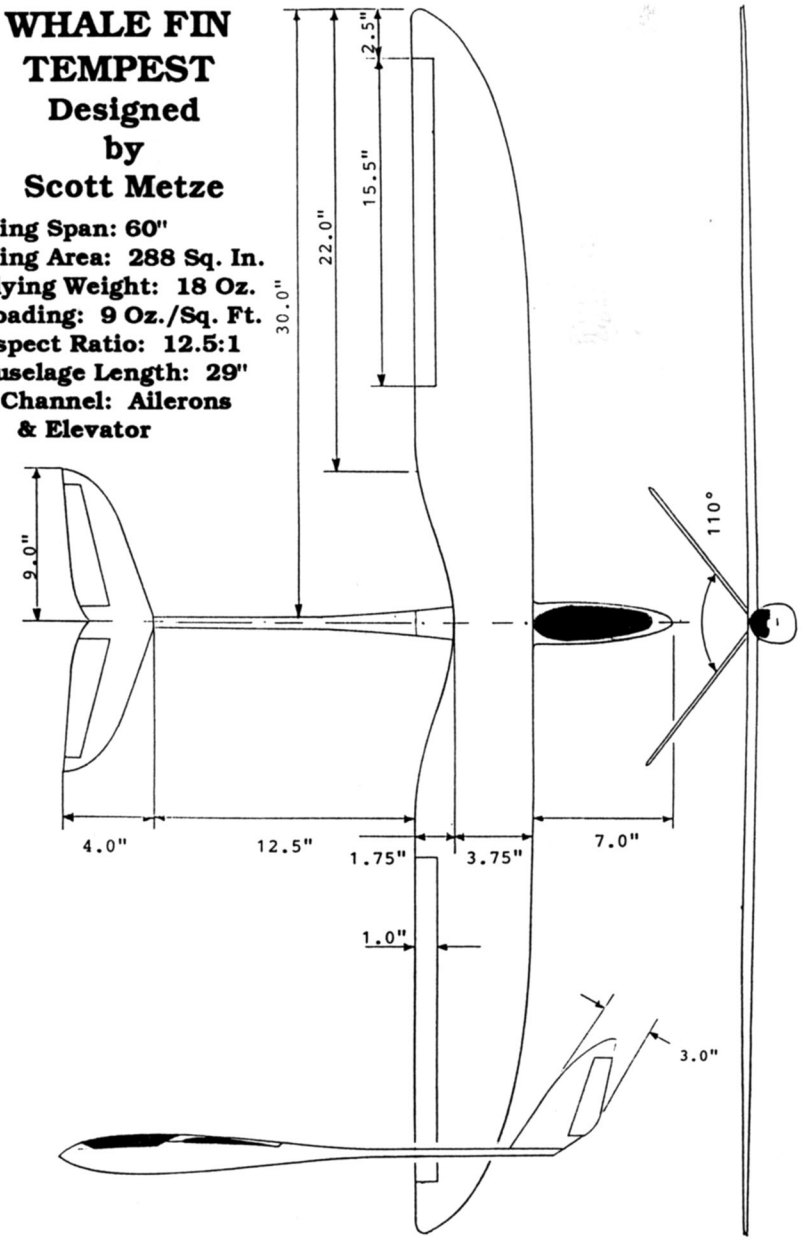
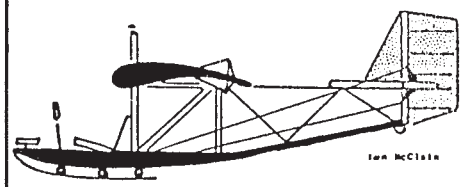
R/C Soaring DIGEST

November, 1990
Vol. 7, No. 11

WHALE FIN TEMPEST
Designed by Scott Metze

Wing Span: 60"
Wing Area: 288 Sq. In.
Flying Weight: 18 Oz.
Loading: 9 Oz./Sq. Ft.
Aspect Ratio: 12.5:1
Fuselage Length: 29"
2 Channel: Ailerons & Elevator





RC SOARING DIGEST
P.O. BOX 6680
CONCORD, CA 94524

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Schedule of Special Events

Date	Event	Location	Contact
Nov. 11	Thermal/H.L./2M Standard & Unlimited	Denver, CO	J. Barr (303) 355-3833
Nov. 11	Thermal Unlimited	Lakeland, FL	W. Futch (813) 294-4766
Nov. 17	Thermal 2M & Unlimited	San Antonio, TX	G. Dickerson (512) 656-1796
Nov. 18	Unlimited Turkey Shoot	Colorado Springs, CO	B. Welsh (719) 495-3572
Nov. 23-25	2 Meter Unlimited - Tangerine	Orlando, FL	S. Pfost (407) 644-4868
Nov. 24	Slope Race	Albany, OR	P. Chewning (503) 645-0323
Dec. 2	Unlimited Thermal	San Diego, CA	G. Anderson (619) 429-8281
Dec. 16	2 Meter & Thermal Unlimited	San Diego, CA	J. Menard (619) 475-0958
1991			
Jan. 19-20	Thermal/Open Unlimited — Southwest Regionals	Casa Grande, AZ	Vern Poehls (602) 945-1957
May 24-26	Slope Race Mid Columbia Cup	Richland, WA	(509) 627-5224 Wil (509) 627-2603 John (509) 525-7066 Roy

Mid Columbia Cup
SLOPE SOARERS RACE
May 24 - 26, 1991, Richland, Washington

Min. $2000 Cash Purse, Trophies & Prizes
Entry Fee: $80 U.S. -- Pre-registration Required
Limited To First 50 Applicants
Tri City Soarers, Rt. 4 Box 9544,
W. Richland, WA 99352
John (509) 627-2603
Wil (509) 627-5224
Roy (509) 525-7066

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J. Morgan Graphics — Printing (415) 674-9952

Feature Columnists & Technical Editors — Martin Simons, Bill & Bunny Kuhlman (B^2), Gordon Jones, Wil Byers

The Soaring Site

Did you see the proposed **R/C Soaring rule change** on page 148 in the November issue of *Model Aviation*?

John Dvorak of the South Bay Soaring Society dropped us a line to see if we had missed it, as well **(and we did)**. Earl Levin brought it to the attention of the SBSS at their business meeting.

John says, "The 150 meter winch line length will limit contests to 2 meter planes. I completely over-looked this one and I bet many other guys have, also. The new rule proposal, that limits to one meter where you stand when you launch, is very restrictive."

To date, we have received two responses to the question in the October issue: Is there anyone in California who does custom vacuum bagging or complete foam wing construction? Scott Metze does both. If you want any additional information, please contact Scott at P.O. Box 1569, Tehachapi, CA 93581; (805) 822-7994.

Tim Lawlor also does custom vacuum bagging and can be reached at (408) 335-3169 weekdays 8 - 5, or leave a message on the recorder. He is in the process of moving and we don't have his new address available.

Jeremy Teo has written to let us know that he has "shut down Banzai Enterprises for the time being because of a new job." Because of licensing laws, he says that he will not be able to run the business, as well, but he will continue to be active in the hobby.

Happy Flying, J^2

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

Jer's Workbench

Where To Obtain Some Hard-To-Find Items

An Airfoil Plot Program

For a long time I have been looking for a computer program to plot airfoils on my Macintosh Plus, but I just couldn't seem to find anything. Chuck Anderson's Model Design software fills that need for me.

The program disk comes with many airfoils already loaded, and includes Eppler, Quabeck, 4 & 5 digit NACA's, and more. I was even able to load another airfoil that was not in inventory and found it quite easy to do.

To use the software, I simply went into the Airfoil Plot Program, selected an airfoil, entered the chord length & skin thickness and printed. Also, I found that if I wanted to, I could add spars and sheer webbing.

Chuck says, "The Macintosh version is a minimal port of the MS-DOS version and does not have many of the refinements normally associated with the Macintosh. Still, I don't know of any other plotting software for the Macintosh or the C-64. Additionally, I am now delivering Vol. 2 of the Sailplane data files. Vol. 2 contains all airfoils covered in Mike Selig's Princeton test, as reported in Soartech, that were not included in the program library or in Vol. 1."

"The MS-DOS version of the Airfoil Plot, Model Design, and Sailplane data files Volumes 1 & 2 have been licensed to Argus House for distribution in the U.K. I have also sold the program to modelers on all continents except Antarctica. Therefore, I will make a special offer to any modeler who sends an order from and takes delivery to Antarctica: $1 in U.S. currency for their choice of programs."

Chuck Anderson
P.O. Box 305
Tullahoma, TN 37388
(Chuck has an upgrade policy, as well. Jerry)

Vacuum Pressing System

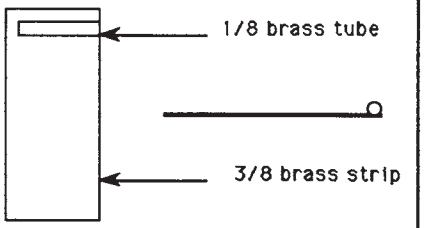
I received a letter this month from Paul Riedlinge of Canada. He saw a very interesting "Vacuum Pressing System" at an industrial trade show. This system was used for laminating wood for furniture, but in the hands of an ingenious modeler, it might be of use in our hobby. For more information, send me a Large S.A.S.E. or contact: Vacuum Pressing Systems, 10A South Street, Freeport, Maine 04032.

Wing Rods

Dave Squires has case-hardened (to a Rockwell of 70 plus) tool steel wing rods available. All sizes are cut to length. See his ad towards the back of this issue for more information.

A Tip from Gordon Jones

An easy and inexpensive way to make spoiler horns is shown below. Just solder the brass tube to the brass strip and connect the spoiler cable with a toothpick to hold it in place. Easy to make adjustments this way, too.



Model Design Software

Plotting Programs for Commodore 64/128, IBM-DOS and Macintosh Computers Using Dot Matrix Printers

...from Chuck Anderson

Airfoil Plot Program

The Airfoil Plot program is a set of programs that allow airfoils to be plotted on many dot-matrix printers. The Airfoil Plot program consists of four modules that provide for entering airfoil coordinates, editing airfoil data, modifying and combining airfoil data, plotting airfoils, and setting up the printer for the program. The Airfoil Plot program will plot airfoils from coordinates saved to disk or from built-up equations (Quabeck, NACA 4-digit, and NACA 5-digit airfoils). This program (does) airfoils up to 45 inch chord length (22 inch chord for Commodore 64/128). The program has routines for plotting skin thickness, vertical station lines, mirror image plots, special foam core template plots, and a complete set of ribs for a tapered wing (tapered wing must use same airfoil over span). The program disk also contains other programs and batch files required to support the program modules as well as 42 airfoil data files and a printer test file.

Model Design Program

The Design program consists of all modules of the Airfoil Plot program along with additional modules for plotting ribs and plans for wings with up to 9 spars as well as leading and trailing edges. This program also allows for transition from one airfoil section to another over the wing span and will incorporate up to 5 degrees of washout over the span. The Design program can plot circles, ellipses, and combinations of circles, ellipses, and straight lines for use as a drafting aid in designing fuselage stations. Airfoils and wings up to 45 in. chord (22 in. chord for Commodore) can be plotted by the PLOT and PLAN options. Maximum wing span is not limited.

Airfoil Data Disks

The programs contain airfoil data files for 42 airfoils and a printer test pattern. Disks of additional data files are available. Vol. 1 of the Sailplane data disk contains 50 data files while the Free Flight Disk contains 83 data files. Vol. 2 of the Sailplane data disk will contain any additional data files included in Mike Selig's forthcoming report on his Princeton Wind Tunnel tests and will be available within 60 days of the release of his report. Vol. 2 will also include the Girsberger RG12, RG14, and RG15 as well as any other airfoils for which coordinates can be obtained before the release date.

