacting RnR Products, 1120 Wrigley Way, Milpitas, CA 95035; (408) WINGS 51.

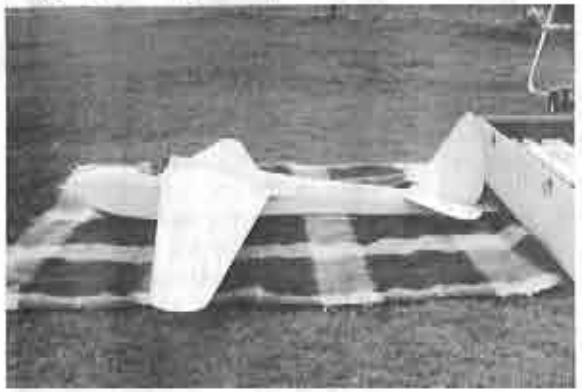
Rich Spicer and his all glass NOVA with a vacuum bagged wing with molded glass L.E. and HQ airfoil. Photo by Jerry Slates at the July 1990 Davenport Slope Race. Rich took third place with the NOVA.

than a hatch. I believe this idea was introduced to the F3B scene by the Australian International Team flying the prototype Marjali in California about ten years ago. It has been widely imitated since.

The other slightly unusual feature of the Synergy III is the three piece wing. The tip panels plug, with carbon fibre joiners, into the centre section, which is bolted to the fuselage pylon. This produces a light and strong structure without the usual high stress concentrations associated with the more usual steel rod wing joiners at the centre. The Synergy III has some dihedral on the outer wing panels only, giving a slight polyhedral effect.

I did not have any chance to fly a Synergy, but several were being used at the small F3B competition I saw at Morgan Hill. They were clearly superior to any other models in this competition. The Synergy is available as a kit on the open market in the USA, and for those prepared to pay and wait in line for delivery, a fully competitive, very advanced model is available. The competitor with such a model almost ready to fly out of the box, will have more time for flying practice and that is likely to produce some good results. Probably some European competitors, and maybe some Australians, will have aircraft every bit as good.

As for the Synergy 91, this is really an entirely new design. The Pylon has gone, being replaced by a simpler shoulder wing design. A nose cone fuselage of refined shape is used, with a conventional tail assembly. The wing reverts to a two-piece type with slight dihedral from the centre. Hinge plan and controls, flaps and ailerons appear to be similar to the previous model. I am not able to describe every aspect of the production since I did not see what goes into the wing. I expect it is generally similar to the Synergy III and certainly the quality, seen from the outside, is superb. Several wing sets have already been made and given, or sold, to experienced F3B fliers to be tested in service on nonstandard fuselages. Reports so far indicate that the new model will be very good indeed.



Richard Tiltman's AIRSPEED TERN. Photo by Jerry Slates

Martin Simons
13 Loch Street
Stepney
South Australia 5069

Readers, at the time of this writing, the Synergy 91 was not available. Now, starting the New Year in style, the Synergy 91 is here. Jerry

MAX-MAN

...by Guy Russo

Greetings from North Idaho where we are enjoying great fall slope soaring and scale aero-towing! I want to share with my soaring buddies an event that has great popularity in our area.

It started as the Thermal Master event and has also been called Thermal Wizard, but, so it won't be confused with any other program, I'll rename our creation "MAX-MAN".

This event grew from the need for new soaring challenges and the inevitable frustration we experience when called to fly in poor lift conditions. In the N.W.S.S. Season Championship program, a pilot is competing with others all across the N.W. on the same week-end. Some may be flying in ideal conditions, while others are in the rain and getting three minutes on ten minute events. Sometimes, the season championship is lost on one poor flight.

This event challenges pilots to make decisions in the air as one can choose to fly a five, seven, or nine minute flight on ANY ROUND. All flights are scored to equal one thousand points as follows.

5 min. = 750 flight points and
250 landing
7 min. = 800 flight points and
200 landing
9 min. = 850 flight points and
150 landing

Thus, a pilot can choose to fly any combination. For example, on a five round contest day, flights could all be 5 min, all 7 min. or all 9, or a combination like 7, 7, 9, 5 or 9, 9, 9, 7, 5. So, what's the big deal? Well, it's the "MAX-MAN".

The MAX-MAN trophy is a separate trophy and is scored by keeping track of total time in the air. This is not as tough to score as you might expect. Believe me, the MAX-MAN contenders will be on top of it and will have a good idea of who is in contention. With pride on the line,

you will see some risk-taking and some great thermaling. In my opinion, any event which challenges the pilot to make decisions in the air, and which helps reduce the luck factor, is an improvement.

Another aspect of this event is how it encourages beginners to go for the longer flights. I was timing for a competitor class pilot who was convinced that 5 minutes was enough of a challenge. I coached him to a 9 minute flight and that experience has stayed with us both.

Obviously, the longer the flight, the less critical the landing. Even if the landing is missed, the flight times are counted. Any landing option can be used. Currently, in the N.W.S.S., only the 50 foot landing line (where the nose is measured perpendicular to the line and a point per inch is measured up to 100 inches), or the 25 foot landing circle (where each 3 inches is worth 1 point) can be used. In either case, the points are scored based on the time flown. (Plus or minus 10 measured landing points on the 5 minute flight would equal plus or minus 25 landing points. On the 9 minute flight, it would

...continued on page 28

Seconds \ Minutes	0	1	2	3	4	5	6	7	8	9
0	0	30	210	390	570	750	620	800	670	850
1	0	33	213	393	573	747	623	797	673	847
2	0	36	216	396	576	744	626	794	676	844
3	0	39	219	399	579	741	629	791	679	841
4	0	42	222	402	582	738	632	788	682	838
5	0	45	225	405	585	735	635	785	685	835
6	0	48	228	408	588	732	638	782	688	832
7	0	51	231	411	591	729	641	779	691	829
8	0	54	234	414	594	726	644	776	694	826
9	0	57	237	417	597	723	647	773	697	823
10	0	60	240	420	600	720	650	770	700	820
11	0	63	243	423	603	717	653	767	703	817
12	0	66	246	426	606	714	656	764	706	814
13	0	69	249	429	609	711	659	761	709	811
14	0	72	252	432	612	708	662	758	712	808
15	0	75	255	435	615	705	665	755	715	805
16	0	78	258	438	618	702	668	752	718	802
17	0	81	261	441	621	699	671	749	721	799
18	0	84	264	444	624	696	674	746	724	796
19	0	87	267	447	627	693	677	743	727	793
20	0	90	270	450	630	690	680	740	730	790
21	0	93	273	453	633	687	683	737	733	787
22	0	96	276	456	636	684	686	734	736	784
23	0	99	279	459	639	681	689	731	739	781
24	0	102	282	462	642	678	692	728	742	778
25	0	105	285	465	645	675	695	725	745	775
26	0	108	288	468	648	672	698	722	748	772
27	0	111	291	471	651	669	701	719	751	769
28	0	114	294	474	654	666	704	716	754	766
29	0	117	297	477	657	663	707	713	757	763
30	0	120	300	480	660	660	710	710	760	760
31	0	123	303	483	663	657	713	707	763	0
32	0	126	306	486	666	654	716	704	766	0
33	0	129	309	489	669	651	719	701	769	0
34	0	132	312	492	672	648	722	698	772	0
35	0	135	315	495	675	645	725	695	775	0
36	0	138	318	498	678	642	728	692	778	0
37	0	141	321	501	681	639	731	689	781	0
38	0	144	324	504	684	636	734	686	784	0
39	0	147	327	507	687	633	737	683	787	0
40	0	150	330	510	690	630	740	680	790	0
41	0	153	333	513	693	627	743	677	793	0
42	0	156	336	516	696	624	746	674	796	0
43	0	159	339	519	699	621	749	671	799	0
44	0	162	342	522	702	618	752	668	802	0
45	0	165	345	525	705	615	755	665	805	0
46	0	168	348	528	708	612	758	662	808	0
47	0	171	351	531	711	609	761	659	811	0
48	0	174	354	534	714	606	764	656	814	0
49	0	177	357	537	717	603	767	653	817	0
50	0	180	360	540	720	600	770	650	820	0
51	3	183	363	543	723	597	773	647	823	0
52	6	186	366	546	726	594	776	646	826	0
53	9	189	369	549	729	599	779	649	829	0
54	12	192	372	552	732	602	782	652	832	0
55	15	195	375	555	735	605	785	655	835	0
56	18	198	378	558	738	608	788	658	838	0
57	21	201	381	561	741	611	791	661	841	0
58	24	204	384	564	744	614	794	664	844	0
59	27	207	387	567	747	617	797	667	847	0

Ridge Writer

...by Wil Byers

What is Slope Soaring?

