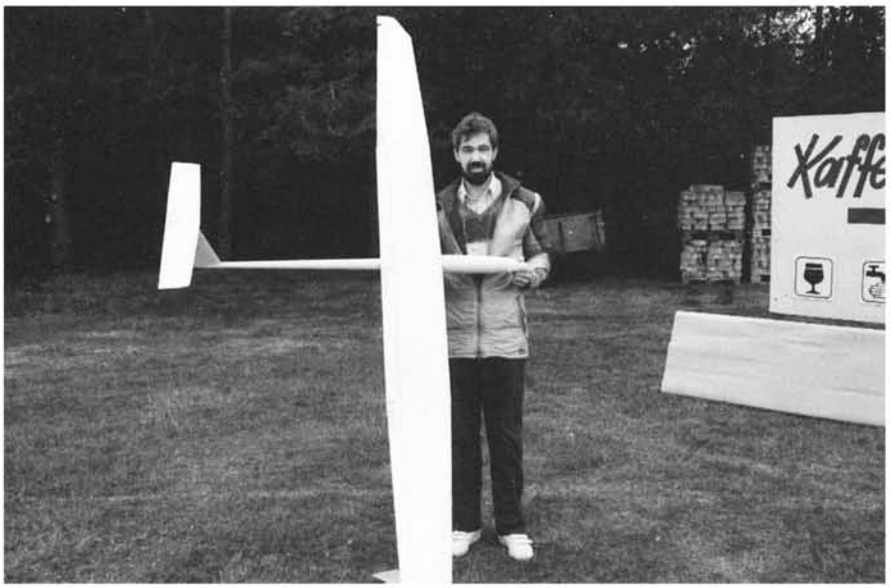
R/C Soaring

By Herk Stokely



PHOTOGRAPHY: HERK STOKELY

Reinhard Liese of Austria was the only contender to win all of the tasks in a single round this year, but missed the winer's spot with his *Epsilon* because of poor scores on a couple of distance tasks.

The most recent World Championships which were held in France this year saw no new spectacular performances by super planes. The reason—obviously—is that this year there was a severe limit on winch power that very effectively eliminated the opportunity for some competitors to get ultra-height on launch. It also removed the necessity for incredibly strong, heavy models.

The European rules that govern World Championship Competition are nothing like the kind for events that we would normally fly in the USA. Since the use of winches was first introduced to World Championship Events (they originally used hand tow), the winch portion of the rules has been changed late in every championship cycle to deal with some perceived abuse of the winch limitations. Usually these changes have affected our ability to get our team ready for the event.

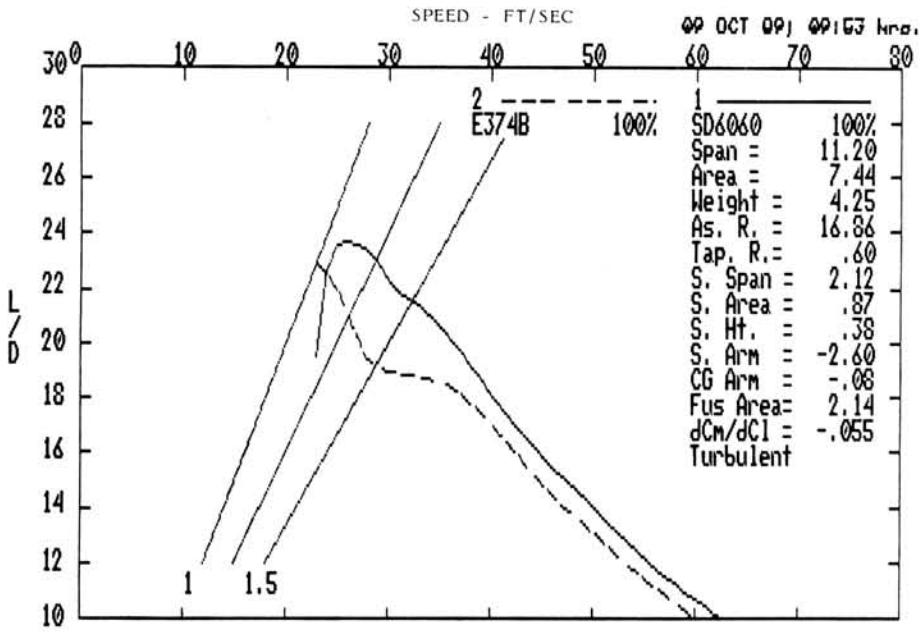
This year was no different. The newly developed winch rules required the use of very special internal resistance measuring equipment for both motors and batteries. About the time we got some of the equipment that we needed to be sure that our winches would be legal, the chairman of the FAI modeling committee rather arbitrarily removed the new internal resistance rules. Still later than that, the rules were reinstated (partially) keeping every one off balance till very late in the game.

