

R/C Soaring

By Herk Stokely



PHOTO: HERK STOKELY

If you're a "wing-nut" like Mark Kummerow, who displays his excellent *Ultrasaur* wing, let Herk know. He's thinking of publishing a newsletter for those who love these things.

With *SoarTech* #9 now published, the universal interest in the Selig, Donovan, and Fraser wind tunnel studies presented in *SoarTech* #8 continues with little abatement. As more people attempt to use the data in that marvelous work, I am receiving numerous questions about how to use the computer generated airfoil plotting coordinates that it contains. I thought that surely someone had written this up before, but a long search of my library revealed nothing complete enough to satisfy the level of detail that I thought was necessary to make it clear. I wrote up a detailed description, that I now use when I get a letter asking for this information. Since the requests continue to come in, I guessed that there are many who still haven't figured this out, so here it is along with a set of ordinates to practice on.

Using computer generated airfoil coordinates

The computer generated airfoil ordinates published for the Eppler, Selig, Selig Donovan, RG, DF and other airfoils are sometimes confusing for folks who are only familiar with the more traditional NACA type ordinates. In this system, the data elements are presented as a single X ordinate followed by a single Y ordinate. Each of these sets plots one point on the airfoil surface. The term "Chord" indicates the length of a line drawn through the airfoil from the tip of the leading edge to the extreme point of the trailing edge. This becomes then the width of the wing at that point.

The computer generated ordinates are organized so that a computer can conveniently drive a pen plotter to produce drawings of the airfoil. Visualize the pen beginning its drawing at the trailing edge of the airfoil. That is the first point presented in the data, 1.00000 (the X ordinate) followed by 0.00000 (the Y

ordinate). The computer multiplies the X ordinate by the chord length desired (let's say ten inches) and places a dot at a point 1.00000 times 10 inches down the chord line and 0.00000 times ten inches above it.

It then proceeds to repeat the same process for all of the other sets of ordinates drawing the airfoil by moving from the trailing edge, over the top surface of the airfoil, around the leading edge, and back to the trailing edge drawing the bottom surface of the airfoil as it goes. This is just the way you'd probably do it if you were asked to draw an airfoil without lifting your pen from the paper. If you look closely at the ordinates you'll see that about half way through the sets the Y value becomes negative as the lower surface points dip below the chord line.

I'll review this for one typical ordinate set from the SD 7043 airfoil set shown; 16 0.50199 0.07347. This is point number 16. The X ordinate is 0.50199 which multiplied by the chord length of 10 inches gives a value of 5.0199 inches. From the leading edge of the airfoil, measure back 5.02 inches and make a mark. The Y ordinate (0.07347) multiplied by 10 gives a height of .73 inches above the chord line at that point. If the Y value was negative the point would be plotted below the chord line. When all of the ordinates have been plotted, connecting the dots will make an excellent representation of the airfoil.

Notice that as the lower surface plotting points approach the trailing edge of the airfoil, the undercamber there rises above the chord line and the Y ordinates become positive even though they are plotting the bottom of the airfoil. If you go to an office supply store, you can buy ten by ten graph paper which has one inch squares divided into one-tenth inch squares. It is a very convenient help in hand plotting airfoils this way.

The ordinates are presented as a complete decimal fraction rather than the NACA sys-

tem which represents them as percent of chord. That means it's already divided by 100 and to use an X ordinate or Y ordinate, multiply each ordinate by the specific chord length to be produced.

Three other types of airfoil ordinates are sometimes seen. First is the old NACA system which I've just mentioned. Here ordinates are usually presented as percent of chord. They begin at the leading edge and each X value has two Y values associated with it. One of these is for the upper surface and the other for the lower surface. All are measured along and from the chord line. For most plotting points the Y values for the lower surface are negative and those for the upper surface are positive.

Second is an older representation that goes back to the very early days of aviation science. In this system the X ordinates are measurements along a baseline that is entirely below the airfoil. Ordinates may be presented as decimal fractions or percent. With this system each X has two Y's but both will be positive values and when plotting is complete, the airfoil drawing will be seen to be some distance above the baseline.

The third system is somewhat like the second one only here the baseline is the flat bottom surface of the airfoil. I've personally only seen the Clark-Y presented this way, but I'm sure that other inventors of airfoils with flat lower surfaces have used it. In the case of the true Clark-Y the entire lower surface is not flat and this plotting line is not parallel to the true chord line of the airfoil.