This is not an easy question to answer, because it is so many things to so many people. Therefore, if I don't answer with total exactness, it is because I don't believe it has an exact answer.

Takashi Shirasu — Pilatus B-4

I do know that it can be a lot of fun, it has a great deal of challenge, is very exciting, is growing in popularity, and is a facet of the hobby you should try at least once, if you haven't already!

Slope soaring in the classic sense is flying one's model glider from the top of a hill in rising air. The rising air is caused by wind blowing up and over the hill. Remember, as the Wrights said, "Birds soar by gliding down through rising air." Thus, when a model slope soars, it is gliding down through rising air, which is rising faster than the model is sinking. Because of this, the model will gain altitude, just as it would if it were in a thermal with the same vertical velocity.

When the wind blows against a hill, however, it generates a band of lift. The lift band will be either very wide or very narrow. Many variables determine the size of the lift band or zone, such as the wind velocity, air density, ambient temperature, ground radiation, or the terrain in front of the ridge to be soared. Additionally, the height of the slope, its width, and its degree of incline all contribute to the lift band. As can be expected, it is desirable to have the band of lift as wide as possible, to maneuver the model in, while the lift sustains its flight.

As stated, the incline of the slope's face is very important to lift band generation and the vertical component of the rising air. Mathematically, the rate of the vertical component will be equal to the rate of the wind in feet per minute times the SINE of the angle of the hill. Therefore, a hill that has a wind of 20 miles per hour blowing into it and has a slope of 45 degrees will produce a vertical component of air of approximately 1245 feet per minute. This is computed by:

((20mph • 5280feet) ÷ 60minutes) • .707 (SINE of 45)

However, note what would happen to that vertical component if the degree of slope were to change to 80 degrees. Yes, it would go up because the SINE of 80 is .985. Therefore, for the same wind under the same conditions, but with the slope of 80 degrees, the rate of the vertical component would be changed to 1733 feet per minute. All that said, let's remember these are figures that magically pop up on the calculator display when the numbers are crunched. Many, many variables will need to be dealt with in the tangible world which will change the way the lift is actually produced.

The type of model flown will be a determining factor as to whether a particular site is soarable, because lift and lift bands will vary greatly with different sites. This may seem very obvious but, sometimes, what appears to be quite obvious, can be quite misleading. For example, a slope may be 500 feet high and have a 60 degree incline on its face. It may be 5 miles wide and facing directly into the predominate wind, and have absolutely no TREEEEEES. This would be described as the ideal slope soaring site. However, it depends on whether the wind is either blowing a gale or blowing very lightly as to how soarable this site is for a particular model.

Well, let's take this example a little further. Using the 500 foot slope above and a model with moderate performance, conditions of the wind can produce entirely different results. On a day when the wind is blowing lightly, the ground may have much radiant energy stored up, which will be given up to the air's upward velocity thus producing a very soarable condition. This is the same as saying that a hot parking lot can feed a thermal. In slope soaring, it may be the face of the hill or a dry field out in front that enhances the soarability of a particular site, during a particular wind condition. At the other extreme, in conditions where the wind may be blowing extremely hard, the density of the air may be so great that only marginal lift exists and its band may be very narrow. Thus, the heaviness of the air can detract from a slope's performance.

There are many different types of hills, cliffs, and ridges that can be used to soar models on, and they will obviously not all produce the ultimate in lift. Some, if not all, suffer from one imperfection or another, such as a cross wind(s), turbulence generated by ridges out in front or an obstruction that turbulates the air. Additionally, bowls or ravines will provide noticeable and sometimes significant changes in the quality of lift being activated at a site. Whatever the wind condition or quality of the site might be, environments such as this are all part of slope soaring. One must develop senses that are keen to these nuances. Be prepared to analyze them and, thereby, become proficient at flying under different conditions.

For a slope soaring enthusiast, the excitement comes when all of the favorable conditions come together. This occurs when the wind is blowing at 25 mph directly into a slope which has an inclined face of 70 degrees, the ambient temperature is 85 degrees, and the model flown has a sink rate of 200 feet per minute over a distance of 5000 feet. Meaning, not considering any outside variables, the vertical component of the air is 2067 feet per minute, and the model is sinking 200 feet a minute in the rising air. Therefore, it is really climbing 1867 feet per minute when you let off the down elevator. Adding to the fun, is its ability to penetrate easily into the horizontal component of the air. So, as an R/C slope soaring pilot, one is having a heck of a lot of fun.

Above, I have outlined just a few of the things that I see as important to slope soaring and the fun associated

Late last week, I received a letter from Mr. Takashi Shirasu from Japan. From the pictures he sent, their club has a very impressive slope site. It also appears scale is very popular, as the face of the slope was covered with long winged glass beauties. I've included a couple of pictures. I hope they look as good to you as they did to me.

with it. They are the physics that make slope soaring happen. However, you may not be in an area where you have large hills such as those described. Fortunately, it doesn't take a large hill to slope soar. Rather, if one can find even a twenty five foot short ridge, with the wind blowing into it, there will be a band of lift, if narrow, but still there. Flying this narrow ridge can be extremely challenging and fun. You might even catch a small thermal being enhanced by the ridge, and then work it to great height, stoop the model to near terminal velocity and, maybe, even add to the excitement with a loop or four point roll. That is the exhilaration of slope soaring.

Understandably, it not for everyone, but this form of soaring is many things to many people such as Daryl Perkins, Joe Wurtz, and Larry Jolly. These fellows are all slope soarers of quite notable talent who, as you already know, are going to the next F3B world championships, with skills, that I would like to think, have been enhanced by their participation in slope soaring in many varied conditions.

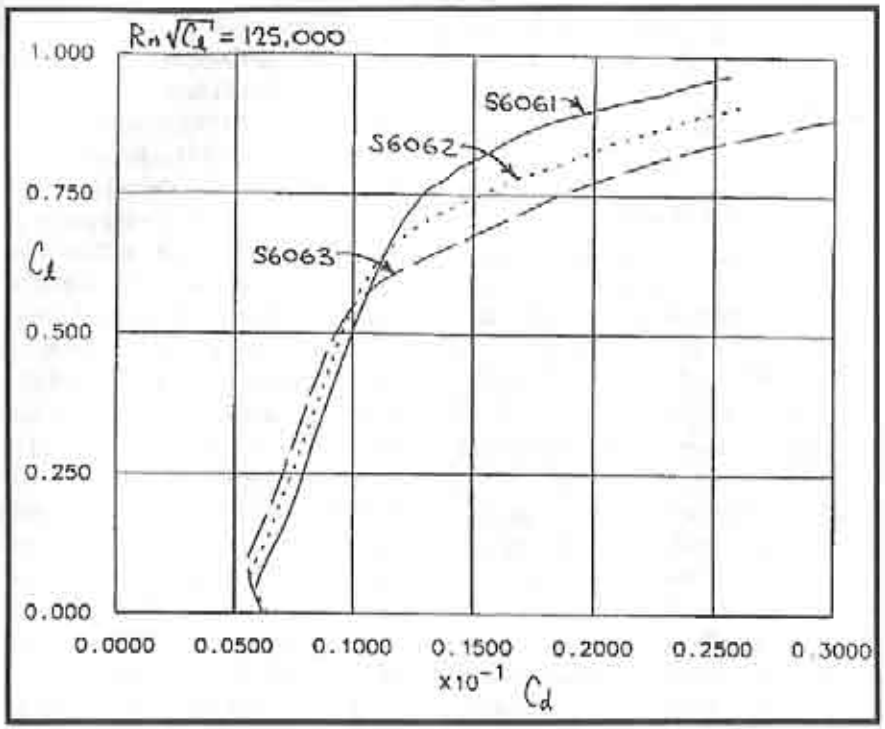
> Lets say then that slope soaring is "Model gliders gliding down through rising air, enhanced by the wind and a ridge."

To help me and all of us in this learning process, please let me know about your slope site, the terrain and any other special details. Also, I would most certainly like to know some of the skills that have helped you. Readers of RCSD would as well. This will help all of us to understand the hobby better. It may even result in saving a few models from the vexares of the wind.