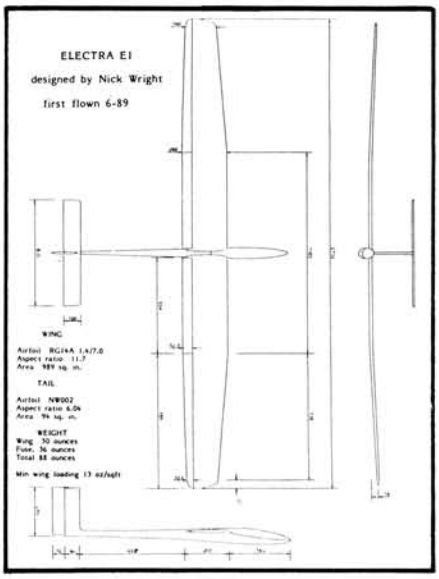
When the championships were actually held, there was in place a severe limit on the power that the winch motors could use. This put some of the super-ship designs from previous years at a disadvantage. Where there had been time to design and build smaller and lighter planes, they had an advantage in the launch phase, but were probably going to be unable to turn in the spectacular runs in the speed and distance tasks that we saw in the last couple of World Championship events. In fact, this year's performance was great with many sub-20 second speed runs, and many distance flights in the vicinity of 25 laps. The competition was good with no serious problems, and the winner, Nick Wright of England, flew a fairly simple model; but he flew it very well the whole way through the event.

The US team members finished 7th (Dawson), 10th (Jolly), and 31st (Spicer) for an overall team standing of fifth.

Selig-Donovan data on disk

For those of you who aren't interested in wind tunnel studies, new airfoils, computer plotting of airfoils, and computer simulations of sailplane performance, I hope that you'll





This performance polar shows the glide ratio (L/D) performance plot **(at left)** for the SD 6060 airfoil compared to the popular Eppler 374. This 3-view shows Nick Wright's World Championship winning *Electra* **(above).**

be patient with my enthusiasm. On the other hand (Fiddler on the Roof?) if you are a sailplane flier, you're certainly going to be getting the benefits of these things in kits, helps, and accessories in the coming years, so hang on!

Besides the new *Soartech* book that contains 400 pages of all of the data and all of the test results from three years of work by Michael Selig, John Donovan, and David Fraser, you can now get all of the numerical information generated by these tests on an IBM compatible computer disk. David Fraser is supplying a data disk for $12 (postage paid anywhere) that contains all of the airfoil ordinates, and all of the performance data that are published in the book. (Actually there were a couple of very bad airfoils tested that he didn't include because they are of no use to modellers.)

The data is available in both the 360K (five and one quarter inch format) and in the 720K (three and one half inch format) for computers that can read IBM compatible disks. The price is the same for either. If you want to order the disk, contact David at 1335 Slayton Drive, Maple Glen, PA 19002.

If you're wondering why you might want to have this data, I'll give you an example. Since the disk had all of the ordinates for all of the airfoils tested, I wanted to use them for plotting out ribs or templates with my computer. I have two plotting programs that I use. One I developed myself, and the other is the one that I've often used in this column, the one by Chuck Anderson. Now these programs use the airfoil data differently, and so they each require a unique data file structure.

With David's disk I was able to write a couple of simple BASIC language programs that took the data from the Fraser disk, manipulated it so that it would work with the plotting programs, and the computer then wrote the data as restructured files on my disk. In all it took about 45 minutes instead of the hours and hours of manual data entry I'd have needed to take the information from the printed page. The data is all in standard ASCII format so that any computer program can read it. There is even a text file on the disk that explains the organization of the data files. If you're going to be extracting this information, either to use it or to print it, the disk is a real bargain.