Atari ST & Amiga Computers

Programs are not available for the Atari ST and Amiga computers, however the MS-DOS program can be used with some versions of these machines. The Airfoil Plot program has recently been checked out on the Atari ST with the PC Ditto emulation program while the Amiga 2000 with the bridge card runs the program just fine. The BASICA version of the 2.0 Airfoil Plot program was checked out on the Amiga Transformer MS-DOS emulator. The current Quickbasic versions of the plot programs haven't been checked out with the transformer emulator, but any Quickbasic program can be run with transformer (and) then the plot programs should perform satisfactorily.

Sailplane Thermal Soaring Contest Scoring Program

I have written a program for my own use in scoring thermal soaring contests. The program puts special emphasis on ease of data entry and error handling. The program is designed for small contests and covers all AMA thermal soaring events. The program handles up to 50 contestants in each of four classes. However, the total number of contestants in all classes is limited to 100. The program is available for Commodore and MS-DOS computers, only.

On The Wing

...by B²

Three new airfoils this month, all for swept 'wings, and all designed by John Yost. The EH 1.0/9.0 is for F3B, the EH 1.5/9.0 for F3E and thermal duration, the EH 2.0/10.0 for situations requiring more stable, higher lift 'wings. These sections are for use on constant chord wings of moderate sweepback, about 20°. Very little twist is needed due to their slightly positive pitching moments. All are capable of very high performance when used with the proper airframe.

EH 1.0/9.0

ZLA	=	-0.37°
Cmo	=	0.00088
Thickness	=	8.99%

EH 1.5/9.0

ZLA	=	-0.55°
Cmo	=	0.00073
Thickness	=	9.0%

EH 2.0/10.0

ZLA	=	-0.74°
Cmo	=	0.00165
Thickness	=	10.07%

Note: The plots are shown on page 7.

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

EH 1.0/9.0

100.0000	0.0000	0.0987	-0.2963
99.6057	0.0150	0.3943	-0.5931
99.1144	0.0412	0.8856	-0.8987
98.4292	0.0870	1.5708	-1.2080
97.5528	0.1533	2.4472	-1.5094
96.4888	0.2385	3.5112	-1.7932
95.2414	0.3411	4.7586	-2.0548
93.8153	0.4606	6.1847	-2.2927
92.2164	0.5974	7.7836	-2.5071
90.4508	0.7522	9.5492	-2.6985
88.5257	0.9252	11.4743	-2.8678
86.4484	1.1162	13.5516	-3.0159
84.2274	1.3243	15.7726	-3.1439
81.8712	1.5482	18.1288	-3.2530
79.3893	1.7866	20.6107	-3.3439
76.7913	2.0379	23.2087	-3.4171
74.0877	2.3002	25.9123	-3.4730
71.2890	2.5715	28.7110	-3.5120
68.4062	2.8493	31.5938	-3.5340
65.4508	3.1310	34.5492	-3.5392
62.4345	3.4136	37.5655	-3.5271
59.3691	3.6938	40.6309	-3.4974
56.2667	3.9680	43.7333	-3.4498
53.1395	4.2324	46.8605	-3.3839
50.0000	4.4828	50.0000	-3.2996
46.8605	4.7149	53.1395	-3.1970
43.7333	4.9242	56.2667	-3.0766
40.6309	5.1063	59.3691	-2.9394
37.5655	5.2568	62.4345	-2.7865
34.5492	5.3716	65.4508	-2.6196
31.5938	5.4669	68.4062	-2.4406
28.7110	5.4791	71.2890	-2.2513
25.9123	5.4655	74.0877	-2.0561
23.2087	5.4041	76.7913	-1.8562
20.6107	5.2936	79.3893	-1.6552
18.1288	5.1338	81.8712	-1.4561
15.7726	4.9255	84.2274	-1.2621
13.5516	4.6708	86.4484	-1.0759
11.4743	4.3724	88.5257	-0.9003
9.5492	4.0341	90.4508	-0.7377
7.7836	3.6606	92.2164	-0.5896
6.1847	3.2578	93.8153	-0.4568
4.7586	2.8317	95.2414	-0.3394
3.5112	2.3893	96.4888	-0.2379
2.4472	1.9387	97.5528	-0.1532
1.5708	1.4910	98.4292	-0.0870
0.8856	1.0617	99.1144	-0.0412
0.3943	0.6667	99.6057	-0.0150
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0.0000	0.0000		

EH 1.5/9.0

100.0000	0.0000	0.0987	-0.2920
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99.1144	0.0472	0.8856	-0.8579
98.4292	0.0925	1.5708	-1.1370
97.5528	0.1571	2.4472	-1.4021
96.4888	0.2411	3.5112	-1.6446
95.2414	0.3435	4.7586	-1.8610
93.8153	0.4636	6.1847	-2.0519
92.2164	0.6015	7.7836	-2.2191
90.4508	0.7579	9.5492	-2.3651
88.5257	0.9335	11.4743	-2.4921
86.4484	1.1283	13.5516	-2.6027
84.2274	1.3418	15.7726	-2.6992
81.8712	1.5731	18.1288	-2.7835
79.3893	1.8213	20.6107	-2.8571
76.7913	2.0851	23.2087	-2.9211
74.0877	2.3630	25.9123	-2.9757
71.2890	2.6531	28.7110	-3.0210
68.4062	2.9532	31.5938	-3.0567
65.4508	3.2604	34.5492	-3.0820
62.4345	3.5718	37.5655	-3.0957
59.3691	3.8838	40.6309	-3.0963
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37.5655	5.6905	62.4345	-2.6313
34.5492	5.8310	65.4508	-2.4933
31.5938	5.9263	68.4062	-2.3401
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13.5516	5.0852	86.4484	-1.0678
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0.8856	1.1023	99.1144	-0.0473
0.3943	0.6855	99.6057	-0.0191
0.0987	0.3199	100.0000	0.0000
0.0000	0.0000		

EH 2.0/10.0

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99.6057	0.0201	0.8856	-0.9378
99.1144	0.0512	1.5708	-1.2279
98.4292	0.1034	2.4472	-1.5023
97.5528	0.1776	3.5112	-1.7470
96.4888	0.2732	4.7586	-1.9587
95.2414	0.3882	6.1847	-2.1421
93.8153	0.5226	7.7836	-2.2994
92.2164	0.6769	9.5492	-2.4335
90.4508	0.8525	11.4743	-2.5484
88.5257	1.0509	13.5516	-2.6479
86.4484	1.2720	15.7726	-2.7353
84.2274	1.5146	18.1288	-2.8139
81.8712	1.7779	20.6107	-2.8854
79.3893	2.0621	23.2087	-2.9511
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74.0877	2.6869	28.7110	-3.0664
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68.4062	3.3745	34.5492	-3.1570
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34.5492	6.8308	68.4062	-2.5563
31.5938	6.9509	71.2890	-2.3841
28.7110	7.0114	74.0877	-2.1981
25.9123	7.0079	76.7913	-2.0018
23.2087	6.9369	79.3893	-1.7985
20.6107	6.7966	81.8712	-1.5929
18.1288	6.5869	84.2274	-1.3892
15.7726	6.3097	86.4484	-1.1904
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4.7586	3.5179	96.4888	-0.2716
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2.4472	2.3639	98.4292	-0.1032
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0.8856	1.2648	99.6057	-0.0201
0.3943	0.7710	99.9013	-0.0048
0.0987	0.3423	100.0000	0.0000
0.0000	0.0000		

Towing Techniques

...by Peter Stevens

When the towline ring has been placed over the glider hook, the pilot should hold the line and fuselage firmly in front of the hook as shown in figure 1. This prevents the ring from falling off when there is no tension on the line while the towman walks away upwind.

The towman walks, with his back to the glider, directly upwind towards a pre-determined point and, having payed out all the line, turns to face the glider, and stops. The pilot then moves his hand rearward to hold the glider fuselage behind the wing leading edge, as shown in figure 1, with the glider in the launch attitude.

You will probably find that throughout a day of flying you will have used more than one towman. (They like to fly, as well.) Before each flight, the pilot and towman must discuss and agree launch signals. Remember that, at the time of launch, pilot and towman are 150 metres apart, and the signals must therefore be clear and unmistakable. Keep the following in mind when agreeing a "go" signal:

DO NOT

1. Wave the transmitter antenna as a signal. This is generally too small and vague.

2. Use "body language". Not clear enough. Can be misunderstood.

DO

1. Use a system which involves moving the GLIDER in a distinctive manner, usually in the vertical plane with the glider in approximate flying attitude.

2. Keep the transmitter antenna BEHIND the wing. I have seen these chopped off by the wing when held in front during launch!!

3. Pilot — brace yourself against the initial pull before you release the glider.

At a pre-determined signal (usually the glider being moved up and down), the towman trots backward, with steadily gaining speed, watching the glider rise in the air — these are the "take-up slack" and "all out" phases. The pilot/launcher should be holding the model above his head in an attitude of about 30 - 40° nose-up. He should hold onto the model whilst the towman runs a distance, which depends upon the wind strength, stretching the line. In a strong wind, this distance need only be 3 or 4 paces, but in flat calm, it is necessary to hang on much longer — 10-15 strides — to build up line tension and catapult the model over that all important first fifty feet. Once the right amount of line tension has built up, the launcher should push the model, still in the nose up attitude, firmly upwards rather than forwards. As the glider rises, increasing resistance (caused by up elevator), will be felt, and the towman should then turn to run forward at a fast pace, ignoring what the glider is doing because this is now the responsibility of the pilot. Near the top of the launch, resistance will decrease and this is the towman's signal that his run should slow to a trot or, possibly, walking pace, and that his attention should once more be focused onto the glider. The moment of release will be indicated by the flag at the top of the line. The towman then stands still and the winch crank handle is used to wind in the line as quickly as possible.

There are times in high wind conditions where, after the initial launch phase, the pull of the glider while climbing is strong enough to require the towman to walk towards the glider. This technique is simple, but has to be learned and practiced, so if you are a newcomer to hand towing, take notice of experience in action and take care on the first few launches in high winds.

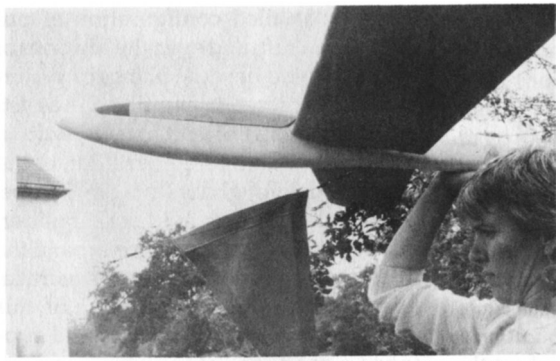


Figure 1 The "take up slack" position with hand clamping line forward of hook.

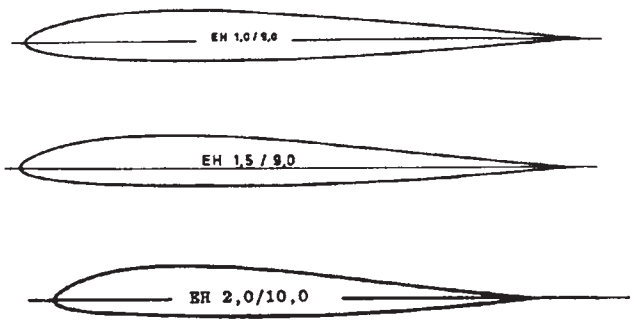
Figure 2 "All out" awaiting launch with hand held behind hook.

The key to good towing is managing the line tension, and you only have two indicators, the pull through the winch and the whistle in the line. Each model will require a different amount of tension and, at different points in the launch, it may need to be altered. So, you will have to learn the launch behavior of each model that you may need to tow if you are going to be called upon to tow a model in a contest.

To increase tension, you run forward; to decrease it, you stand still and let it die off, or run back towards the flier. Somewhere between these three positions is a method that gives a steady tension of the right strength, and your job is to find it and maintain it. The pull that the model requires must be learned, but the whistle that the line gives out is a fair indication and can tell you a lot. A light-weight model should not cause the line to whistle, and if it does, ease off. A medium-weight model can usually take a whistling line, so get the line to just start to whistle. A strong model can be towed with the line whistling all the way. A strong, heavy-weight model can be torn into the sky.