Slope Vacation?

I've had this idea for quite sometime and have shared it with friends such as Byron Blakeslee from M.A.. The idea is to coordinate a vacation trip for family and soaring buddies to some exotic soaring sites such as New Zealand, Switzerland, Germany, South Africa (if they can settle down politically), England, Scotland, France, Brazil (or some other country in South America), Hawaii, or even Japan. The letter from Takashi rekindled that idea and I am interested in what you think. If you are interested, please let me know and I will generate a data base of interested parties and attempt to put something together. Is there an interested travel agent flyer who could help us put together an economical plan? Clubs interested in hosting such a gathering, of model addicted vacationers, would you please send me some information about your sites and accommodations. We could then make evaluations and start to plan. This could be a very fun time for wives and children too, if the site were close to points of interest.

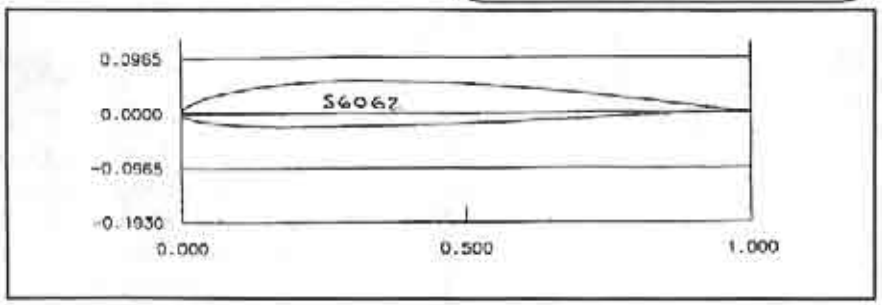
S6062 8%		0.00107	0.00295
1.00000	0.00000	0.00045	-0.00181
0.99680	0.00020	0.00563	-0.00607
0.98733	0.00088	0.01601	-0.01033
0.97184	0.00225	0.03144	-0.01419
0.95072	0.00438	0.05180	-0.01752
0.92441	0.00730	0.07696	-0.02024
0.89341	0.01095	0.10672	-0.02234
0.85821	0.01522	0.14083	-0.02382
0.81934	0.01994	0.17897	-0.02471
0.77733	0.02496	0.22075	-0.02507
0.73267	0.03005	0.26575	-0.02494
0.68588	0.03506	0.31346	-0.02440
0.63746	0.03978	0.36335	-0.02349
0.58788	0.04408	0.41486	-0.02225
0.53767	0.04783	0.46742	-0.02074
0.48734	0.05093	0.52041	-0.01900
0.433737	0.05323	0.57326	-0.01706
0.38823	0.05467	0.62537	-0.01496
0.34037	0.05520	0.67617	-0.01273
0.29424	0.05479	0.72513	-0.01044
0.25026	0.05344	0.77171	-0.00816
0.20882	0.05117	0.81540	-0.00600
0.17033	0.04804	0.85566	-0.00409
0.13513	0.04409	0.89194	-0.00252
0.10353	0.03938	0.92370	-0.00135
0.07580	0.03401	0.95045	-0.00056
0.05216	0.02810	0.97178	-0.00012
0.03276	0.02178	0.98733	0.00004
0.01774	0.01528	0.99681	0.00003
0.00715	0.00884	1.00000	0.00000

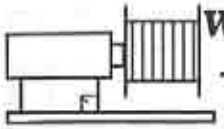


Selig 6062 Airfoil

If you liked the 6061 airfoil designed by Michael Selig, I think you will like his S6062. The S6062 is an 8% thick section. As Michael says, the thinner section has even lower drag. Note though, the drag bucket is narrowed with decreasing thickness. And, because of this narrowing, the airfoil will suffer somewhat when high angles of attack are encountered. So, if you are thinking about using the section in an application where you will be turning hard, it might not be the ideal section to select. However, if you are a straight line speed demon, this is a likely candidate for your new ridge rocket.

Hoping for Wind, Wil Byers
RT. 4 Box 9544
W. Richland, WA 99352
(509) 627-5224 (7:00 PM - 10:00 PM weekdays, after 9:00 AM weekends)





Winch Line
...by Gordon Jones

LSF -- Its Role In Model Aviation

Most members of the modeling community are aware of an organization referred to as the LSF, but many are unaware that the organization is international in scope.

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

The LSF is a 7000+ member organization founded by Lee Gray of California in 1968. It was started to provide an avenue of skills progression to the sailplane pilot and bolster the momentum of competition among them. At that time many of the sailplane pilots were banning together to enhance the levels of competition and further the interest in sailplanes.

The LSF program consists of five soaring "Achievement Levels". These levels contain specific soaring tasks for each level - each being progressively more difficult as you progress from Level I to Level IV. Achieving Level I requires only that you have accomplished two 5-minute soaring flights and 5 landings within 3 meters of a designated landing spot. From there, the required accomplishments increase in difficulty to include contest points, cross-country flights, increased duration flights, and slope flight requirements. You can be assured that a pilot who has achieved Level V is both very good and very determined. There are presently 72 members who have achieved Level V worldwide. One of these individuals has achieved Level V twice. (Now that's determination.)

The way the LSF program works is that each time you achieve another Level you send in a witnessed voucher to LSF headquarters, where your accomplishment is registered. You will then receive from LSF a new voucher for the next level. This provides a measure of your soaring ability in comparison to a large group of national and international pilots who participate in LSF, even if you never compete directly against them.

You can purchase caps, patches, decals, etc. to show off your LSF Level, but basically the LSF program is just for the personal satisfaction of knowing you have striven for and achieved new heights (no pun) in your soaring ability.

For the new comer to radio controlled soaring it is an excellent way to improve your flying skills and confidence in an enjoyable manner. It further allows you to learn the techniques that will be needed for the next LSF Level.

For information and a voucher to get started, send $1.00 in postage to the LSF. Be sure to request one of their flyers, too.

League of Silent Flight
Box 517
Winfield, IL 60190

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

LSF Levels and the requirements for each:

Level	I	II	III	IV	V
Thermal Duration	5 min	15 min	30 min	1 hour	2 hours
Slope Duration	15 min*	1 hour*	2 hours*	4 hours*	8 hours

* A second thermal flight, which meets the basic Thermal Duration requirement for this Level, may be flown in lieu of the Slope Duration requirement. However, the second thermal flight may not be flown on the same day as the first.

Spot Landing	3@5mtrs	10@1.5mtrs			
Goal & Return			1 km	2 km	10 km
Contest Requirements:					
Number of Entrants		5	10	15	20
Minimum Performance		1 place or 3,000 points	2 places or 4,500 points	1 win and 2 places or 6000 points	3 wins and 12,000 points

Towing Techniques
...by Peter Stevens

Care & Maintenance

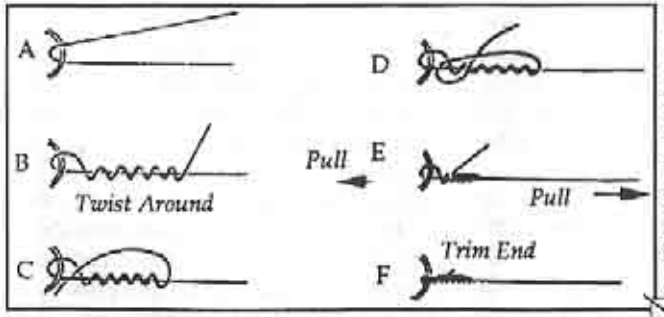
As stated before, when not in use, keep the winch in a bag to protect it from sunlight.

At the start of each season, inspect the line for damage and signs of deterioration. If you ignore any signs at this stage, you will have troubles later when you least need them (i.e., mid-launch).

It should be clearly remembered that about 90% of line breaks occur at knots, particularly those knots tied in an unapproved manner. If the line has more than say, five knots, discard it and wind on a new one.

If the winch can be dismantled, remove the gearbox cover and ensure that the gears are undamaged and packed with grease.

Inspect the glider hook and the fuselage structure around it, both inside and out and correct any damage discovered. This may require removal of a small area of covering — but that's the way its gotta be if a thorough inspection/repair job is to be done and, after all, a good job done once, at the start of the season, will suffice for the whole year. I've seen a hook, complete with about 2 square inches of ply fuselage bottom, ripped out at about 50 feet attitude on towline launch because of an undetected broken joint — Oh, sadness!