I've included an extract of the data files for illustration. These data are for the Selig Donovan SD 6060 airfoil. The 6060 was designed to be an improvement on the Eppler 374 which has been extremely popular with designers of cross country sailplanes and slope racers. The first section of data, printed directly from the disk, is the performance information collected during the wind tunnel tests of the airfoil. The second, also printed directly from the disk, are the ordinates for plotting the airfoil. I've added a bit of explanation by way of notes included in parentheses ().

Since I thought it might create some curiosity about the airfoil, I plotted out a rib using Chuck Anderson's program with the file that I took from the data disk. Then I began to wonder if the airfoil was really better than the E-374, so I used David Fraser's performance program (which already has the wind tunnel test data entered) and tried the SD-6060 against the E-374 on a model that might be typical of a cross country type sailplane. The results are pretty dramatic as you can see. Even in this fairly large model, the E-374 suffers from low Reynolds Number flow problems that reduce its performance. The SD-6060 is very much better throughout the whole flight range. Notice that the dimensions of the models used in David's program are in feet and square feet (not inches).

This is a pretty exciting time for soaring design, I hope that you're enjoying it as much as I am!

SELIG-DONOVAN TEST DATA EXTRACTED DIRECTLY FROM DATA DISK

```
This is an extract directly from
the data disk. It is for the newly
developed SD-6060 airfoil which is
designed to be an improvement on
the Eppler 374. The first section
holds the performance data, and
the second are the plotting
ordinates. The items enclosed by
() were added by me.

Airfoil  SD6060
Builder  FOX
 5    (number of RNs tested)
59100. (RN for this data set)
17 (Number of data points)

( Cl., Cd., angle of attack)

-.399 0.0288  -6.00
-.331 0.0223  -4.97
-.277 0.0158  -3.96
-.187 0.0156  -2.96
-.125 0.0145  -1.93
-.009 0.0186  -0.93
0.143 0.0217   0.12
0.273 0.0231   1.15
0.395 0.0258   2.17
0.490 0.0249   3.19
0.579 0.0258   4.21
0.661 0.0242   5.23
0.742 0.0218   6.25
0.813 0.0240   7.26
0.866 0.0312   8.28
0.892 0.0457   9.28
0.906 0.0662  10.28
100600. (next RN)
16 (no. of data points)
-.388 0.0237  -5.98
-.322 0.0183  -4.99
-.248 0.0145  -3.96
-.161 0.0132  -2.95
-.035 0.0138  -1.92
0.144 0.0151  -0.89
0.249 0.0169   0.16
0.341 0.0177   1.17
0.429 0.0180   2.19
0.519 0.0180   3.21
0.611 0.0170   4.22
0.704 0.0176   5.25
0.788 0.0174   6.26
0.863 0.0206   7.27
0.921 0.0289   8.29
0.960 0.0374   9.30
155700. (ditto)
17
-.403 0.0206  -5.99
-.328 0.0159  -4.97
-.197 0.0123  -3.95
-.083 0.0112  -2.93
-.012 0.0114  -1.91
0.115 0.0119  -0.89
0.211 0.0117   0.13
0.300 0.0118   1.15
0.398 0.0115   2.18
0.499 0.0123   3.21
0.598 0.0126   4.23
0.695 0.0134   5.24
0.784 0.0154   6.27