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

On The Wing Plots



Winch Line

A Visit With Martin Simons

...by Gordon Jones

As most of you know, Martin Simons is one of the world's best known model designers. He has written probably the most comprehensive aeronautical design book available today, and this publication is the bible for many builders throughout the world. Martin was born in Britain, but has lived in Australia for the past 22 years and is now an Australian citizen. He teaches at the University in his home at Adelaide, and is presently in Oxford lecturing for a six month period.

I visited with Martin and his wife Jean in California recently, and came to find an extraordinary individual who is both in love with our hobby and enormously funny. During our visit, which spanned several days, I learned a great deal about Martin Simons, the man. He has flown full-size sailplanes for quite a number of years, and he provided many wonderful stories of his flying career. His wife Jean even added some very interesting and humorous stories on Martins' flying days.

Martin moved to the radio controlled hobby because he not only enjoyed watching the planes fly, "But that with models one can take a project right through from the dreaming stage to serious designing, building and flying, with the further possibility always ahead of modifying, improving and progressing to another new design. I hardly ever build from kits or from other people's plans, although confess to having fallen for the Falcon 880 and Synergy kits I saw in California." This has been a boon to the model hobby as we have all benefited from his aeronautical knowledge.

As one would expect, Martin is also a walking archive of aviation history which includes detailed configuration of numerous aircraft, and even the histories of the pilots who flew the planes of yesteryear. He is presently engrossed in assisting in the editing of a set of texts, written by a former German glider pilot, about the early days of glider flying in Europe. No wonder he is an avid scale builder, and at this time attempting to expand the interest in scale thermalling in Australia. His article in the August issue of this journal was quite interesting and provided a good look at the scale competition taking place in Australia. He is interested in expanding the levels of competition so that more people will take an interest in the scale side of our hobby.

Martin has an abounding curiosity about the practical use of design strategies and the different designs coming out of the United States, today. While in California, he visited Mark Allen and got a first hand look at the making of the Falcon 880 and Swift 800. At several contests he got a chance to view some of the latest designs in flight and even some scale birds taking to the air. His interests do not stop at the design of the aircraft themselves but overflows into the building technology that has continued to become a great part of our hobby. I found it humorous that he had not seen a retriever before and was fascinated by the idea of them. He did say that he would not get one though, because then he couldn't use the excuse that he was going flying to get some exercise. Jean would never approve of that.

When a technical discussion arises, Martins' personality lends itself to an almost instant comradery with the others in the discussion. He is very easy to talk to and has an extremely inexhaustible patience level; as opposed to some experts who talk down to those not as technically aware. I found it interesting that my wife Peggy was able to understand his rhetoric. He relates aeronautical

Martin Simons & Mark Allen discuss the Falcon 880. Photo by Jerry Slates

design in terms and ideas in a very clear and concise fashion that all can grasp. Of course, being an R/C and full size pilot helps the process greatly.

I had a very enjoyable trip to California and a wonderful time with Martin and Jean. I learned a great deal in the process and expect to use some of this new found knowledge in coming projects. If you ever get the chance to meet Martin, you will be in for a pleasant experience.

♣ ♣ ♣

Martin says, "Amateur designing and home building is no longer really practicable in full-scale sailplane soaring. Even if one has the required abilities, it would take an individual many years to produce a competitive sailplane and while doing all the design and construction work, there would be very little time for flying. Even the two year project of rebuilding a smashed wooden glider, which I completed in 1967, was really more than reasonable for an amateur. So, yes, I like watching models, especially my own, but I very much prefer designing, building and flying! Having returned to model flying, I now find I have no time or energy for the big stuff and, rather to my surprise, am not missing much."

"I hope you and your club will persist with the F3J type of competition. The news in England is that this class is going to go ahead internationally and I think it will become much more important, possibly more so in the long run than the F3B class, which attracts only a small number of dedicated enthusiasts now. Another class which has a good following here is the so-called F3E, a form of pylon racing."

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Martin is flying the Falcon 880 on one of his first trips to the U.S.A. The radio is the new X-347. It was a beautiful day and the Falcon was showing off a bit. (Or, was it Mark.) Photo by Jerry Slates

Note: The address for the N.S.S. will be changing, soon. We'll keep you posted.

Understanding Thermal Soaring Sailplanes

Part 3...continued

...by Martin Simons

Performance calculations

All that follows should be understood in the light of what has been said previously.

Each of figures 25 through 31 (25 & 26 to be discussed this month), each with its appropriate table, is a comparison of wings of the same span, planform and loading, with different aerofoil sections. A similar method was used in Part 2, to compare wings of identical section (Clark Y) but of various sizes and aspect ratios, and above to show the effects of profile inaccuracies.

Clark Y versus NACA 6409

It is often thought that a thermal soaring sailplane should have a strongly cambered wing profile to produce a low stalling speed and minimum rate of sink. Experience with free flight sailplanes reinforces this idea. However, free flight models, apart from the towline launch, are trimmed to fly at one airspeed, whereas the radio controlled model must fly efficiently at varying speeds, as explained in Part 1 of this series. Nevertheless, it is worth considering the possibilities of using large camber. In Figure 25 the NACA 6409 profile is compared with the Clark Y wing which was the basis for Part 2 of these articles. Both sections were tested at Princeton but the 6409 was the only profile in these tests which had an open framework type of construction with film or fabric covering that sagged between the ribs. The 6409 is of course thinner than the Clark Y (9% against 11.72%) but has 6.0% camber, one of the most strongly cambered sections likely to be considered for a radio controlled sailplane. The camber of Princeton Clark Y model is 3.55%.

The outcome of this comparison is probably not surprising. The thin, strongly cambered profile produces a low stalling speed combined with a low minimum rate of sink. The best glide ratio is fractionally better than that of the Clark Y wing but the 'penetration' glide is very poor.

The difference in minimum rate of sink is 1.7 cm (.67 ins) per second, which after ten minutes of perfectly trimmed flight in the same air would be 10 metres (33 ft) difference in altitude. Thus in conditions with weak lift and very narrow thermals, or no lift at all, the NACA 6409 model would have a measurable advantage over the Clark section. However, in almost any other kind of weather, the Clark wing would be more practical, being capable of searching for lift over a wider area and escaping from sink more quickly. Once established in a thermal of reasonable size and strength, the Clark Y wing would climb almost as fast as the 6409, if the 6409 model ever reached the lift at all.

Wortmann FX 63-137 versus Clark Y

Thin wing profiles such as the NACA 6409 tend to have narrow drag buckets. That is, the drag increases rather sharply on either side of the ideal trim. The stall of such profiles also tends to be rather abrupt. Sections of moderate thickness generally have a wider range of useful trims, a milder stall than thin profiles, and develop higher lift coefficients with only a slight over-all drag penalty. It is possible that a sailplane with a thick section of 6% camber, though having higher drag on average, would perform better at both ends of the speed range, low and high, while probably doing less well in the middle range, about the best L/D trim.

Following this line of thought, Figure

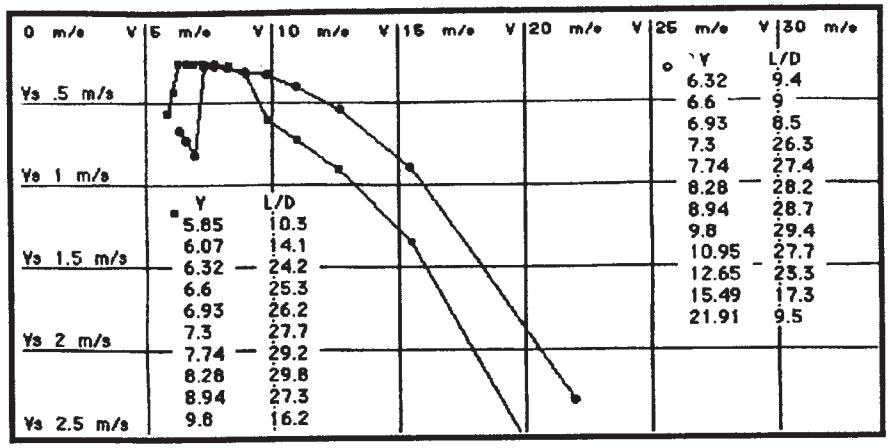

Figure 25

Performance Polar for Wing

	CLARK - Y - PT		NACA 6409 - PT	
Velocity Metres/Sec	Sink M/Sec	L/D Ratio	Sink M/Sec	L/D Ratio
21.92	2.301	9.53	3.081	7.11
15.50	0.891	17.39	1.348	11.50
12.65	0.543	23.31	0.907	13.96
10.96	0.395	27.71	0.722	15.18
9.80	0.333	29.41 MAX	0.602	16.29
8.95	0.311	28.79	0.327	27.33
8.28	0.293	28.25	0.278	29.83 MAX
7.75	0.282	27.48	0.265	29.27
7.31	0.278 MIN	26.30	0.264	27.71
6.93	0.815	8.50	0.264	26.30
6.61	0.734	9.00	0.261	25.32
6.33	0.670	9.44	0.261 MIN	24.27
6.08			0.430	14.12
5.86			0.565	10.36

26 compares the Clark Y with the Wortmann FX 63-137. The 63-137 was designed for muscle-powered aircraft and was therefore intended to have a particularly good 'power factor', this being also the factor which governs the minimum rate of sink of a sailplane. It was used on some of the earlier human-powered aircraft and it has also been very extensively studied by aerodynamicists looking for aerofoils for high altitude and remotely piloted surveillance vehicles.

The profile, as tested at Princeton has almost 6% camber and is 13.59% thick. It was not one of the most accurate models tested, the average departure from the true ordinates being 0.8 mm (.0322 ins). The polar curve shows very much what should be expected. The stalling speed is lower than the 6409. The minimum rate of sink is not so good, in fact not significantly different from the Clark Y, but it occurs at a lower airspeed. The best glide ratio, in the middle speed range, is not so good, and the high speed glide is better

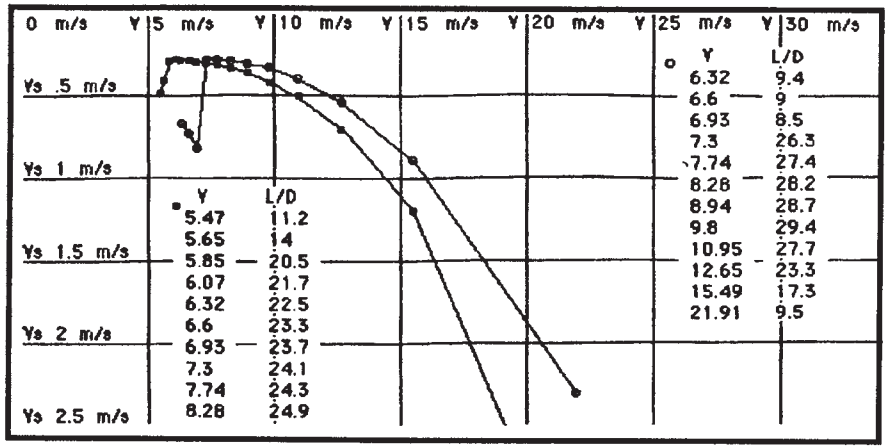

Figure 26

Performance Polar for Wing

	CLARK - Y - PT		WORTMANN FX63 - 137	
Velocity Metres/Sec	**Sink M/Sec**	**L/D Ratio**	**Sink M/Sec**	**L/D Ratio**
21.92	2.301	9.53	3.507	6.25
15.50	0.891	17.39	1.195	12.97
12.65	0.543	23.31	0.700	18.07
10.96	0.395	27.71	0.505	21.69
9.80	0.333	29.41 MAX	0.422	23.24
8.95	0.311	28.79	0.364	24.61
8.28	0.293	28.25	0.331	24.99 MAX
7.75	0.282	27.48	0.318	24.36
7.31	0.278 MIN	26.30	0.303	24.12
6.93	0.815	8.50	0.292	23.70
6.61	0.734	9.00	0.283	23.37
6.33	0.670	9.44	0.281	22.51
6.08			0.279 MIN	21.75
5.86			0.285	20.52
5.66			0.402	14.09
5.48			0.488	11.23

than the NACA 6409, although inferior to the Clark Y wing.