Peter Stevens
91 High Street
Northchurch,
Berkhamsted
Herts, England
HP4 3QL.

Knots for Broken Lines

Experience has shown that the most effective type of knot for monofilament line is the so-called "blood knot". Before making the knot, soak the end to be tied in water for a couple of minutes. This knot may be used for either line breaks or attaching the line to key ring or winch drum. Easy-innit??

The 2-Meter DUCK

...by Mike Stump

The 2 meter DUCKS built to date are prototypes with specific goals in design.

Mike's 2 meter DUCK

Designer Troy Lawicki's main objective was to build a contest sailplane that is durable enough to withstand heavy contest use and abuse. A reasonably light wing loading was also necessary, as well as the ability to carry ballast easily in typically windy Michigan contest conditions.

As in all performance sailplanes, the wing is the thing. The 2-meter Duck uses a double-taper leading edge planform with a ten and one half inch chord for the first 23", tapering to a seven and one half inch tip chord. Wing area is around 750 square inches. This takes the loading of a relatively heavy (50 - 56 oz.) 2 meter sailplane down to 10 oz. per sq. foot. Two meter Ducks have flown well in windy conditions carrying as much as 17 oz. additional weight.

Five of the seven prototypes are using SD 3021, while the SD 7037 and SD 7032 are flying well on two others. Two of the Ducks are using a straight-taper wing at approximately 650" area. All but one are being flown with Vision/Atracs using six servos with aileron and flap servos mounted in the wing. One is using a three channel linkage set-up and is flying very well.

Durability comes in the form of a fully molded, kevlar-reinforced fiberglass fuselage that features a slide-on nose cone/canopy. Wings are vacuum-bagged foam cores with a carbon fiber reinforced spar. The skin is 1/16 inch balsa using epoxy for the adhesive. This system is able to withstand launch loads that will cause 5/16 inch rods to bend occasionally. Aggressive contest landings have not revealed any structural problems, either.

Among the seven pilots, landing styles range from flying downhill to the spot gently, to stopping the plane in the air with flaps 4 - 5 feet over the spot and letting it fall. There is enough flap on the double-taper wing to stop a Duck flying at 30 mph in a matter of feet.

The Duck stab is 12% of the wing volume for good authority. It uses the SD 8020. Stab and rudder are both foam cores with 1/16" sheeting.

Launching and flying capabilities are what make the Duck really special. On launch, the Duck rotates to near vertical right after release. Climb-out is very steep, and "rock steady". You need to stay on the winch with good line speed to keep it climbing well. Great zooms can be accomplished if you take it over the turn-around before release. This 2 meter will launch with any larger sailplanes I have flown.

Ducks are extremely maneuverable and have a wide performance envelope. They are "full bore" contest sailplanes that are well behaved and a delight to fly. Four 2 meter Ducks placed in the top 12 at the 1990 AMA NATS. Other 1990 accomplishments include: 3 of the top 4 places at the Grand Valley RC (Michigan) 2-day 2 meter contest (25 entries). Troy Lawicki won 2 meter, standard, and placed 2nd in unlimited at the Michigan State Championships (117 entries). The season's final contest in Davison, Michigan saw Ducks take 5 of the top 6 places in 2 meter and 3 of the top 4 places in standard, which was done in 25 to 35 mph winds. Jack Swint won both classes flying his 2 meter Duck unballasted. Jack's Duck is the one flying on three channels.

Kits should be available in 2 meter and standard sizes by mid-November. all components are highly prepared for assembly. Construction is fast and accurate. Anyone with interest or questions may call: Troy Lawicki (616) 276-9696, Mike Stump (616) 775-7445, or Pat Sullivan at (616) 882-7708.

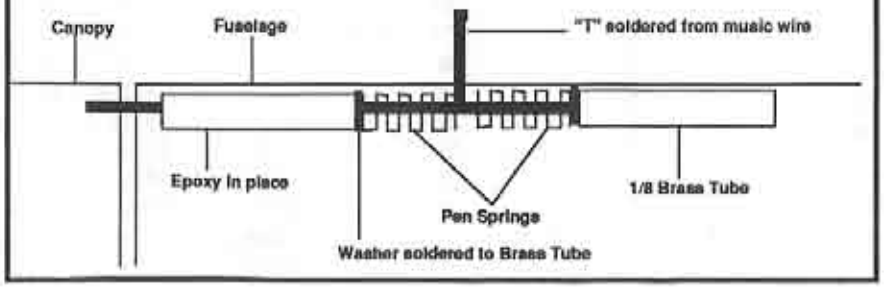
2 Meter DUCK Specifications	
Wingspan:	78 3/4"
Root Chord:	10 1/2"
Tip Chord:	7 1/2"
Wing Area:	750 Sq. In.
Airfoil:	SD 3021
Fuse. Length:	49"
Weight:	51 - 55 Oz.
Wing Loading:	10 Oz./Sq. Ft.
Stab Airfoil:	SD 8020
Stab Volume:	12 %

(L - R) Mike Stump, Troy Lawicki (designer & kit manufacturer), and Pat Sullivan from Northwest Michigan

Mike Stump
607 Washington
Cadillac, MI 49601

A Tip From Gordon Jones

Looking for a way to attach the canopy that is covered up and out of the way? Try this one on for size.



Understanding Thermal Soaring Sailplanes

Part 3...continued

...by Martin Simons

Eppler 214 vs Clark Y

The Clark Y profile was designed for full-sized aircraft about 1920.[1] It ought to be possible in 1991 to do better for a model sailplane than this. We are, however, in for some surprises.

The Eppler 214 was designed specifically for models and has been widely used on thermal soarers. The Princeton test piece had 4.03% camber and is 11.10% thick. It is thus only a little thinner and only slightly more cambered than the Clark Y. The main difference is that the E214 was designed according to sophisticated boundary layer theories which Clark could not have known.

The comparison in Figure 27 must be rather disturbing to the theoretical

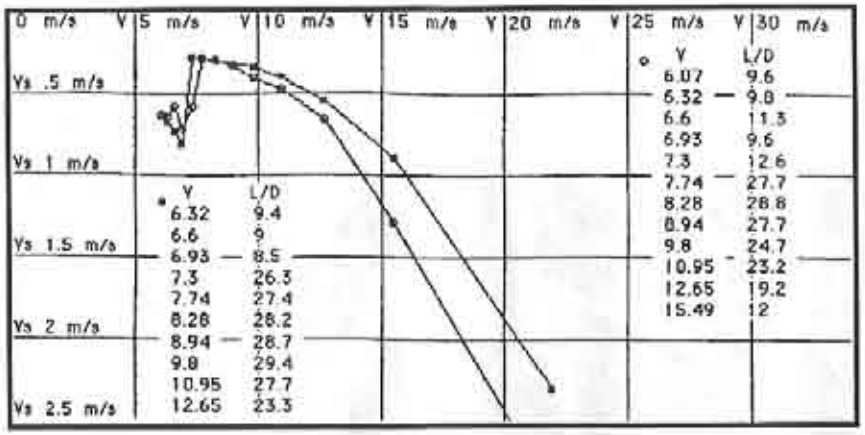


Figure 27

Performance Polar for Wing

	CLARK - Y - PT		EPPLER 214	
Velocity Metres/Sec	Sink M/Sec	L/D Ratio	Sink M/Sec	L/D Ratio
21.92	2.301	9.53	2.930	7.48
15.50	0.891	17.39	1.291	12.00
12.65	0.543	23.31	0.658	19.22
10.96	0.395	27.71	0.471	23.28
9.80	0.333	29.41 MAX	0.397	24.71
8.95	0.311	28.79	0.322	27.78
8.28	0.293	28.25	0.287	28.85 MAX
7.75	0.282	27.48	0.279 MIN	27.74
7.31	0.278 MIN	26.30	0.580	12.61
6.93	0.815	8.50	0.717	9.67
6.61	0.734	9.00	0.583	11.33
6.33	0.670	9.44	0.639	9.90
6.08			0.630	9.64