0.860 0.0199   7.27
0.916 0.0251   8.28
0.950 0.0336   9.31
0.961 0.0465  10.29
199700.
15
-.154 0.0117  -3.97
-.076 0.0102  -2.93
-.066 0.0102  -1.92
0.078 0.0101  -0.90
0.213 0.0097   0.15
0.305 0.0098   1.16
0.404 0.0100   2.18
0.507 0.0103   3.20
0.609 0.0109   4.22
0.707 0.0121   5.25
0.794 0.0143   6.26
0.873 0.0179   7.28
0.934 0.0239   8.30
0.971 0.0315   9.31
0.985 0.0420  10.31
307400.
14
-.191 0.0112  -3.99
-.099 0.0094  -2.96
-.012 0.0082  -1.94
0.078 0.0077  -0.91
0.177 0.0080   0.12
0.302 0.0077   1.15
0.407 0.0078   2.18
0.510 0.0087   3.20
0.610 0.0095   4.22
0.705 0.0109   5.24
0.794 0.0131   6.27
0.871 0.0170   7.28
0.937 0.0212   8.29
0.978 0.0284   9.30
Data file name PDSD6060
Fig. 12.109
```

```
SD6060 (plotting data)
(  X          Y ordinates)
1.00000   0.00000
0.99661   0.00023   0.00025  -0.00159
0.98660   0.00108   0.00495  -0.00647
0.97033   0.00283   0.01525  -0.01148
0.94829   0.00559   0.03068  -0.01612
0.92100   0.00941   0.05114  -0.02025
0.88905   0.01419   0.07648  -0.02381
0.85301   0.01977   0.10645  -0.02678
0.81346   0.02595   0.14078  -0.02919
0.77096   0.03248   0.17909  -0.03105
0.72602   0.03912   0.22096  -0.03238
0.67917   0.04563   0.26592  -0.03321
0.63091   0.05177   0.31347  -0.03354
0.58174   0.05738   0.36306  -0.03338
0.53222   0.06225   0.41413  -0.03273
0.48283   0.06606   0.46614  -0.03159
0.43386   0.06866   0.51852  -0.02995
0.38566   0.07003   0.57073  -0.02784
0.33862   0.07020   0.62223  -0.02527
0.29316   0.06922   0.67254  -0.02231
0.24976   0.06713   0.72116  -0.01906
0.20883   0.06402   0.76761  -0.01568
0.17076   0.05988   0.81133  -0.01236
0.13589   0.05480   0.85176  -0.00922
0.10456   0.04887   0.88838  -0.00638
0.07700   0.04218   0.92070  -0.00399
0.05344   0.03486   0.94818  -0.00214
0.03399   0.02710   0.97032  -0.00090
0.01879   0.01913   0.98661  -0.00024
0.00790   0.01132   0.99662  -0.00002
0.00148   0.00411   1.00001   0.00000
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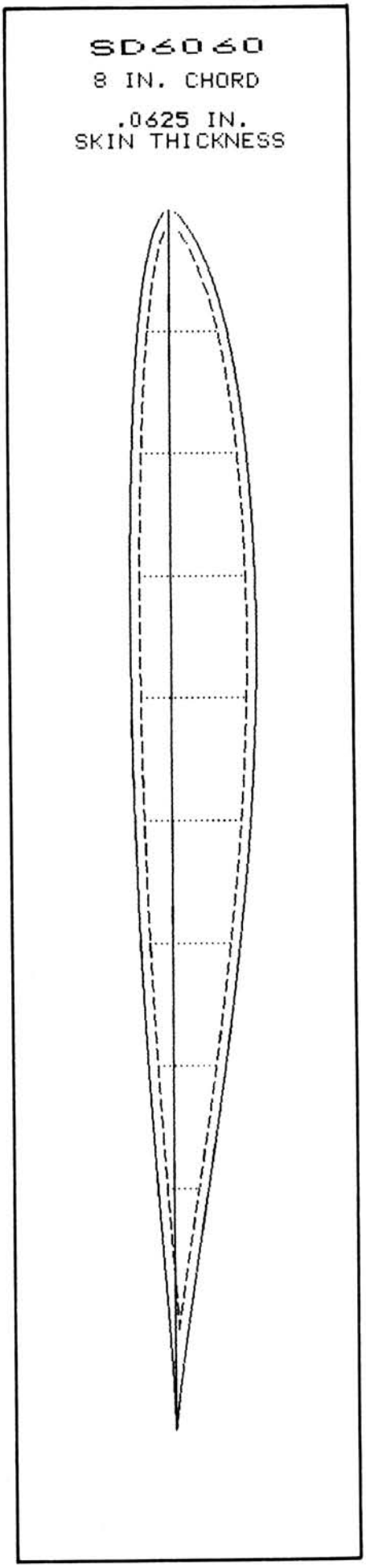
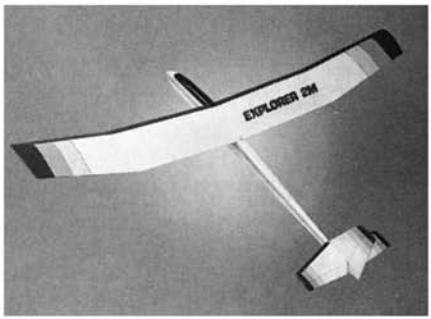
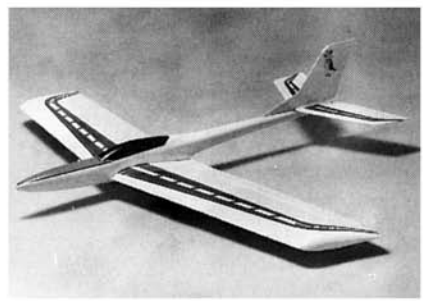


flying report



GLOBAL HOBBY DISTRIBUTORS, *18480 Bandilier Circle, Fountain Valley, CA 92728-8610,* has announced their first release in a new line of R/C model. Their new Explorer 2M sailplane is the first of a line of quality cut balsa and hardwood kits. Whether a beginner or an experienced flyer, the new Explorer 2M can be used for beginning or winning. With its flat bottom airfoil and long tail moment, the plane offers the stability a novice pilot needs. Because of its strong, oversized spars and stiff "D"-tube wing structure, the Explorer 2M can also be used for aggrwessive high-speed flight. Specifications: wing span - 77.25 inches; wing area - 574 square inches; wing aspect ratio - 10.4:1; wing loading - 8-9.5 ounces/square foot; flying weight - 32-38 ounces; radio - two channel; and length - 44.5 inches. The Explorer 2M kit features quality machine and die-cut balsa, ply and hardwood parts, rolled full-size plans, instruction booklet, and basic hardware. Explorer 2M kits are being shipped to local hobby dealers now and retail price lists at $52.95. Check with them for more information or contact Global Hobby Distributors at their address above.