It seems from this that by using a camber as high as 6%, with either thick or thin form, the modeller will produce a 'one speed' or 'floater' sailplane suitable only for practically windless conditions with weak and narrow thermals, or no thermals at all. This should not astonish anyone but it should be noted that such camber values do not actually reduce the fundamental minimum sinking speed figures very much, if at all. They produce a model which flies slower, but comes down almost as quickly or at about the same rate, as the Clark Y.

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Using The RC Channel Analyzer

...by Kurt Rosner

Having volunteered to run the transmitter impound and channel security at the 1990 F3B team selection, I was happy to get my hands on Jim Hauser's prototype 'RC CHANNEL ANALYZER' for that spectator event. This device, which I tend to think of as the 'Magic Wand' (MW), was mentioned, with photograph, in Bob Underwood's column in the September 1990 issue of Model Aviation, *page 135.*

MW is not quite a radio receiver, and it is not quite a spectrum analyzer, but it receives radio signals and displays them in visual form like a spectrum analyzer. Picture a fuzzy horizontal line at the bottom of a screen, the fuzz representing background radio noise, with signals showing as bumps or tall skinny peaks, or tall fat peaks, depending on the received signal strength and bandwidth, and you've got it.

Jim created MW for RC aircraft use, so the spectrum it displays is from 72.0 MHZ to 73.0 MHZ. It takes a 3/4 turn of a large knob to cover that range on the prototype. When a signal is lined up exactly in the center of the screen, the frequency or RC channel number can be read off the scale directly under the knob's pointer. Signals up to 60 KHZ away on either side of center can also be identified on the 2-3/8 inch square LCD (liquid crystal display) screen that covers a 120 KHZ chunk of the frequency spectrum horizontally, and 60 db of signal strength vertically. The dial is calibrated in 20 KHZ steps, or it can be calibrated in RC channel numbers.

It's the telescoping whip antenna that creates the magic wand: with the antenna collapsed for maximum attenuation, wave the wand over the transmitter impound area while turning the knob from stop to stop, and quickly see and identify any hot transmitter. Extend the antenna and search for commercial stations and RC turkeys who set up within shoot-down range of your operation without announcing their presence.

The analyzer is compact, light-weight, runs many, many hours on a 9-volt battery, and is easier and faster to use than monitor receivers (scanners). You cannot get the "big picture" instantly with a receiver; scanners lock on to signals, and have to be constantly diddled to continue scanning or searching in the presence of signals. Of course, MW won't alert you if you're not looking at it, and, as I discovered over Labor Day weekend, even a magic wand is only as sharp as its operator!

Jim has started work on an improved version. There will be no knob because of the inherent weaknesses of potentiometers. A key pad will control the "tuning"; pushing one key will show the entire 1 MHZ spectrum, giving you a really big picture, then you zoom in on areas of interest by playing the keys. A digital readout will show the selected frequency or RC channel number, perhaps both.

Enough interest has been expressed in MW by RCers that Jim will produce the improved version in small quantities at about $500 each. That price should put the analyzer within reach of the larger clubs. All RC clubs should own, and use, some sort of "early warning" device. Many RCers have such expensive aircraft now that a further investment to protect the aircraft from shoot-downs seems reasonable. MW should be available in January, 1991.

Please drop Jim a line if you are interested in obtaining additional information.

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The Aero Spectra Corporation
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Boulder, CO 80307

X-347 A Computer Radio & More

...by Wil Byers

What is a computer radio? Specifically, what is the X-347?

In its simplest form, a computer radio is a system which utilizes analog circuits (the potentiometers, switches, and Rf transmitter) interfaced to a micro computer, a digital information processor. The interfacing (some kind of analog to digital conversion) allows analog signals to be processed by the microprocessor via algorithms. The algorithms are written into or stored in another device that also interfaces with the µprocessor called a Read Only Memory (ROM). The read only memory will contain the necessary algorithms as a set of machine language instructions; which will be used by the micro computer to determine what actions need to be taken when signals are received. This unique system affords you, the user, the ability to perform functions with a computer radio that in past years would have required special mechanical mixing systems or would have not been possible at all. Because, in the micro computer world, a signal can be converted to a digital value, then be read in by the system, acted upon via the set of instructions, and then sent out to the Rf transmitter to be transmitted to the airborne receiver. The receiver, after narrowly receiving the signals, converts them into a servo recognizable form, which results in movement of said servo, or lack of!

This very brief explanation is so bare of detail it hardly begins to scratch the surface of what is really going on, but it gets a basic idea across. The idea that a computer radio is not really all computer but a mix of old and new. Suffice it to say, however, that what is taking place inside our new generation of radios would have made Tesla sit up and take notice. As well, it affords us, via creative imagination, the opportunity to develop model aircraft with superb flying and handling performance. However, it should be understood that computers are dumb machines and, therefore, they do only and exactly what they are told to do, even though it often times feels that they do just the inverse of what we think we told them to do!

Now, what is the X-347 radio system, anyway? It is Japanese Radio's (JR) third generation of computer radio recently introduced to the model enthusiast. Their first radio, the Galaxy 8, introduced back in 1985, was also the industry's first computer radio.

Since then, computer radios have come a long way and the X-347 is no exception. The 347 is a radio offering three radios in one package. It is optimized for Helicopters, Pattern, and Gliders. This is to say, written into its memory are a set of instructions which allow it to be programmed to function either as a Glider, Helicopter or a Pattern radio, selectable by you, of course. Likewise, this radio can store up to four different sets of model flying parameters, which you enter in its memory. Thus, one might have parameters for an F3B model, a Slope Racer, a Scale Glider, or even an F3J ship all stored in memory waiting to be called up when needed. So, one might choose to store two different sets of parameters in memory for the same model in order to fly the model in two entirely different environments (i.e., thermal vs. slope). Additionally, the 347 is a seven channel radio. Therefore, its name implies its abilities.

Ok, would you like some specifications? If not, turn the page. After all this is a great publication with lots of interesting glider stuff, but I'll miss you.

TRANSMITTER

Model No.	NET -C127HZ
Encoder	8 channel computer system
Modulation	PCM or PPM
Output Power	Approximately 1W
Current Drain	200 mA yields approximately 2.5 hours flying time
Power Source	Nicad Battery 550 mAH
Output Pulse	1000 µS/2000µS (1500 neutral)
Weight	955 grams (2 lbs 1.75 oz.)

RECEIVER

Model No.	NER-627XZ
Type	7 Channel FM-ABC&W (Automatic Blocking Circuit & Window) a new technology in narrow band reception, & ACI PCM
Sensitivity	5 µV minimum
Selectivity	8 Khz/50dB
Weight	44grams (1.55 oz.)
Size	.83 X 1.42 X 2.0 inches

SERVOS

Model No.	NES 901
Torque	41.6 oz/in
Speed	.27 sec/60 degrees
Input Pulse	1.5 MS ± 600 µS
Power Source	4.8V DC
Weight	34 grams (1.2 oz)
Size	1.35"Hx.70"Wx1.32"L

BATTERY

Voltage	4.8V
Power	550 mAH

Since RCSD is a R/C soaring publication and I am a died in the wool glider enthusiast, I will discuss only the glider functions available on the X-347. Remember though, the radio can function in three completely different modes and, therefore, one might consider using one of these model modes to design a program that would be useful to you in some special application (i.e., slope aerobatics).

The first thing you are going to notice, when you inspect the X-347, is that it has an extremely ergonomic feel to it and that it is light in your hands. It appears very different from the standard boxy lines of most radios on the market today. The 347 has a molded plastic case with smooth handsome lines that holds inside a very powerful electronic remote control system. This is a system that affords the user many functions and features. On the top center of the radio, there is an LCD (Liquid Crystal Display), which informs you about a number of things taking place within the system, such as battery voltage, model type, modulation type, timer display, or the function which is currently being programmed, if in that mode. Besides the display you will notice six keys along the bottom that will be used to enter your particular model parameters into the radio's memory. Additionally, these keys will be used for setting and starting such things as the count down timer.

As with many of the new radios on the market, the X-347 features a voltage alarm on the transmitter. The purpose of the alarm being, of course, to get you to stop having fun and land the model aircraft before it decides on its own to attempt a final approach. Therefore, when the voltage in the X-347 battery pack reaches 9.0 volts the display will flash BATT and an alarm will sound 7 times, thus warning you to land promptly!

A feature I enjoy is the ability to adjust

the stick tensions. Thus, one can obtain the stick feel they find most comfortable. Also, the stick length is adjustable via an allen wrench adjustment. It also comes with a DSC (Direct Servo Control) connection, which many of you might like to to use at the flying field. This feature allows you to control the servos in your model without transmitting any RF signal and allows it to be done while only drawing 50 mA rather than 200 mA, as when the RF section is powered up. One very special feature is the Trainer system. It is a system which, for the first time, allows truly programmed training via the trainer cord interconnect. Allowing the instructor to program in only the functions which will be pertinent to the students ability.

Since the X-347 is a computer radio, I'll just bet you want to know what features can be programmed. Well, there are many. First, one must begin by getting access to the Function Menu. This is simply accomplished by pressing the UP and DOWN keys simultaneously, after which the display will show the last active program. Next, pressing either the UP or DOWN key will allow the programmer to scroll through the functions one by one. The functions will, of course, vary depending upon which model type you have selected. In this article for the sake of simplicity, we will only talk about the glider mode. Once the programmer has reached the appropriate function, changes can be made by pressing either the + or - keys. One can easily select another channel of a particular function by pressing the CH key. Once the programmer has made all of the program entries they wish to make, they exit the program data entry routine by pressing the UP and DOWN keys simultaneously again. That's all there is to programming the X-347. If it sounds easy, it is easy!

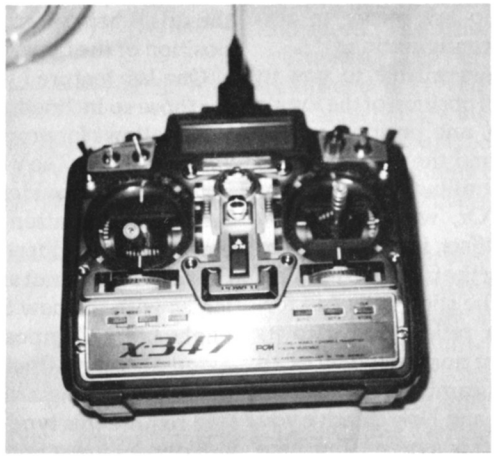
Besides the model functions which one can program, there are some system parameters that can also be modified. These

Wil Byers' E-RACER with 96" wing span and E-221 airfoil. It has a beautiful finish & great workmanship. It flew extremely well. This photo was taken by Jerry Slates at the July 7-8th Davenport Slope Race.

are items like: selecting the model you wish to fly. Or, you can name the model, select the type of aircraft to be flown, do a complete data reset, choose from different wing configurations such as V-tail, select the modulation type, and perform a copy function that allows a program to be easily copied from one model to another.

When one enters the Function mode and steps through the menu they will find 21 functions available, besides the above mentioned system settings. They are from the top of the menu to the bottom: Dual Rate, Exponential, Servo Reversing, Sub Trim (allows additional trim), End Point Adjustment, Elevator-Flap Mixing, Differential Aileron Mixing, Flap-Aileron Mixing, Aileron-Flap Mixing (Flaperons), Crow Mixing, Dual Flap Trim (allows Trimming of Flaperons with dual trim pots), Four Programmable Mixing Functions, Flap Knob Value Adjustment, Fail Safe (allows adjustment of time delay), Trainer Function, Stop Watch Timer (provides a count down up to 35 minutes), and an Integral Time Display. Since there are many functions which this radio is capable of and I cannot possibly discuss them all here, I will only discuss a few. If this does not completely satisfy your need to know you can write or call me or the JR distributor and we will try and answer all your questions.