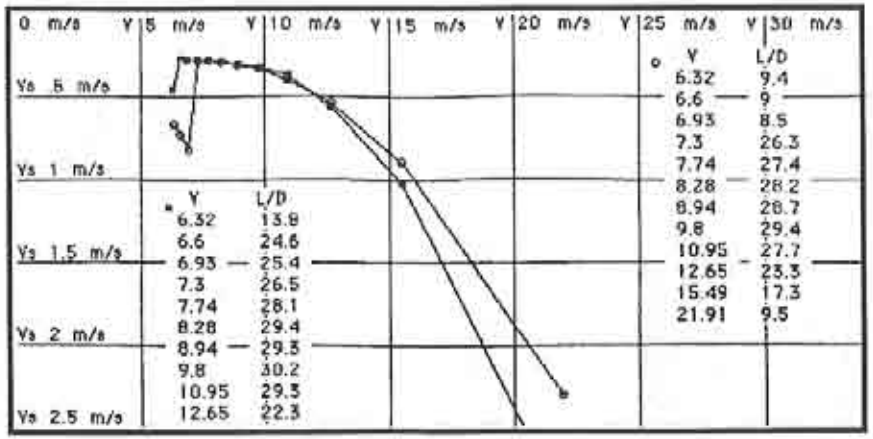


Figure 28

Performance Polar for Wing

	CLARK - Y - PT		SELIG - DONOVAN 6080	
Velocity Metres/Sec	Sink M/Sec	L/D Ratio	Sink M/Sec	L/D Ratio
21.92	2.301	9.53	2.970	7.38
15.50	0.891	17.39	1.019	15.21
12.65	0.543	23.31	0.567	22.32
10.96	0.395	27.71	0.373	29.37
9.80	0.333	29.41 MAX	0.324	30.24 MAX
8.95	0.311	28.79	0.305	29.31
8.28	0.293	28.25	0.281	29.47
7.75	0.282	27.48	0.275	28.15
7.31	0.278 MIN	26.30	0.275	26.55
6.93	0.815	8.50	0.273	25.43
6.61	0.734	9.00	0.268 MIN	24.63
6.33	0.670	9.44	0.456	13.87

aerodynamicist. As mentioned in Soartech 8, the form of camber used for this profile seems to cause some serious problems. The E214 stalls at higher speed than the Clark Y and the E214 polar curve is everywhere inferior.

Selig Donovan profiles

It would take far too long to examine every profile for which wind tunnel figures are now available. The polar for Eppler 374 appears in Figure 24 (*RCSD* 9/90, page 15), and is not especially favourable. This wing, whether in accurate or wavy form, stalls faster than the Clark Y, sinks quicker, has a poorer best L/D and equals the Clark section only at the fastest airspeeds.

For the rest, a short cut will be taken to consider the most recently designed airfoil sections produced at Princeton which, as far as possible, combine up to date theoretical work with practical testing in the most promising way. The principles and methods used in producing the Selig-Donovan sections are described in Soartech 8 (Chapter 4). The tunnel tests included sixteen of this series, one of which was a symmetrical profile.

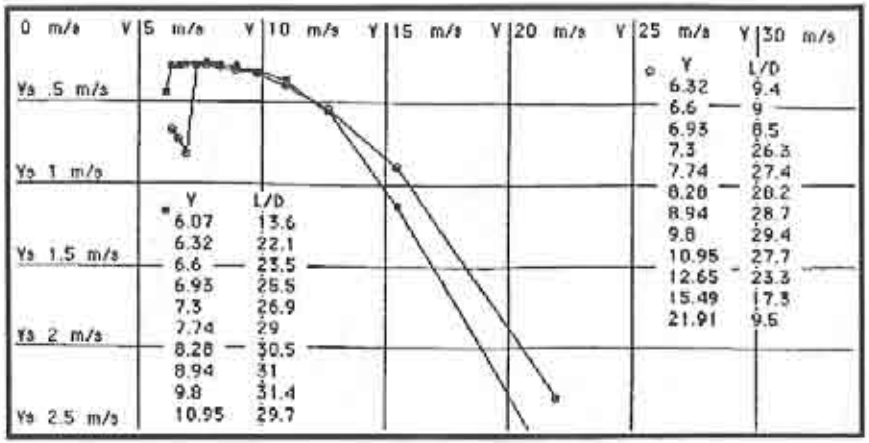


Figure 29

Performance Polar for Wing

	CLARK - Y - PT		SD 7032	
Velocity Metres/Sec	Sink M/Sec	L/D Ratio	Sink M/Sec	L/D Ratio
21.92	2.301	9.53	2.768	7.92
15.50	0.891	17.39	1.126	13.76
12.65	0.543	23.31	0.556	22.74
10.96	0.395	27.71	0.368	29.77
9.80	0.333	29.41 MAX	0.311	31.48 MAX
8.95	0.311	28.79	0.288	31.08
8.28	0.293	28.25	0.271	30.52
7.75	0.282	27.48	0.267 MIN	29.04
7.31	0.278 MIN	26.30	0.271	26.92
6.93	0.815	8.50	0.271	25.53
6.61	0.734	9.00	0.280 MIN	23.56
6.33	0.670	9.44	0.286	22.16
6.08			0.445	13.65

Generalising, with one exception the SD profiles are relatively thin, and most have less camber than the Clark Y. Several of them were intended for multi-task sailplanes rather than thermal soarers.

SD 6080 vs Clark Y

Polars for the SD 6080 with thick and thin trailing edge appear in Figure 23 (*RCSD* 9/90, page 14). For the sake of convenience the more accurate model of the SD 6080 is compared directly with the Clark Y in Figure 28. The 6080 is 9.18% thick with 3.74% camber, i.e., thinner but very slightly more cambered than the Clark.

The 6080 shows a better low speed performance than the Clark Y, with lower minimum sink, slightly superior best L/D and a lower stalling speed. The sinking speed would give the modern profile only a 6 metre (20 ft.) height advantage after ten minutes in the same air. It would have a small advantage in very narrow thermals, theoretically being able to turn a little tighter without stalling. At high speeds the Clark wing is better.

SD 7032 vs Clark Y

The SD 7032 is described by its designers

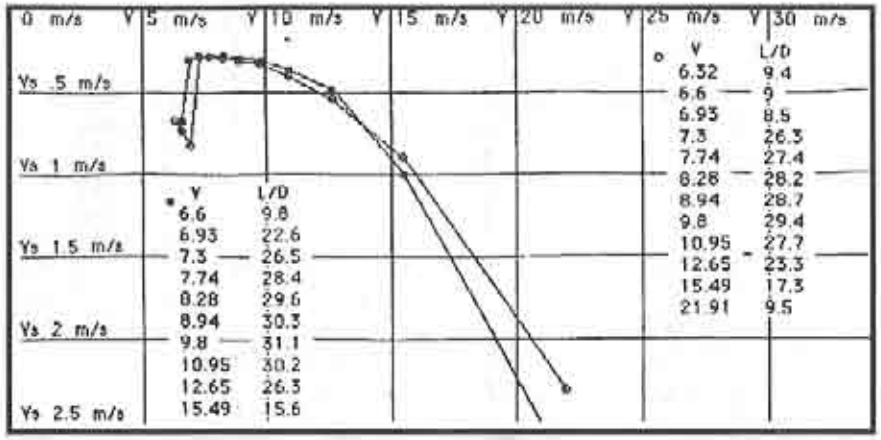


Figure 30

Performance Polar for Wing

	CLARK - Y - PT		SELIG - DONOVAN 7037	
Velocity Metres/Sec	Sink M/Sec	L/D Ratio	Sink M/Sec	L/D Ratio
21.92	2.301	9.53	2.768	7.92
15.50	0.891	17.39	0.993	15.61
12.65	0.543	23.31	0.480	26.33
10.96	0.395	27.71	0.362	30.26
9.80	0.333	29.41 MAX	0.314	31.19 MAX
8.95	0.311	28.79	0.295	30.35
8.28	0.293	28.25	0.280	29.62
7.75	0.282	27.48	0.272 MIN	28.49
7.31	0.278 MIN	26.30	0.275	26.60
6.93	0.815	8.50	0.306	22.68
6.61	0.734	9.00	0.672	9.83
6.33	0.670	9.44		

as one of the best sections for thermal soaring sailplanes. It is 9.95% thick and has 3.66% camber, thinner but less cambered than the Clark Y. The polar comparison is shown in Figure 29.

This profile is superior to the Clark Y at low speed. The stalling speed is less and the minimum rate of sink is slightly better. The difference, in the same air, would be 6.6 metres (22 ft.) after 10 minutes. The best glide ratio is a full two points better and occurs at a useful airspeed, although the Clark Y wing is again better at inter-thermal penetration velocities.