BOB MARTIN RC MODELS, *15230-C Acoma Lane, Lake Havasu, AZ 86403,* has recently re-introduced two of their sailplane kits, the Coyote and the SR-7. The Coyote is a sleek, aerobatic, low wing, aileron and elevator controlled sailplane and has set a new standard for this type of aircraft. Duralene fuselage, foam wing cores, 1/64th inch ply wing skins, and precision machined balsa parts make this an easy to build and durable ship. Plan and illustrated construction are included. Retail price is $89.95. The SR-7 is a high performance sailplane designed for quick roll rate and extremely fast flight. The clean design affords the experienced flyer with the ability to perform maneuvers at speeds other aircraft can only wish for. It too



has a Duralene fuselage, along with foam wing cores, 1/64th ply skins, precision machined balsa parts, a plan and instruction booklet. Retail price is $99.95. Both kits are available at local hobby dealers. Check with them for more information or contact Bob Martin RC Models at their address above (phone: 602-855-6900).

NINJA

THE "BLACK BELT" OF SLOPE SOARING

Designed by *Mike Pratt*

The NINJA ("silent assassin") is designed to be the ideal model for trying your hand at the thrills and fast paced action of R/C slope soaring. Whether you are a rookie or an experienced slope soaring enthusiast, you will enjoy the NINJA's responsive control and exciting aerobatic capabilities. Inside or outside loops, rolls, and inverted flight are routine with this carefully engineered design. The NINJA's super clean aerodynamic shape and semi-symmetrical Eppler-374 airfoil provide the wide flight envelope so necessary for conquering the cliffs with "Black Belt" precision. You will have the all-out high-speed performance you need for penetrating strong winds, along with gentle slow flight characteristics for easy control on landing. The 500 sq. in. of wing area and light 8 oz./sq. ft. wing loading will help you maintain altitude even in light lift conditions. Construction of the NINJA is easy, fast, and rugged enough to withstand the high-G turnarounds common in slope soaring.

KIT FEATURES:
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Flying Tips For The Novice Slope Soaring Pilot

SIG®
KIT RC-63

SPECIFICATIONS:
Wing Span: 58 in.
Wing Area: 500 Sq. in.
Fuse Length: 39 in.
Typical Flying Weight: 30 - 32 oz.
Wing Loading: 8 - 10 oz. per sq. ft.

Radio Requirements:
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3 Channel for elevator, aileron, rudder
Accepts standard size servos

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