One special thing about computers is that their resolution is determined by the number of bits they can read in at one time. In other words, an 8 bit µprocessor can give a resolution of 256 while a 16 bit processor can give a resolution of 65,536. This simple example may not readily explain why, but this unique feature allows us the ability to program in very precise values. Since this is possible, one can therefore tell the radio, via the program, exactly what it is to do with the information that it receives from either your thumb or a particular switch. So, when a function is accessed, as in the case of Dual-Rates, the programmer (you) can tell the radio to respond by moving servo outputs in 1% increments. To make this process a bit more clear, let's say you want to adjust your dual rate to apply only 61% of full throw when in the dual rate mode. All you have to do is access the Dual-Rate function, then step to the desired channel, such as elevator, and key in the percentage of movement you wish, in this case 61%, then exit the function and you are ready to fly with 61% of full throw on your elevator, when the dual rate switch is activated. Additionally, a switch is seen as an address location internally to the radio µprocessor system, rather than as a hard wired location. As such, inputs are read only as digital highs or lows to the processor. This special digital feature provides an algorithm written into the machine language of the ROM, and allows you, the user programmer, to decide which position on a selected switch will be on or off. Neat, huh! You are no longer locked into uncomfortable control setups but, rather, you tailor the system to your specific needs.



Another function that is especially useful is the Timer. The Timer offers two separate functions: count down and stop watch. In count down mode, the clock is set to a predetermined value in 10 second intervals up to 35 minutes. When activated via the Snap-roll switch or the + or - keys, the clock will monitor the elapsed time until it reaches the last 30 seconds of the countdown at which time the transmitter will beep three times. At 20 seconds it will beep 2 times, and then beep one time every second from 10 to 0. Once the countdown has reached zero there will be a continuous tone for 1 second, after which the Timer will begin counting up with a + indication to the left of the time value. The stop watch function is pretty standard except

that at 44 minutes 59 seconds the time will reset to zero and continue to count.

As would be expected, if you are a serious glider pilot, you will be interested in Butterfly Mixing or what many refer to as Crow. Yes, the X-347 can provide Crow. This function is defined as "Mix SP" on the function menu. It allows the programmer to enter values which will yield up ailerons and down flaps when deployed and will add elevator compensation if needed. The Crow system is activated using a toggle switch, which is located in a convenient place on the upper left hand corner of the radio, and then increasing the Spoiler (Throttle) stick. This is bit tricky to program the first time and you should make note of the fact that the "Offset" is an important part of the program and, therefore, should not be left out. Additionally, the radio affords you the option of using a knob located on the top left corner to also deploy the Crow configuration.

Two setups are available to you in Crow: one for each position of the toggle switch. Therefore, one position can be utilized as Crow and the other position could be used for trailing edge Reflex or something else. Or, when using the Spoiler stick for Offset, it can be used to completely camber the trailing edge. One need only move the stick to its full forward position for reflex, pull it to its neutral position for normal flying, or all the way back for camber. The choices here are up to you and how creative you want to be with this system. But here once again, I want to say, computers are dumb machines that do only what you tell them to do!

Besides the Crow mixing feature in the X-347, the designers have added four Programmable Mixes, which can to used a number of creative ways. Three are multi-function Programmable Mixes (A thru C) with Aileron and Rudder Mixing (Mix-D). The whole purpose of mixing is to aid in design, make the model easier to fly, and provide special flying abilities. Therefore, a model may be set up to fly with mix on part of the time, while at other times the model will have the mix turned off. For this reason, all mixes can be switched on or off in flight, utilizing any number of switches. Each channel of the radio is identified and used to establish particular function identities. These identities are used to establish mixes with one channel becoming the "Master" channel. The "Master" channel being the channel to which we will mix another (i.e., the ailerons are the master). The channel being mixed will be known as the "Slave" channel, (i.e., the rudder being a slave). So, in this example, we would have established an aileron/rudder mix, with you deciding and entering into the program how much mix is necessary for your model. As with the Crow function, each Mix has an "offset". The purpose of the offset being to redefine the neutral position of the Slave channel.

One last feature I wish to emphasize, for those so inclined, is a System Set-Up which allows for programming of V-Tail configurations. The V-Tail configuration, when active, provides that both tail surfaces work in unison to operate both as elevator and rudder. I mention this because V-Tail aircraft are becoming popular, as with the new Swift designs from Flight Light Composites. And, I know many of you out there are also very interested in flying wing designs, which will require this type of configuration.

Now, for just a minute reflect back on where radio technology was ten years ago. Moreover, think about the cost of a good radio ten years ago and how much you had to pay for that radio. Today's R/C system is much more sophisticated and reliable than it was a decade ago and their price has actually gone down. I find that fact amazing when one compares what a house or car cost today by comparison to a decade ago. Besides the radios and transmitters getting better, the servos that now come as standard are much much better, with both size going down and torque going up, not to mention their outstanding resolution. And, if one is not happy with what comes as standard equipment, you can certainly upgrade for a small price.

If you or a flying friend are looking for a new radio system, maybe you would do yourself and your model justice by taking a look at the JR X-347 computer radio. Don't let the computer part scare you off. Or, don't think that because it is high technology it will cost you your first born child. It won't. This is a system that ten years ago would have been impossible to own and, today, is not only affordable, but even reasonable. Lastly, as a glider enthusiast, you will find the X-347 an asset to your model's performance and to your flying skills.

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W. Richland, WA 99352

Another Tip...from Gordon

K-Mart has been offering some small plastic tool boxes that make great flight boxes, and you might even luck out and get a blue light special, too.

About The Cover
WHALE FIN TEMPEST
...by Scott Metze

I designed and built the Tempest Whale Fin at the request of Lewis Hignite. The basic wing planform was conceived to reduce fuselage drag and keep a moderate 12 to 1 aspect ratio.

The Tempest Whale Fin has been flown with a wing loading from 10 oz./sq. ft. to 19 oz./sq. ft. A second plane was also built without the root cut out. Both planes have identical wing loading and have been flying together for six months. I find that the Whale Fin design has consistently out-flown its identical mate in L/D, minimum stall speed, and in top-end speed. The difference is noticeable.

The wing uses the Jack Chambers' 16 airfoil and is carved from solid balsa. The center of the wing has three layers of 5 oz. carbon top and bottom. These layers stop at the beginning of the ailerons. The basic Tempest fuselage is used for the body.

This is the 26th version of the Tempest made to date. There is a spin-off of this version being built at this time. It has high aspect "swallow" wings, a 50 "span with an average chord of only 3.75 inches, and is being built strictly for all-out speed. The Swallow Tempest will have a "T" tail and be a two channel airplane.

(Readers: Scott Metze produced these excellent drawings, himself...Jerry)

Scott Metze
P.O. Box 1569
Tehachapi, CA 93581
(805) 822-7994

Bruce & Marie Abell
Photo by Jerry Slates

Covering With Polyester Chiffon

...by Bruce Abell

Everywhere I go with one of my gliders, I get asked, "What is the covering?" And, then, "Why?" So, I thought that I'd better put it all on paper and what better publication for it to appear in than RCSD!

First, perhaps, I'd better explain the "Why?" before I get to the "How!"

"Why?"

I go back to the 40's and F/F models when tissue was the covering and silk was used for the larger models, so fabric and dope are almost second nature to me. When the mylar iron-on films first appeared, I tried them but was not very impressed due to the tendency of this covering to sag under a hot sun with resultant loss of strength in the model. At least the doped silk didn't sag but it was too easily punctured and, after a period of 12 months or so, became quite brittle while tissue was even worse in this respect.

I subsequently started looking around for an alternative and finally, one day, while accompanying my wife when she was looking for some material to make a dress (She's into all this sewing and related craft bit!), I saw this very fine, light material called "Chiffon" in a dress material shop, so I purchased a couple of yards at a price that was about half that of silk. The material turned out to be nylon and the strength problem was solved!!

Then, I happened onto some polyester Chiffon and found that this could be heat-shrunk whereas the nylon couldn't. Further, the nylon I found to be more "elastic" than the polyester, so I now opt, where possible, for the latter because of the greater rigidity as well as the ability of heat-shrinking those compound curves where the dope alone isn't quite sufficient.

Another fabric I have found that fills all these requirements is polyester "Organza" which is at around the same price as "Chiffon".

The finished covering job is a little heavier (mainly because of the coats of dope) than the iron-on film but, for me, the incredible strength more than compensates.

When shopping for your covering material, be very fussy, as the thickness (and weight!) can vary greatly. I've measured samples at .006" and .003" and it's very easy to settle for the former if you are not aware. Another thing to watch for is the weave, as an open weave will take more dope to seal it than a close weave will. Remember that polyester fibre does not absorb the dope, so the dope has to surround the fibres to be effective, but more on this later.

"How?"

The first step is to brush on two coats of full strength dope to all surfaces where the fabric has to adhere. This is vital as the dope has to surround the fibres and the initial coats of dope on the fabric covering have to be 60/40 dope/thinners in order to penetrate through the weave. This thinned dope will not readily stick the fabric to the framework. Of course, this process cannot be used on foam wings or fuselages. Usually, I coat only the outline on the top and bottom surfaces of a wing and the under-surface of the ribs if they are "under-cambered".

The next step is to cut pieces of fabric (around 1" over size all around) to suit the surface to be covered and, in this case, I'll describe covering a wing panel. The piece of fabric is laid over the panel, and one corner at the root is stuck down by brushing on a coat of full-strength dope and RUBBING IT THROUGH THE FABRIC WITH A THUMB OR FINGER! Usually, it only takes about 30 seconds of this action for the dope to set and, after another couple of minutes, the fabric can be pulled tight without the stuck corner letting go.

Having got our first corner stuck down, we now lightly dampen the fabric by spraying it with water from a hand atomizer of some sort. This dampening seems to make the fabric expand a little and results in a tighter resultant covering job. I prefer this system to dampening the fabric first as it is then easy to keep the fabric damp as the covering job continues rather than have the last part done with the fabric dried out.

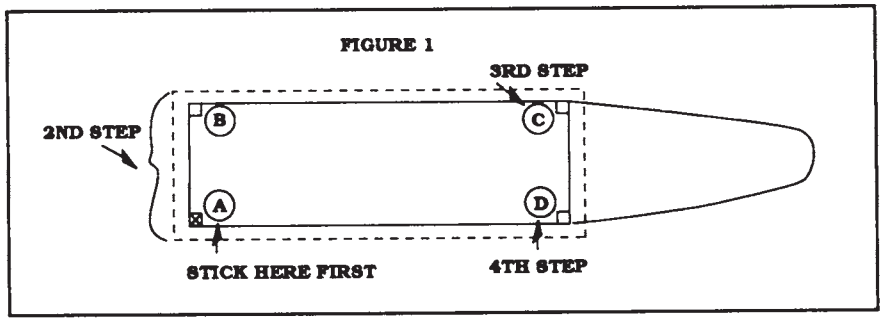
With our fabric now damp, we firmly grip the other root corner, stretch it tight across the root and, while still holding it tight, brush a coat of straight dope along the root and rub it through the fabric until the dope sets enough to hold the fabric tight when the corner is released.