Referring back again to the NACA 6409 (Fig.25 - *RCSD* 11/90, page 11), the SD 7032 profile nearly matches the 6% cambered profile at low speeds and does not come down quite so badly at higher velocities. The stalling speed is almost the same and the sinking speed difference is only 6 mm per second, i.e., 3.6 metres (12 ft.) after 10 minutes. The 7032 wing shows a flattish top to the polar curve, indicating quite small variations of sink rate over a range of flight speeds from about 6.5 to 9 m/s. Nonetheless, the high speed part of the polar is disap-

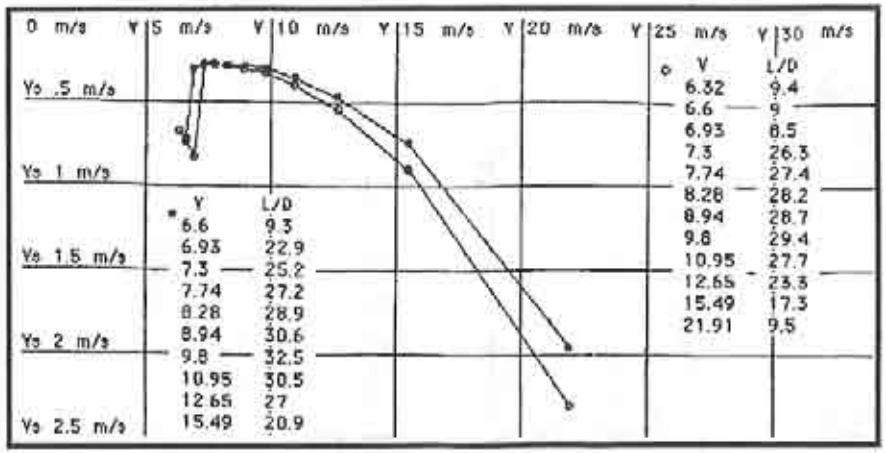


Figure 31 **Performance Polar for Wing**

	CLARK - Y - PT		SELIG - DONOVAN 8000	
Velocity Metres/Sec	Sink M/Sec	L/D Ratio	Sink M/Sec	L/D Ratio
21.92	2.301	9.53	1.960	11.18
15.50	0.891	17.39	0.739	20.98
12.65	0.543	23.31	0.468	27.06
10.96	0.395	27.71	0.359	30.53
9.80	0.333	29.41 MAX	0.301	32.53 MAX
8.95	0.311	28.79	0.292	30.69
8.28	0.293	28.25	0.286	28.97
7.75	0.282	27.48	0.285 MIN	27.22
7.31	0.278 MIN	26.30	0.290	25.23
6.93	0.815	8.50	0.302	22.94
6.61	0.734	9.00	0.710	9.30
6.33	0.670	9.44		

pointing. Some further discussion of this profile appears below.

SD 7037 VS CLARK Y

The SD 7037 is described as a thinner, decambered SD 7032, It is 9.2% thick with 3.02% camber. The polar comparison is shown in Figure 30. This profile is minimally better than the Clark Y at low speed, with the flattish top to the polar indicating a very useful performance at speed below 12 m/s (40 ft./s, 27 mph) but still falling behind in penetration. A rather surprising trend begins to emerge.

SD 8000 vs Clark Y

Figure 31 compares Clark Y with the SD 8000 profile which, its designers remark, despite differences in shape is actually very similar in the wind tunnel to older F3B profiles such as the well known RG 15 and HQ 2/9.

For the first time, a profile has been found which is distinctly superior to the Clark Y at high speeds. The interesting question is how much has been sacrificed in terms of low speed, thermal soaring capability. The minimum sink rate of the SD 8000 is only 7 mm per second poorer, 4.2 metres (13.5 ft.) after ten minutes, and the SD 8000 wing has a slightly lower stalling speed. In practice these two

wings would climb pretty well together, but the best glide ratio of the SD 8000 is fully three points better and as the airspeed rises further the Clark Y is left further behind.

Subject to all the usual cautions and remembering what has been said earlier about experimental error, it seems now that the best airfoil section for a thermal soaring sailplane is not, after all, very different from the profile that would have been chosen for a multi-task competition model. But such a profile in practice may give hardly any margin of performance above the very traditional Clark Y.

♣ ♣ ♣

1 Virginius Clark's career included service in both the U.S.Army and Navy, and NACA in its early years. He later worked for Howard Hughes.

Martin Simons
13 Loch Street
Stepney
South Australia 5069

Some Photos from the July Davenport Slope Race...by Jerry Slates

Left - Sam Shiller & SWIFT 800 that was modified by Ron Vann.

Bottom Left - Ron Vann's SWIFT 800

Bottom Right - Mark Grand and the OUTLAW! The wing is made of 1.5 lb. gray foam and sheeted with 3/32 balsa wood.

F3J In Madison Wisconsin

...by Al Scidmore

Our second annual F3J contest was held on October 6th, 1990.

Like last year's contest, we had a good breeze to help the towmen get the birds in the air. Talk of ballast died out about noon time, however, and the wind wasn't really that much of a factor. We had hoped for more of a turnout but, for this section of the country, we got what could be expected: 22 entries.

We followed the provisional rules with few exceptions. First, we flew 2 meter and unlimited classes mainly because we had trophies left over from an earlier rain-out. My personal feeling is that there should be only the unlimited class as in the provisional rules. This would afford more flights for each entry... which is the name of the game... fly, fly, fly. Second, we did not require that each flier have two frequencies available. Rather, we set up the heat matrix so that fliers on the same frequency did not have to fly against each other. Third, we used our conventional limits of the field rule for the outer circle rather than the ridiculous 75 meter outer circle which is called for.

This year all of the launch lines were monofilament. We provided a choice of 60 or 80 pound for those who had not brought any of their own. Those who brought their own launch equipment had line as high as 180 pounds breaking strength. Each line was tested for length with a 2 kg. pull. The monofilament line was a great improvement over the braided nylon that was used last year. The only line break was traceable to crossed line on the previous launch. Launch heights were uniformly high... some as high as 165 meters, I would estimate. Everyone seemed to be coming off of tow almost overhead the towman at full extension of the line. The launch procedure involved establishing good tension on the line prior to release, and then a good strong release. Line stretch of 40 or more feet is possible at launch time. Broken lines should not be expected under normal circumstances.

M.A.R.C.S.
LSF Regional
3J International
Duration
October 6, 1990

Two Meter

1.	Terry Edmonds	4000
2.	Rich Burnowski	3766
3.	George Burr	3534
4.	Jerry Skelding	3357
5.	Lee Murray	3226
6.	John Hohensee	3212
7.	Wayne Fredette	2816
8.	Wayne Westphal	2719
9..	Carl Mohs	2456
10.	Randy Rohlena	2213
11.	Gordon Lane	2237
12.	Bob Harold	1773

Unlimited

1.	Rich Burnowski	3740
2.	Terry Edmonds	3726
3.	George Burr	3669
4.	Wayne Fredette	3119
5.	Gordon Lane	2929
6.	Bob Johnson	2876
7.	Brian Andreas	2577
8.	Randy Rohlena	2492
9.	Al Scidmore	2050
10.	Bob Harold	1347

Thank-you for participating in F3J at Madison. We look forward to competing with you next year. Thanks to Al Scidmore, Brian Andreas and Wayne Westphal for their work in putting on a successful contest. Carl Mohs — CD

The contestants seemed to know the rules this time out and there was less time spent in establishing the rules this year. We allowed the two model rule, but only those who suffered damage to their primary plane took advantage of it. We still supplied a rules handout both in the contest announcement and at the pilots briefing. We also supplied towlines for those that wished to use them since we knew that a number of contestants had not made up monofilament towlines, yet.

The relaunch privilege was utilized several times because of pop offs, but few used it to refly a bad launch, or down air. The propane operated air horn worked well for pilot communication. However, there were instances when the pilots were pushing the end of the slot and the timer and airhorn operator had different times. This was costly to Rich Burnowski when he landed a half second after the airhorn blast and Terry Edmonds, who landed a second prior. No clear strategy emerged, that I could see. Several launched immediately with pretension on the line, but others waited a bit to see someone else sample the air.

The limiting factor on number of flyers in a time slot is still the number of bodies present. Since two helpers are needed per flyer, there cannot be any more in the air than the total number of people present divided by three. Again, it comes to me that having non-flying helpers present would speed things up or allow more flyers per slot. We eliminated the fly-off for the top flyers since that would mean less flying for the rest of the competitors.