M-O-M or should it be P-O-P

A letter from (Ohio) Jim Martin is a great addition to the ongoing dialogue we've been having about contests that use man-on-man scoring ideas. He also has a comment on my statement, in the December 1992 column, that man-on-man isn't politically correct terminology; and person-on-person just plain doesn't sound right. Jim says that this kind of competition format is old stuff for his DARTS club (Dayton Area Thermal Soarers) and why aren't we all doing it that way?

"We (DARTS) have been providing club and sanctioned contests with the Man-on-Man (MOM) concept since September 1983. (Maybe we should start referring to it as Pilot-on-Pilot—POP—but that has problems with the acronym too!) We are in total agreement that it is the *only* way to score soaring events. One of the ideas behind this type of scoring is the advantage of being able to use any type of task without modifying the scoring. We use MOM for all our events from H/L to unlimited and it works so well that the six CD's in our club refuse to be a director for a lottery call-up style of contest.

"We launch with winches in flight groups of up to eight, in a 10-second window on a small field. That translates to 30 to 50 feet between winches sometimes. In the last nine years of doing multiple winch launches, I can count on one hand the numbers of mid-air during launch; and all but one can be attrib-

SD7043

SD7043

1	1.00000	0.00000	17	0.45282	0.07620	33	0.00052	-.00278	49	0.60146	0.00096
2	0.99681	0.00046	18	0.40422	0.07789	34	0.00555	-.00770	50	0.65530	0.00311
3	0.98736	0.00191	19	0.35665	0.07850	35	0.01669	-.01150	51	0.70751	0.00487
4	0.97202	0.00451	20	0.31056	0.07802	36	0.03324	-.01452	52	0.75740	0.00615
5	0.95121	0.00828	21	0.26639	0.07645	37	0.05501	-.01669	53	0.80430	0.00688
6	0.92544	0.01315	22	0.22457	0.07382	38	0.08183	-.01802	54	0.84755	0.00703
7	0.89522	0.01897	23	0.18549	0.07015	39	0.11345	-.01856	55	0.88650	0.00654
8	0.86108	0.02553	24	0.14954	0.06549	40	0.14956	-.01839	56	0.92047	0.00546
9	0.82351	0.03256	25	0.11702	0.05989	41	0.18979	-.01756	57	0.94881	0.00400
10	0.78301	0.03979	26	0.08821	0.05340	42	0.23374	-.01617	58	0.97110	0.00248
11	0.74004	0.04690	27	0.06331	0.04612	43	0.28094	-.01429	59	0.98713	0.00119
12	0.69500	0.05362	28	0.04249	0.03818	44	0.33088	-.01204	60	0.99678	0.00031
13	0.64825	0.05974	29	0.02581	0.02975	45	0.38302	-.00951	61	1.00001	0.00000
14	0.60019	0.06515	30	0.01334	0.02106	46	0.43678	-.00683			
15	0.55127	0.06975	31	0.00509	0.01236	47	0.49153	-.00412			
16	0.50199	0.07347	32	0.00083	0.00404	48	0.54665	-.00148			

The SD 7043 is a relatively unknown airfoil from the Selig, Donovan, Fraser book *Airfoils at Low Speed* (Soartech #8). It would be an excellent airfoil for a

small lightweight glider. It does need to be turbulated to develop its full potential in that kind of application.

uted to not exercising any common sense. (We have had more mid-air during thermaling!) If you're reasonably competent on a winch and can go straight, then there's no problem. In fact, the adrenalin rush you get screaming up the line wing tip to wing tip sets the stage for the rest of the flight. In the event of a line break, all planes are called down and the breaker moves to a spare winch. All are launched again in a 10-second window. You fly pop-offs, that's your fault! As with LSF, every flyer has his own landing spot; but we do have a rule that any airplane contacting another pilot or timer shall receive a zero for the round! Our landing is strictly a bonus, over and above the landing score.

"In subsequent rounds, the flight groups are set up by total running scores and, of course, frequency conflicts. That puts all the 'winners' of the first round competing against each other, and the middle of the pack flyers going against pilots of similar capability. During the contest you are most always competing with people of similar capability, which means closer competition. Beginners especially like this concept!

"We don't agree that winches are the big problem because we don't have problems with ours. Of course, it's expensive to maintain 6-8 winches; but you have to if you're going to run any number of contests during the season.