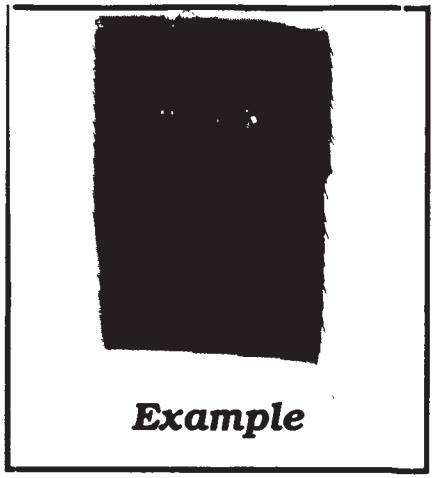
This sounds much more difficult than it is in practice, but it is a messy job and it does get messier in-so-far as one's fingers get coated liberally with dope before the job is completed. However, the application of a rag soaked in thinners will remove it all.

At this stage, we now transfer our attention to the other wing panel or some other part being covered while the doped down root strip thoroughly sets — usually around 5 to 10 minutes.

If our wing panel is an all open structure (ala "Paragon" or "Olympic II"), then the next step is to repeat the stretching and doping process we just did across the root along the leading edge and firmly stick the fabric in place here. It is usually best to stretch the fabric and stick down the tip end first, as you then have two hands free to handle the panel while rubbing the dope into the rest of the L.E. covering.

However, when carrying out step 3 at point C (See figure 1), don't pull the fabric straight along the line B - C but, rather, slightly forward of C. This will put a slight diagonal wrinkle in the fabric which will pull out as we stick down the trailing edge. If we don't do it this way, we can end up with undesirable wrinkles in the opposite direction. Remember, though, that the forward deviation is





Example

only enough to just cause the suggestion of a diagonal wrinkle. Also, the greater the tension applied, the tighter the final result will be. The remainder of the leading edge can now be firmly stuck down.

The next move is to stick down the trailing edge, and this is best done in a manner similar to the L.E. by stretching it diagonally at D and sticking it down the same way we did at A, B and C. When D is dry, we then go back and start working from A towards D by stretching our fabric chordwise a couple of inches at a time and sticking it down in the now familiar manner. In this way, a couple of inches at a time, we complete the laying on of the panel except for the final stage of sticking it down the section C - D. This is done by simply stretching the fabric span-wise an inch or so at a time and sticking it down with our full-strength dope.

One other advantage of this system is that it is very easy to unstick a section by doping it, pulling the fabric up and then re-sticking in a re-tensioned position.

Like I said, it's a bit messy, but very effective although time consuming, as well.

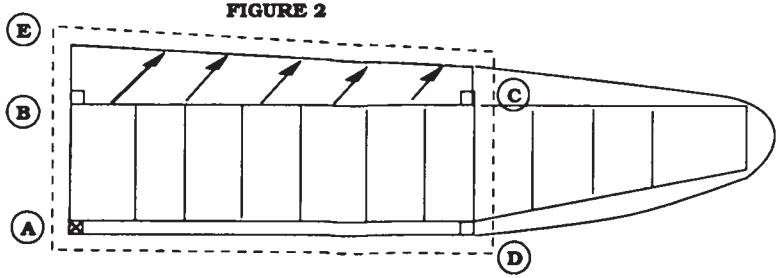
Now we trim the excess off the fabric, leaving about 1/4" overlap all around. This overlap is now cut about every two inches into the edge of the framework and then folded down and under and doped in place. This gives more adhesion on the root, end ribs and L.E. while the T.E. is considerably strengthened and stiffened.

If, however, our wing panel is built with a sheeted section from the L.E. to the main spar, it often is better to vary our process as shown in Figure 2.

Follow our sequence as for the open framework wing except that we do it only around the edges of the open part of the framework. We then stretch and stick down our fabric from B to E and allow it to set for a few minutes (We should be, of course, alternating between panels.). Next, we really lay on the dope over the L.E. sheeting and rub it through the fabric in the direction indicated by the arrows in Figure 2, doing this a few inches at a time, and all the time making sure that there are no wrinkles or missed spots.

The same procedures apply to all other panels on wings, tail assemblies or fuselages.

FIGURE 2



The final job to be done is to seal and tauten our covering but, before we do this, we can go over the spots that are not quite taut enough with a heat-gun to bring them up to the same as the rest of the covering. I DO NOT recommend fully heat-shrinking all of the covering as this will result in excessive tightening after the dope is applied, and this can cause severe distortion and warping.

I find that the best way to ensure that the dope penetrates the weave of the fabric and surrounds all the fabrics is to thin it down 60:40 (dope:thinners) and I also like to add a bit of raw linseed oil (about 3/4 teaspoon to 1 pint) to plasticize the dope.

The thing to watch out for when applying this thinned down dope is to not get globs of dope collecting underneath the fabric. I overcame this by brushing on the dope with the brush laid flat and not held at 90° to the surface. This will spread it evenly. I only do one rib-bay at a time and then turn the panel over and do the same section of the under-surface. When the panel is turned right-way up to do the next rib-bay, it will be seen that any globs will have run back through the fabric and are now on the outside surface where they can be spread out before doping the next bay. This procedure is repeated until all the open bays are done. This problem of large globs of dope collecting is, of course, not a problem on the covering over sheeted surfaces, as the dope is more easily spread evenly here.

After the first coat of thinned dope has been allowed to dry for a couple of hours in the sun (Longer if the sun isn't shinning and, in these cases, I recommend 24 hours.), the second coat of thinned dope can be applied. DO NOT BE ALARMED if the fabric has gone all slack after the first coat of dope as subsequent coats will pull it back. However, some areas may be worse than others and the heat-gun can, again, be applied to these areas at this stage.

The second coat is applied in the same manner as the first and here we start to see the areas of fabric that have not been sealed by the first coat. I find that it usually takes about 4 coats of this 60:40 mixture to fully seal the fabric and, even then, there may be a few small pin holes not properly sealed. Sheeted areas may require a couple of extra coats because of the tendency of the balsa to soak up the dope.

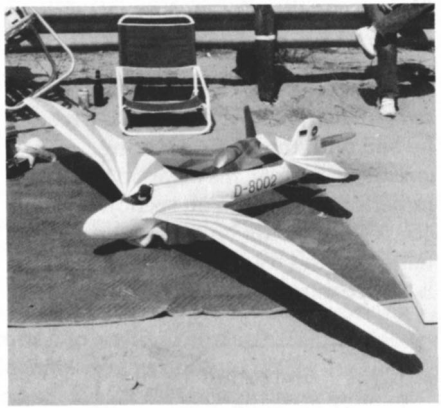
Another advantage that I, personally, think this covering has is to actually very slightly turbulate the entire surface of the wing and this will allow the model to be flown slower and thermal a little better. I believe I have seen this actually happen to a "Paragon" which was covered in film after the pilot had been flying it for a few years covered with fabric. He found he had to fly it faster with the film covering to get anything like the results he had with the fabric covering.

This, of course, may not be beneficial to performance with all sections or over 150,000 Reynolds Numbers, but is certainly worth a try at R_n below this, which is where most thermal R/C gliders fly.

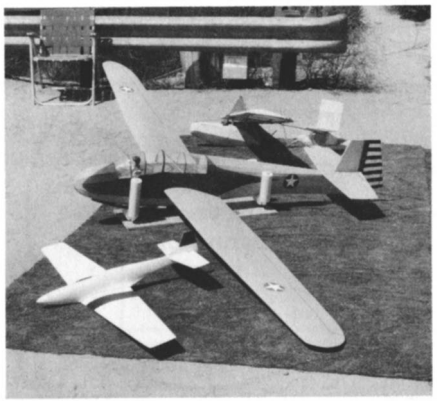
Bruce Abell
17 Ferguson Street
Cessnock, NSW 2325
Australia

Dear Readers:
Please let us know if there is something you would like more information about.
RCSD

Brian Laird's sporty Japanese Zero. Model featured very responsive handling and good speed range.



HABICHT by John Raley was very nicely finished, but it never flew while I was there. It should have flown nicely, though.



Torrey Pines Scale Slope Soaring Fun Fly

...By Wil Byers

First, let me tell you that the Torrey Pines event was a lot of FUN!! Are you really surprised at that? Well of course you aren't. That is why I'm writing this article isn't it?

But, why do as many as 78 modelers with their 135 models come to an event of this kind? Why, after all, there isn't any competition is there? And, no one goes home with any trophies to show off. So, why bother spending the time and energy to come, in some cases a long distance, to fly a few hours or minutes with a bunch of other model R/C soaring junkies? My answer is, because there is competition, leisure, learning, and comraderie that does not exist in any other R/C glider format.

Lets start by facing the reality that there is an underlying competition taking place. The competition is very subtle and probably goes out of its way not be recognized, but it is there none the less. It is there in the fellow who spends a great many hours building a beautiful model to soar the Torrey 350 foot high cliff. While fellow enthusiasts enjoy and respect the art of his flight, as well as his courage to throw such a creation into the lift, the results are uncertain. It can also be seen among the varieties of models that appear, each modeler wanting his creation to be unique from all the others in vintage, size, shape, or design or some other small detail. Or, the competition may be in a beautiful paint job that was labored over for endless hours, by a

TG-3 by Joe McBride took advantage of the light lift conditions to put in a nostalgic flight. Foreground: P-51 Penetrator.

craftsman attempting to get a truly laminar flow wing on his DG-202, ASW-20, Pilatus B-4, Salto, or ASW-15. These were just some of the designs on display at the Fun Fly. Possibly, it is just a matter of the individual who has taken the most care in preparing the documentation which he will present with his model. But it could be something as subtle and unrecognized as the workers doing the best job they can, so that all in attendance will have a good time during their weekend holiday. People like Gary Knapp and others spent much of their weekend making ours a fun one. Whatever it is, it is a healthy competition, which provides creativity, fun, and energy to an otherwise non-competitive event.

Fun Flys are very unstructured, with just enough control to keep things safe and also provide flying time for all involved. This is to say that one need not leap out of bed at 6:30 in the morning and hurriedly do the three S's in order to make it to the flying field on time. No, not at this event, anyway. The fun fly format was leisurely and one could arrive at any time of the day, even though the flying did start promptly at 9:00 AM each day. Jerry Miller, a Torrey Pines Gull's member had, in fact, gone out of his way to assure us that our off field stay would be very enjoyable, arranging for very nice hotel accommodations. The hotel, the Windham Garden, was very comfortable with nice amenities and a pleasant touch of class. Therefore, one was inclined to lounge a bit in the morning before heading to a great site for some fun in the sun, as the gentle ocean breezes rose up the face of the Torrey cliff.

Also, because the format was so relaxed, many of the flyers came and went. They were allowed to enter and partici-

Bob Greenwood holding his very nice little F-18 power slope model.

Dave Katagari, one of the pioneers of slope soaring and designer of the now famous "Ridge Runner", is holding his nicely done Reno Racer. Model flew good, even in light lift.

B-2 Stealth Bomber by Randy Warner. Flew just as nice as it looks. He said he spent a number of hours hand sanding the airfoils to shape.

Beautiful 1/4 scale Pilatus B-4.

Ninja Turtle pilots the very authentic Zoegling Trainer...by Pat Morrsley.

pate on either Saturday, Sunday, or Monday of the Labor Day weekend. Thus, many people chose to fly only a couple of days out of the three. This was especially nice since the LaJolla, San Diego, L.A. area has many things to do, which can be fun for the whole family and I for one had a great time seeing special attractions, as well as beautiful models.

Another feature of this event, as well as something I have seen at other fun flys, was the ability of the attendees to learn a whole bunch about how to build as well as fly these machines of beauty. It seems that those attending, in the pursuit of scale modelling excellence, have no inhibitions about informing other scale enthusiasts or would be enthusiasts as to how or why they have done something. This may be because they don't perceive the techniques that they are using as a competitive advantage. Therefore, an individual who participates either as an entrant or a spectator is certainly able to enhance their skills, both in terms of construction and flying. Note, also, that scale enthusiasts are not averse to spending money and time on these superbly performing soaring craft. This is to say, if one wants to see some of the latest innovations in design, electronics or materials, an event like Torrey is the place to be. And, because many of the ideas that are spawned in the scale arena are certainly applicable to other facets of this wonderful hobby, one cannot loose by participating.