Allan K. Scidmore
5013 Dorsett Drive
Madison, WI 53711

Jim & Brent Lythe with original MOTH, are from Santa Clarita, California. The wing profile is E-374. Photograph was taken by Jerry Slates at the July Davenport Slope Races in California.

be 15 points.)

Here is a scoring table to get started. By studying this, you will see that 30 seconds either side of target varies by 3 points per second. I won't go into how we arrived at all this except to say that this final program seems to work. A few other important points to keep in mind, if you try this event, are as follows:

- Advertise it and publish the regulations.
- Define an off field landing as

some potential MAX-MEN will go to great lengths.

- No sandbagging. I suggest flight groups, but that's another letter.
- If you go over 30 seconds past target, you must score on the next higher flight time unless it's the 9 minute, and then the flight time is ZERO.
- MAX-MAN seconds stop at 9 minute -0 seconds. We have never had a fly-off, yet.
- Do not mix a 3 minute precision in with this event.
- Even under what you might call ideal conditions, the MAX-MAN event does not take longer to run than other events.
- Create a trophy worth flying for, such as a traveling trophy or a Thermal Wizard.

Give me a call at (208) 765-9772 and let me know what you think. GOOD LUCK!!

Guy Russo
5722 Pinegrove Dr. W.
Coeur d'Alene, ID 83814

Jer's Workbench...continued

pricing, as yet but, by the time you read this he should be able to tell you the costs. We wish him luck, and will keep you posted on the accessories he is offering.

If you need any additional information, send a SASE to John Clarke, 911 Covert Avenue, New Hyde Park, NY 11040.

♣ ♣ ♣

In the March, 1989 issue of *RCSD*, Jim Gray did a review of a video that was offered by Mark Foster on the "Top Eight Slope Sites of the West". Well, Mark is once again offering the video tape and, as Jim said in his review, "In my opinion, it's worth having the video for its entertainment value alone, but if you're a dyed-in-the-wool slope soaring pilot, and would like to know what slope to try next, you'll find this video a ready and excellent reference." The price of the tape is $25.00, and can be obtained from Mark Foster, 826 Oneonta Dr., So. Pasedena, CA 91030.

Multi-Task Soaring In The Lone Star State

...by Pancho Morris

Multi-task soaring has been popular in Texas for many years.

The first three TEXAS NATIONAL TOURNAMENTS (TNT) were multi-task format. They consisted of AMA distance which is flown cross-wind and thermal duration. The first two were held in San Antonio and the third in Dallas. This format was dropped for the TNT because the meet was becoming quite large and the distance event took a long time to fly as we were only flying two fliers on the course at one time. To fly, more flyers would require more sighting devices and more manpower. This is the problem with distance or speed events.

In the Dallas area, we have flown a multi-task event every year as part of our regular monthly contest schedule. These also have consisted of AMA distance and thermal duration. We have gone with AMA distance because we felt it would be easier to fly with the lighter ships flown by the novice and sportsman class fliers. Whether this is really true, I'm not sure.

This always seems to be one of the most popular events of the contest season. After the meet, there are always a lot of comments about how much fun the distance is to fly. I feel that this is because it is a real change of pace from the regular thermal duration event.

This year was no exception. Our August multi-task contest drew 28 fliers. The weather cooperated and a great crew of dedicated workers came out to man the flags and sighting devices. The launch and retriever equipment worked beautifully (a miracle and a blessing!!) and a great time was had by all. Planes flown ranged from Bounty Hunters (a Don Chancey designed multi-task ship) to Falcon 880's, Windsongs, and thru to Gentle Ladies. We ran a 5 minute time from release of towline for the distance event. The high lap count was 8 1/2 (out and back) by Les Akers flying a Falcon with a 100" wing and George Parks with a Falcon 880.

We fly 6 minute duration with an FAI landing tape to keep it similar to F3B. The distance scores are normalized to 1000 points to bring them into line with scores for two rounds of six minute duration with 100 point landings. The winner was Mark Hoffman flying a 2 meter Bounty Hunter.

Aside from the heavy demand for manpower, this is a very fun event to fly. If you have not tried one in your area, you should.

Pancho Morris
2715 Eastbrook Dr.
Mesquite, TX 75150
(214) 681-1098

A sampling of the planes flown includes Legionairs, Falcons, Windsongs, Gemini, Antares, Bounty Hunter 2m, and original design.

MCV Hooks 'em to the West Coast

...by D.O. Darnell

Well, I just returned from the West Coast where things were just as crazy as ever. I try to make it out there a couple of times a year. It's usually mind expanding, so I always look forward to it!

This year, friends Barbara and Tim Renaud of Airtronics graciously invited me to take part as their guest in the 1990 Visalia Soaring Contest. That was in April, and the contest was October 6th and 7th. I arrived in L.A. October 4th. Tim and Barbara picked me up at LA "X" and it was off north on interstate 5. (Oh, so that's what they call "Grid Lock"?)

I've been to a lot of contests in the last twenty years, or so but, possibly, with the exception of some of the Chicago Soaring Nats in the early seventies, this was the biggest and most challenging contest I have ever participated in. This 17th annual event was put on by Central Valley R/C. World class fliers flock to see this one and the competition is extremely keen.

The pilot's meeting was at 7:45 A.M. (groan). The events were 3-minute precision and 5-minute duration with a landing strip consisting of adjacent boxes worth 10, 20, 30, 20, and 10 points, respectively. The boxes were only three feet square. (These guys are serious!) Most of the time the air was great, but when a downer came through, you had to struggle to stay up 3 minutes.

Brad Classen, Joe Wurts, Bob McGowan and Fred Weaver weren't affected however, finishing 1, 2, 3, & 4. The first three finishers flew FALCON 880's, with the new Airtronics Legend finishing 4th under the capable thumbs of Fred Weaver (who won last year), and two other Legends in the top 10 or 11 slots. Ed Holder, incidentally, who was 8th, was flying one of the other Legends provided bunks for Tim and myself. (Thanks, Ed, and wife Mauvie, too!)

The event terminated Sunday afternoon with an outdoor barbecue and a drawing which had about a jillion prizes. These guys (CVRC) sell raffle tickets with great tenacity. (I ended up with twenty bucks worth!) Prizes consisted of a lot of really great stuff. Kits, radios, and (only in California, folks) a vasectomy from an MD! CVRC always takes the time to write thank-you letters to each contributor which the winner (of the prize) has only to sign and place in the addressed, stamped envelope and drop into a mailbox. This kind of program gets you the good prizes year-after-year, and is indicative of the class of event that the Visalia contest is: FIRST CLASS! Kudos to CVRC and especially to the George families. You'all really have STYLE!

Of course, being in the business we're in, we shot the whole meet and have the tape for sale. It's title is "Visalia Fall Soaring Festival #17. 1990". It's available, now.

Also available is a new tape entitled "Building the Airtronics Legend" which features designer Tim Renaud and is on building and discussing details of construction and the ship's design philosophy. We spent a whole week with Tim who was hustling to finish the Legend's instructions, etc. Airtronics not only gave us full access to their resources, thereby allowing us to finish the Legend tape, but also provided us with deluxe accommodations during the shoot. We all owe them our thanks!

Mark Allen has delivered the Falcon 600 kit, and it will be the subject of a new video called "Building the Falcon 600". This video, unlike the first Falcon (880) tape, will feature a full kit with presheeted wing, and will use a film covering. I expect it to go together extremely quick so you can expect this video to ship on or before December 1. Mark and I chatted at Visalia and he tells me he's staffing up for sustained production and has plans for a new kit using advanced manufacturing techniques. Mark is to be congratulated for his success. I'm sure we can expect more good things from Flight Lite Composites!

In closing, I would like to thank all of our customers for their patience, many of whom have purchased all our videos, and especially thank those of you who had to wait a couple of extra weeks on the Falcon 880 or NATS tapes. Also, thanks to the South Bay Soaring Society and Rick Rohlfing for his kind letter.

D.O. Darnell
Model Construction Videos
4227 E. 83rd St.
Tulsa, OK 74137
(918) 481-5855 (Eve.)

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.