"From our experience over the last nine years, we disagree completely with your statement that you can't 'launch a flight group all at the same time' because we have been doing it and will continue to do it until something better comes along. (We realize

that the LSF had to stagger launch times a bit because of the high number of entries!) You can't sandbag with our format! You launch within 10 seconds after the starter says 'GO' or take a zero for the round. Personally, I'll try my hand at the available air rather than take a zero. My air is the same as everybody's.

"The 'H' words you mention (*actually they were Frank Weston's words — Herk*) are some directions to go and we think it will lend itself to MOM scoring just as well, but it looks to us that the hand-tow, if not handled (promoted) properly, will develop into an *athletic 'art-form'*. We should not let that happen.

"Herk, I know this is lengthy but everybody told me that we must let you know that there is at least one club that is on the leading edge"

Thanks Jim and DARTS; it's folks like you writing about the things you're doing that stimulates us all to keep looking for better ways to enjoy our sport.

F3B/USA returns

This week I received the new F3B/USA newsletter that's now being published under the editorship of George Spitzer. It also has a slightly different name *F3B/USA * F3F/USA*. It has twenty-eight pages of news and interesting articles and a new layout with lots of photos. George appears to be using the best of desktop publishing to make this a very professional looking publication. *F3B/USA* was started about six years ago as a newsletter information exchange for those in the USA who are interested in the World Class R/C soaring competition designated F3B by the FAI. Its original editor was Randy

Reynolds from Colorado. Byron Blakeslee took over from Randy a couple of years ago and continued to publish sporadic issues.

George is now injecting new life into what has been a very valuable publication, and I'm sure that it will continue to improve as a result of his efforts. Almost anyone who is interested in what is going on in the forefront of competitive R/C soaring will want to subscribe to *F3B/USA*. By expanding its format to include F3F (Slope Racing) and the community of sailplane flyers who love to go fast, George is bringing together interest groups who have much in common. Order *F3B/USA * F3F/USA* by writing to George at 87½ North Catalina, Pasadena, CA 91106. The cost is \$12 per year in the USA, \$17 in Canada and Mexico, and \$28 in the rest of the world.

MARCS National Sailplane Symposium

Al Scidmore wrote to let me know that the Proceedings from their very successful 1992 MARCS National Sailplane Symposium will be available very soon. Al is taking over the distribution of the proceedings from Walt Seaborg who had handled them for many years. All back issues (1983 was the first and 1990 & 1991 were skipped) are available at very affordable prices. In the USA all eight issues can be purchased for \$75 including shipping. The last four issues are \$45. All individual issues are available at prices which range from \$7 to \$12 (plus shipping). Send your order, or send an SASE to Al at 5013 Dorsett Dr., Madison, WI 53711 if you want more information. Overseas prices are higher.

editorial

Ken Willard

It is with deep sorrow that I report the passing of one of the hobby's great pioneers. Ken Willard succumbed early in the morning of February 17th to a long illness. We will all



remember Ken as "Chief Sunday Flier". It was Ken who coined this almost universal modelling term and he authored a very popular column under that title, as an Associate Editor, in *Radio Control Modeler* for many years.

Ken designed and published hundreds of designs which had only one purpose: Fun! Many of his designs were kitted and thousands of modelers were fortunate to build and fly the models conceived by a true genius. Ken was voted into the A.M.A. Hall of Fame in 1977. His spirit will live on in those who fly for the sheer joy of it on a Sunday afternoon.



Yeah, it's bird... but it's a plane too. It certainly isn't Superman though. What it is may be a modeler's ultimate chance to see how the birds do the flying thing. The model comes from—where else—the Birdworks.

The earliest drawings of airplanes by the pioneer designers followed nature's lead and ended up looking about as much like a bird as did what we now call the airplane. Leonardo DaVinci's sketches of his ornithopter certainly gave evidence that Leo had spent some time observing the visitors to his birdfeeder.

The noted Bayou philosopher, Mac Rebenack (alias Dr. John) has observed that "What goes down, comes around". I guess that holds true for airplanes as well. At least it does this month, as we present the most unusual slope soarer we've seen to date. The Birdworks is now producing a fiberglass and foam kit of a very real looking seagull. Their R/C Gull is reviewed this month by soaring guru, David Garwood. Put some paper down and turn to page 34 to see what all the "flap" is about...

R/C GULL
AEROBATIC SLOPER

BUILD VIDEO \$15
SUBKIT \$75
+ \$7 S&H



EMERALD TOUCAN \$83
+ \$7 S&H

THE RUBBER DUCK
elastic sloper

THE BIRDWORKS
P.O. BOX 1302
PORT ORFORD, OR 97465
(503) 332-0194