If none of the above really seem a significant justification for attending next year's scale fun fly, maybe you should play checkers as a hobby. Or, you should come just for the comraderie. For me this has got to be one of the mainstays of my appetite for these happenings, and the

Howard Hulin had a lot of fun showing off the performance of his glistening F-84. It is very light and flew in light lift.

Torrey Pines Scale Fun Fly did not leave me hungering. The fellows who attend are a great lot and they want to share in your enjoyment as much as you do in theirs. But, there is really no way for me to convey this to you without you experiencing it for yourself. People like Bill Liscomb, who was the originator of the whole scale fun fly idea, is one of those guys who loves scale soaring so much he imparts the feeling to you, as does Sal Paluso, Charlie Morrey, Byron Bruce, Derik Bruce, Bob Greenwood, Dave Katagari, Bob Reynolds, Gary Anderson and many, many more. After all, there were 78 entrants and they too have a bit, if not a lot, of the scale bug.

Now that I have hopefully given you a feel for the scale fun fly format, I would like to briefly talk about the event itself. Well, let me start by saying that I was one of the late arrivals not actually arriving until Sunday afternoon. However, I was informed that Saturday's participation had been good with about 45 modelers taking part in the fun. Winds had been light but this was nice from the stand point that the light air machines were able to take advantage of the lift without having their wings ripped off or demolished in the rotor on final approach. When I arrived on Sunday the wind was light at about 10 mph and a number of models were flying including a beautiful Stealth bomber by Randy Warner. The wind would pick up a bit, possibly to 15 mph, but never really strong enough for the heavy weight machines to perform for the crowd. But, at least one goliath flew. It was a 1/3 scale ASW-20 from American Sailplane Designs and owned by John Collins. It had a very successful flight climbing about 400 to 500 feet over the top of the hill, much to the delight of the attentive crowd. As I said earlier in the article, all varieties of models were flying and, as testament to that, a very unique model called a Zoegling trainer was showing the watchers how it must have been in the old days to fly without an engine. Also, in evidence were a number of power slope scale models. They required a bit more wind than was available, so many were temporarily grounded. Howard Hulin, however, was able to fly his F-84 stand off scale model all over the slope while flashing the sun back at the on lookers from its aluminum monokote finish; this was a nice touch on this attractive little model.

The following companies supported scale slope soaring by donating prizes or gift certificates.

Ace R/C
Aerospace Composite Products
Airtronics
American Sailplane Design
American Small Business Computers
Banzai Enterprises
Beemer R/C West
Cermark Company
Cheetah Models
Combat Models
Cox Hobbies
Dodgson Designs
Dynaflite
Fraser-Volpe Corporation
House of Balsa
Jarel Aircraft Design and Engineering
LJM Associates
Lone Star Models
Milo Model Products
Northeast Sailplane Products
Robbe
Rollin Klingberg
Satellite City
Scale Glider Components
Sig Manufacturing Company
Slope Soaring News
SR Batteries
Sunfair Models
Top Flite
Vinylwrite
VS Sailplanes

Sal Paluso's pit area. Yes, these are all his and include SALTO, DISCUS, DG-202, ASK-18 & PILATUS B-4. All models are 1/4 scale.

Combat Model's stable of models. Includes F-16, A-4, A-10, MIG, and soon to be introduced F-15.

Sunday evening, after the flying had finished and everyone had time to wash off the salt mist from the Pacific Ocean and change into fresh attire, a group of flyers got together for dinner at one of the many very nice local restaurants in LaJolla. Additionally, after dinner the Gulls had a great raffle; it was supported by many generous manufacturers and dealers who recognize the importance of the growing soaring movement.

My wife Mary Jo, my daughter Bessy, and myself returned on Monday to watch the flying for a few more hours before heading north to Disney Land, one of the many family things there is to do relatively close to Torrey Pines. We were greeted with a smaller crowd than on the previous days, but there was still a respectable showing of approximately 30 flyers. The winds were better at between 15 mph and 20 mph, and the sky soon filled with warring power slope soarers. I believe that at one time, my wife counted 9 lively, little, silent, power replicas darting about the sky attempting to emulate the real thing in dog fight formation. At the same time, Bill Liscomb's ASW-15 was floating about the sky in a peaceful, graceful style. Many other models flew that day, but the contrast of the two model types flying at the same time in the same environment was so stark it demanded one's attention.

We left the fun fly at about noon and headed north. However, I am sure all remaining pilots spent the rest of the day enjoying the generous lift.

In closing, it must be recognized that R/C soaring has changed significantly over the last decade. Where once we had only floaters and more floaters, we now have a large selection of model types to choose from. They range from F3F slope racers to hand launch, while in between we have scale, power scale, F3B, F3J, Two meter, Standard and Open thermal soaring ships, and even cross country thrown into the *...continued on page 33*

In case you hadn't heard, the final scores were: Jolly - 14855 - flying a Comet 89T; Perkins - 14700 - flying a Comet 89T; Wurts - 14590 - flying his Halcyon (which is a Falcon 880 fuselage and his own wings); Seth Dawson - 14556 - flying a Comet 88 fuselage and Synergy 91 wings; Steve Lewis - 14272 - flying a Comet T fuselage and Synergy 91 wings; Don Edberg - 14254 - flying a King; and Rich Spicer 14130 - flying a Synergy III. There were 24 total ENTRIES - up six from last time's 18 entries.

Mark Allen will supposedly offer his version of the Halcyon, to be called the EAGLE. This is a new and refined (and much lighter weight) EAGLE compared to the original of a few years ago.

Byron Blakeslee did a great job of CD at the Team Selection Finals, ably assisted by the Pike's Peak Soaring Society and Rocky Mountain Soaring Association who did a fantastic job. Apparently, there was an efficient and smooth contest with only one minor protest. Members of the SMTS/F3B Board of Directors who attended (and helped) were: Randy Reynolds, Ray Olsen, Jerry Slates, Joe Wurts, Don Edberg, Seth Dawson, Rich Burnoski, Terry Edmonds, Skip Miller, and of course Byron Blakeslee.

The issue of SMTS (Multi-Task Soaring) which appeared several years ago in *RCSD* and which has been strongly and actively supported ever since by the many clubs around the USA, now seems to contain a lot of good ideas and interesting propositions from many knowledgeable sources — BUT, they are all different!!! That is healthy, too, and welcomed by everyone. However, at some point in time, there will have to be a FINAL DECISION made about what rules are to be followed and what the limits on sailplanes are to be.

As you know, a limit of 75 ounces all-up weight was proposed, and some think that this ought to be upped to 80 oz. Also, a wing-loading limit of 12.5 oz. per sq. ft.

High Start

...by Jim Gray

Well, we all know who will represent the USA at the World F3B Soaring Championships in the Netherlands next year. Larry Jolly, Daryl Perkins and Joe Wurts, with Seth Dawson as possible alternate. These fellows all finished the Team Selection finals and scored within 98% of perfect!

was proposed. Some view a combination of the above as too restrictive; some would like a weight only limit, and others a wing loading only limit. One of the biggest problems of setting a wing loading limit is HOW TO MEASURE IT QUICKLY AND EASILY. Weight is easy to determine, but wing loading — ahhh, that's the problem. What is needed is some quick and simple, foolproof means of measuring (or calculating) wing area in the field; that is, perhaps at registration before a contest. Can someone come up with a neat method of doing that? How about a perimeter meter that measures the perimeter of a wing? Then, by knowing span and weight, loading can be determined? Or, what about an optical sensor of some kind that would measure the light blocked by a wing held over a source? What about an optical character reader of some kind adapted to read wing area and fed to a computer with a voice and screen readout?

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...once we can agree on just what that limit shall be. I feel relatively certain that there is some reader out there who can tell us how to do this...so how about telling us how? Write to me, care of *RCSD*, and I'll make sure that it is passed along. WE NEED A

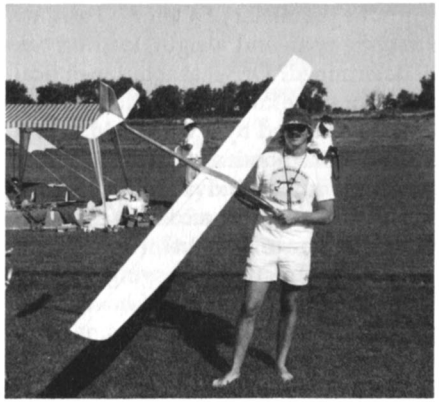
...continued on page 33

Some Photos of the F3B Team Selection Finals

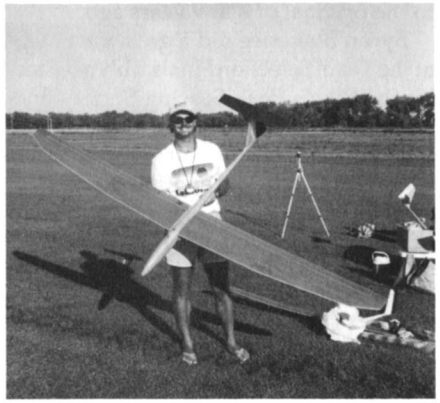
...by Jerry Slates

We wish to thank Lonnie Leech & his sister for making available the beautiful sight you see in the photographs. THANKS from all of us!

Larry Jolly

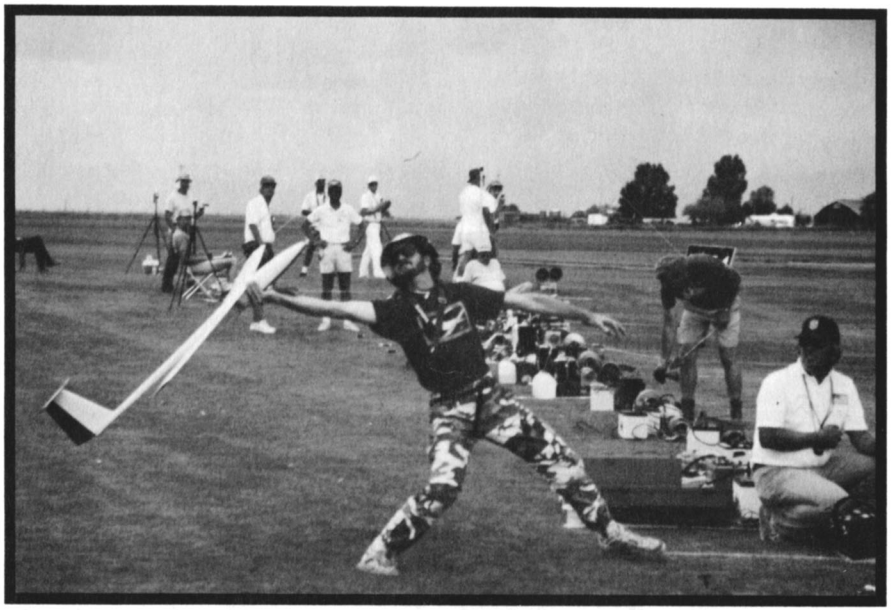


Joe Wurts



Daryl Perkins

Rich Spicer

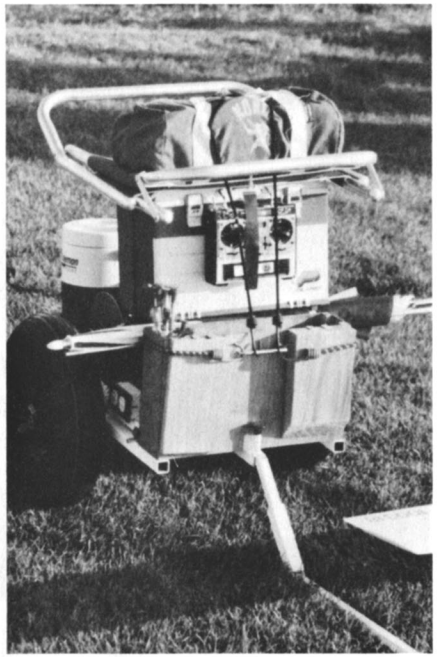


Richard Tiltman launching Steve Lewis' COMET T.