On the Subject of SMTS

In the November issue of *RCSD* page 29, Jim Gray asked a question regarding how to determine wing area. " One big objection to a wing loading limitation is the problem of how to determine the wing area quickly and with no pain or strain..." Greg Sprenger has suggested a method, as printed below.

Dear Jim,

I've recently read your request for a technique to measure wing area for SMTS contests. I have an idea that I think will work.

The technique is based on tracing the wing outline onto a piece of readily available Kraft paper. After tracing, cut out the outline with a scissors and weigh the paper. Using the basis weight of the paper and simple division, a very accurate wing area can be found. Here is the procedure as I envision it.

1) Determine the basis weight of the Kraft packaging paper by cutting out a measured piece of at least 5 square feet (enough to get a reasonable weight). You will need a balance that is accurate to the nearest 0.1 ounce. Old style triple beam balances are relatively inexpensive. (They weigh in grams, so conversion to ounces is required.) Fold up the paper and weigh it. Divide the weight in ounces by the area in square feet. This gives you basis weight in oz/sq ft.

2) Using this same roll of paper, lay 1/2 of the wing on top of a piece of paper, trace the perimeter of the wing onto the paper, cut it out, fold it up, and weigh it.

3) Divide this "wing" paper weight by the basis weight of the paper you determined in 1) to get the wing area:

$$\text{Wing area (sq. ft.)} = \frac{2 \times 1/2 \text{ "wing" paper weight (oz.)}}{\text{paper basis weight (oz./sq. ft.)}}$$

Using the agreed upon wing loading limit, the CD can then develop a maximum weight for each pilot's plane. Just before flying the speed task, each plane can be weighed. The CD can then check his list for maximum allowable weight for that plane and pilot, making sure that it is below the plane weight limit and the wing loading limit.

In the pursuit of fairness and speed, perhaps pilots could measure each other's planes before the contest begins. This technique should be inexpensive, relatively easy and quick, and should be fairly accurate even for complex planforms.

(signed) Greg Sprenger, 2786 Valley Heights Dr., San Jose, CA 95133

Response: Your solution is really very neat, and would be accurate enough for most purposes. It is simple, easy to do, and the only drawback I see is the use of LOTS of Kraft paper! However, that should be no problem, as some could be re-used for smaller wings.

The one thing I see as a potential drawback is the time it might take to draw outlines of half wings for, say, 50 to 100 contestants...but I agree that for an SMTS contest, there would not likely be that many entered. So the problem of time is not that great. Ordinarily, you might expect ten to fifteen entrants in an SMTS contest, and the registration paperwork using your method could be done within maybe half an hour...so it wouldn't be prohibitive, especially for a two-day contest.

I like the simplicity and direct applicability of your method to almost any situation where wing loading is needed. since you already know ratio of weight to given area of paper, you can easily find area of given paper "wing" half. As you say, multiplying by two gives whole wing area, and could be done in less than a minute, I'd guess...Jim Gray

Greg Vasgerdsian
Moraga, CA

Press Release

...from Gail Gewain of Composite Structures Technology

"Would you like to build stronger, lighter, more consistent models and save time too? Use composite materials such as carbon, Kevlar® and fiberglass and apply them under vacuum pressure to minimize epoxy weight while giving maximum bonding strength. This is possible because of the uniform atmospheric pressure applied to the lay-up eliminating voids. Now you can control the amount of epoxy even better by using our Teflon® Coated Glass Cloth (TCG) porous release material and Bleeder Felt directly over the part. The vacuum draws out the air in the vacuum bag applying pressure and forcing the excess epoxy out of the laminated cloth skin thru the TCG. When the part is removed from the vacuum bag, the TCG easily peels from the laminate taking with it the Bleeder Felt and excess epoxy and weight. The surface will be very finely textured from the weave of the TCG but is easily sanded perfectly smooth with a fine grit sandpaper in a few minutes. For maximum benefit and minimum weight, use a very low viscosity epoxy such as our Imported Clear Epoxy system.

"The new CST products expand the choices you have when selecting materials for your next vacuum bagged model. We have four different forms of bagging material and three different peel-plys. We also offer two choices in spray mold release; silicon based and Frekote 700, a non-silicon based mold release which will not transfer to your part.

"Composite Structures Technology has also expanded our line of composite materials offering many new carbon fiber products including tapered sheets designed for building composite wing spars, light weight tapered tailbooms for a wide variety of modeling applications, and 0.060 carbon sheets. We are also adding 0.030 and 0.060 carbon strips sized for spar and trailing edge applications. Our newest addition is thin unidirectional carbon fabric 10 inches wide which can be used to greatly increase the bending strength of thin wings in vacuum bagged applications. CST will sell this unique carbon fabric by the foot so customers can minimize waste and maximize strength! We also stock a choice of weights of Kevlar® cloth and the widest selection of Rohacel® foam. If your hobby shop is not yet carrying these products, contact CST directly at Dept. MR64, P.O. Box 4615, Lancaster, CA 93539 or call for a free catalog 805/723-3783 on our very complete line of vacuum bagging supplies and composite materials."

A Note of Apology

The Torrey Pines Gulls have written to tell us that they inadvertently left a donor's name off the list of donors to the Torrey Pines Scale Fun Fly as shown on page 27 in the November issue of *RCSD*.

"The Torrey Pines Gulls sincerely apologize for leaving this fine company off the list. Composite Structures Technology of P.O. Box 4615, Lancaster, CA 93539, has available a large selection of vacuum bagging systems and supplies, carbon fiber sheeting, tow, kevlar 49 cloth, fiberglass cloth, resins and Rohacell. Contact them for a complete catalog."

"We hope we haven't forgotten anyone else, and we sincerely thank all those who made the 1990 Scale Fun Fly a great event!"

Signed Jerry Miller, Torrey Pines Gulls

The Answers To The Most Frequently Asked Questions

- Back issues are available for $2.00 each for 1990 or, if you want the whole year, they are available at the yearly subscription rate. We have all of 1990 and most months in 1989.
- There is no charge to subscribers for classified ads, as long as they're personal in nature.
- No, you don't have to be a writer to submit an article. Just write it and send it in and we'll work with you, as needed. A computer disk is not required! By the way, this month we'll start accepting cassette tapes.
- 95% of the photos in *RCSD* are color! That's right! Joe, our printer, has a special screen that, in most cases, improves the quality to near-black and white resolution. Black and white photos are expensive and are not required!
- Line drawings can be reduced or enlarged and touched up through the scanning process, or imported to a graphics software application. It takes at least 8 software applications to produce *RCSD* every month, sometimes more. For those of you interested in obtaining more information on this subject, drop us a line or give us a call. We'll share all our secrets with you.
- We will return photos, disks and any other material you wish returned. Be sure to tell us what needs to be returned. However, if you have valuable photos, for example, please take special care in the mailing process. Registered mail might be appropriate, in this case. Remember, mail is occasionally lost! A SASE is not required.
- If you have a MacIntosh or an IBM/Compatible, just save to disk in your favorite word processing format. We'll translate on this end. However, send us a hard copy with the disk for the 5% which may cause us format difficulty.
- You may ask, "So, how can you do this?" In an effort to provide information on the subject of R/C soaring which is, of course, a relatively small niche as compared to the entire arena of R/C planes, we find ourselves asking people for information. When we do this, one of the most interesting responses we get, along with a frequent look of surprise, is, "You're interested in that?" You bet we are. Remember, if you have information on the subject of R/C soaring, we're interested. Don't wait for us to find you!
- Yes, we accept products for review, but it usually takes us awhile, where we can't do the review ourselves, to find someone with the time to do a write-up. If you have the time and energy to do, for example, construction and flight evaluation articles, please let us know. Currently, we need help in this area.
- No, we don't pay for the articles. We do this in order to keep the cost of subscriptions affordable.

Beardsley to Pilot California Slope Racers

The 1991 International Slope Race is off to a flying start under the leadership of Rich Beardsley, recently elected chairman of the board of California Slope Racers. Beardsley, of Santa Maria, was elected by a slim margin over Ray Kuntz of Los Angeles. Slope race pilots are represented by thirteen board members located throughout California.

California Slope Racers was organized in 1989 to manage the annual International Slope Race and to run regional races. Any pilot who enters a CSR slope race becomes a member of the organization. There are no membership dues. Expenses, such as printing, postage and AMA fees are obtained from CSR contest entry fees.

Information may be obtained from Rich Beardsley, 2401 Country Lane, Santa Maria, CA 93455; (805) 934-3191.

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