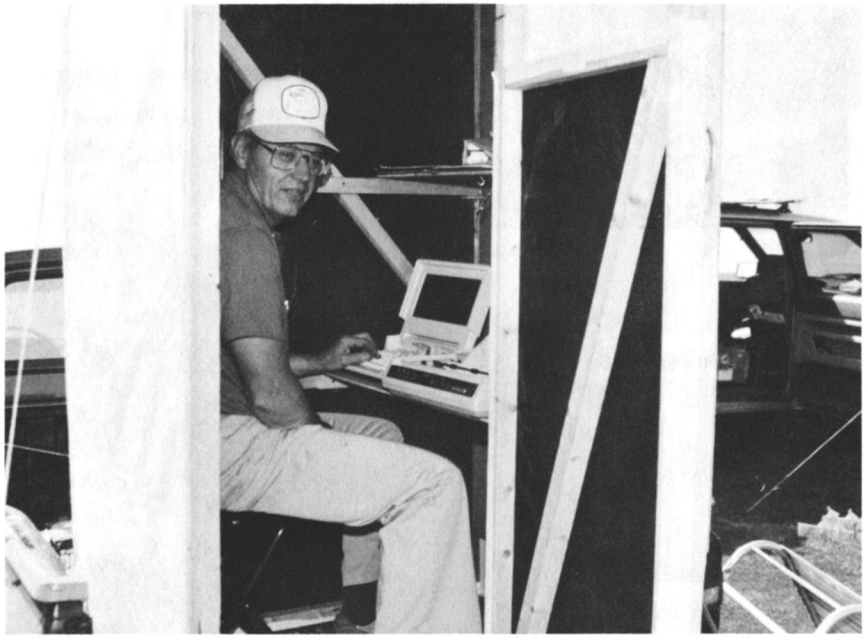
Seth Dawson preparing for flight.

Terry Edmonds & his COMET T

Chuck Drake was the scorekeeper with his own program and Tandy! Some set-up!



A clever winch carry-all.



The Rocky Mountain Radio Flyer Wagon...neat, huh!

High Start...continued

METH0D RIGHT NOW! Unfortunately, we can't spend the time just before a contest to measure span, mid-span, chord, etc., and make a calculation...because there just isn't time enough for that tedious method. Think about it and let me know.

Thanks to Byron Blakeslee for this information about the F3B TSF contest.

Happy Soaring,
Jim Gray

Jim Gray
210 East Chateau Circle
Payson, AZ 85541

Torrey Pines...continued

equation of possibilities. So, if you are at a loss for projects to build, scale just might be an area you want to look into, if for no other reason than to participate in a fun fly event and share in the fun and relaxation. I know that theTorrey Pine Gulls will welcome you to their event next year.

Wil Byers
Rt. 4, Box 9544
W. Richland, WA 99352

Flatland Fun Contests

...by Don Anthony

AS A FLATLAND CONTEST DIRECTOR, I have wrestled often with the issue of bringing variety and fun into the same ol' thermal contests associated with us "flatland" glider guiders. Over the years I have conducted, participated in or heard about a variety of thermal or quasi thermal *fun* contests. I would like to share some of this inventory with the readers in the hope that one or more of these contests will be used by their local club to liven up their Saturday contest & fun fly.

Balloon Tag

This fun filled contest will sure separate those that have depth perception from those that don't. This is a good **calm day** activity.

Figure 3

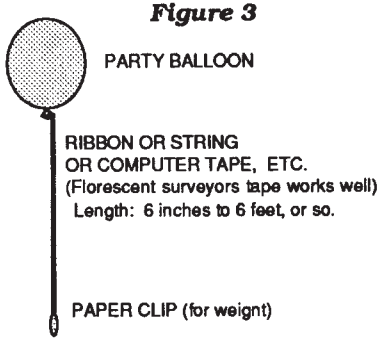
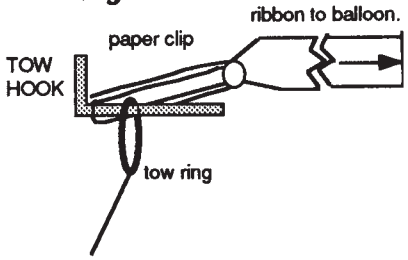


Figure 3A



RULES: See Fig #3 for suggestions on how to prepare the balloon devices. Two different versions can be used: balloons with a very short streamer and balloons with a 4 to 6 foot streamer. The object of this contest is to launch the glider with the balloon attached via the towhook. When the glider comes off of tow, the balloon separates and begins its trip to earth. The glider guider tries to hit the balloon on its way down and scores points for each hit.

If the balloon has a long streamer, entangling the plane in the streamer (capturing the balloon) and bringing it back to earth earns big points.

This is not as easy as it sounds. One can stand near the turnaround and watch a pilot feinting with his glider at a balloon 30 or so feet in front of him and wondering why he isn't hitting it. (A video camera should produce some excellent and funny club footage.)

Left Turn/Right Turn Contest

This simple contest allows only a left turn or a right turn during the specific task except for launching and final approach on landing.

Usually one round is flown right turn only, the next round is flown left turn only. The timer is the judge and (X%) of the pilot's score is subtracted for each turn of the plane in violation of the round's requirements.

The best advice I have for a pilot in this contest is to "PLAN AHEAD."

Well, that's the pick of the crop for fun-flying contests that I have known. I am always on the lookout, however, for new and exciting ways to spice up the Saturday fun fly. So, if any of you readers out there have some new ideas for fun and games at the flying field, please drop me a line and share them with me.

Now, on to landing contest!

The Empty Can Jackpot

In this landing contest, a suitable, empty beverage container (aluminum can) is wrapped with some thin plastic foam (anti-nick for gliders). A dollar bill is rubber banded to the side of the can and some sand or dirt is put into the can to keep it stable on the ground.

The can is set in the landing circle near the center. Pilots have only to knock over the can when they land to clam the $1.00 on the can.

Sounds easy? Think again!

Eight stalwart flyers took two turns apiece trying to dink the can. After the dust had settled, the original can was still standing tall with the original buck waving in the breeze. Eight crestfallen hot shots were emptying out other cans and consoling themselves with new and creative excuses, such as: "The can moved."

Now maybe some one out there can knock the can over four out of four times. But we overshot and undershot and did a heck of a lot of ground loops over and around the can. Next time perhaps we should use a 16 oz can.....it's taller.

Landing Bingo Contest

In this version of bingo, a number of small circles (3-5 feet in diameter) are drawn on the ground. The circles have different numbers. For example, five circles with the binary numbers 1,2,4,8,16 can add up to any number between 1 and 31. Pilots draw a goal number from a hat. Then, they have to land their plane in the correct number of circles to add up to their goal number. NOTE: This is a landing contest and there is a LOT of up and down. This is also a good contest to learn landing skills. Also, depending on time and contest size, the number of attempts permitted may or may not be limited. If the number of attempts is limited, a 1:2 limit is a reasonable starting point. (i.e., need five numbers to reach your goal. Your limit is ten attempts.)

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More About Torrey Pines

...by Rick Palmer

A few pictures of what I liked at the Torrey Pines Fun Fly...

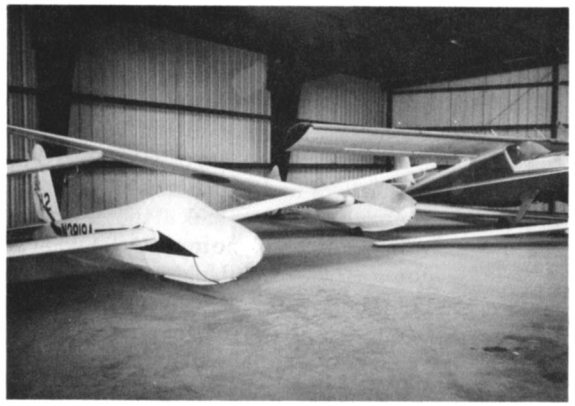
I liked the yellow-orange KA-6. It had my vote for best flight for older scale gliders. I liked the TG's, also. Got the best pit. The Reiher got my vote, too. The neatest odd flyer was a nice gull, which flew rather well! The very next power scale glider I might look at getting would be one of the F-15's.

I sure wish I could have judged the wind better. It was a long drive just to find light winds. I should have brought lighter ships. Oh, well!

On the way home, I stopped at Estrella, a glider port out of Phoenix, and took a ride for awhile. I always take a look in the back hanger as they hide some goodies in there. This time, it was an LK-10A with the Rising Sun mark on the wings!

The KA-6

The Blackbird, red Komet & Phoebus (held) are mine.



The back hanger at Estrella.

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Reading the Rules

...by Gordon Jones

Every other year, AMA publishes a new rule book. This publication contains the rules for each task flown in sailplane competition in the US. (The FAI rules book is also available from AMA, if desired.)

This rule book provides a description of each task, landing task options and serves as a general guide on contest rules. With some local variation, it is used as the bible for competition throughout the US. In addition to having all this wonderful information, it is free for the asking. (Or, if you have competed in the past year, it will be automatically sent to you. Such a deal!)

There is one important factor that I left out of all this, however. It needs to be read by contest participants, before the contest is held. Unfortunately, this seems to fall by the wayside about contest time every year. It seems that we hear the same old questions at every pilots meeting prior to a contest, and many of the questions could have been eliminated if the participant had simply reviewed the rule book prior to attending the meeting. A lot of questions can make for a long pilots meeting, and I have seen numerous arguments and squabbles come up that had no business taking place at all.

The purpose of the pilots meeting is to restate the task and landing option involved, and to stipulate the field boundaries and any special considerations that are not in the rule book. Contest schedules are usually posted in newsletters and magazines well in advance, and a quick look at the rule book will take away all the mystery on what is going to take place (Unless you end up at Poncho Morris' yearly mystery contest). It only takes about five minutes to locate and read all the particulars, and you will arrive at the contest fully prepared for what will take place. This is an especially good idea for the individual who has never participated in a contest before.

There are usually any number of people who will be more than happy to explain the events, the landing options, and give you a general description of what really happens at a contest. This can alleviate many fears for the newcomers and make the experience more enjoyable.

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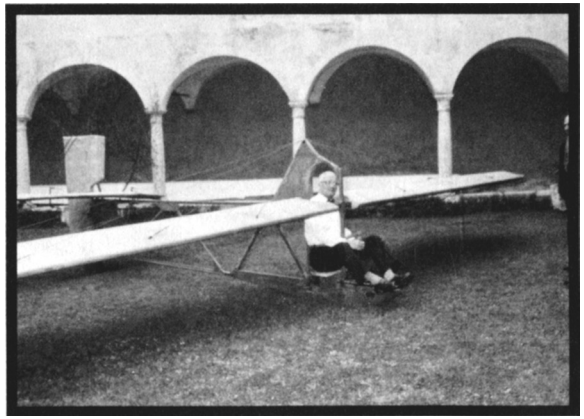
Mike Harvey of England says, "British thermal soarers are getting bigger. The photo is taken at the 1989 Nationals."

Ferdi Gale of Italy says,



"The celebration, that the magazine Modellistica organizes every two years, was held last March in an old cloister at Bassano Del Grappa (the town which gave the name to the Italian "Grappa" liquor)."

"In the cellars they found a 1932 school glider, which will be restored to flying conditions by a group of enthusiastic volunteers. I could not resist the temptation of sitting in the open cockpit. Please note the "Skull Splitter" just in front of the pilot."

"Many gliders like this were built, in those days by groups of amateurs, often with the financial help of the political authorities. The original plans have not yet been found, but the refurbishing will be done anyhow. Apart from the tissue covering, structural parts seem to be in repairable condition."

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Correction

In the September issue, the classified ad on page 18 for Hans Wiederkehr shows the wrong area code for Selden, NY. It should be 516 instead of 518.

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.