

Opening Hours 9.30-5.00  
 Closed Tuesdays & Sundays  
**MAIL ORDER SPECIALIST**  
**UK OR ABROAD**  
 Minimum U.K. postage £1.50  
 Kits & Radios £3.00  
 Orders over £200  
 Post Free U.K. mainland.

# GLIDERS

**TELEPHONE**  
 (0602) 870243  
**FAX**  
 (0602) 605992

## Gliders

Vedra 100\* £59.95  
 Habicht 113\* 2ch (Jedraski Wing) £74.95  
 Saphir 100\* 2ch £124.95  
 ASW 22-BE Varig (NEW 1990) £219.95  
 £26.95  
 Gentle Lady 78\* 2ch £39.95  
 Sophisticated Lady £78.95  
 Dina 2300 3-4ch Ail-Sport £39.95  
 Escala 78\* 2-3ch £39.95  
 Sunrises 100\* 2ch £39.95  
 Osprey 100\* 2-3ch £46.95  
 Algebra-1000 118\* 2-3ch from £69.95  
 Apex 74\* or 98\* RTF either £89.95  
 Cub 60\* 2ch ARTF £39.95  
 Sensor 117\* GRP & Flaps O/class £119.95  
 Middle Phase R/E or Ail. from £37.95  
 Phase-6 66\* Sport or Prof sec. £44.95  
 Heron sport aerobatic £39.95  
 Llanero 100\* 3-4ch F3B £109.95  
 ASW15B 84\* 2-3ch £74.95  
 Flamingo Contest 110\* 4-5ch £139.95  
 Fiesta SF 126\* 4-5ch £149.95  
 ASW24 135\* 3-4ch £189.95  
 ASW19 125\* 3-4ch £179.95  
 DG600 138\* Semi-scale 5-6ch £209.95  
 Alpina Magic 173\* 4-6ch £264.95  
 ASW17 Royal 151\* 3-4ch £189.95  
 LS3 127\* 4-5ch £159.95  
 DG 300 Multiglex £259.95  
 DG 500 173\* 4-5ch £299.95  
 SF36L Motor Glider 138\* 4-6ch £179.95  
 Vampir Flying Wing 124\* 2-3ch £109.95  
 Gellert 58\* flying wing 2-3ch £54.95

## Gliding Accessories

**GRAUPNER MICRO COMPUTER CONSOLE SYSTEM**  
 MC-56 16 channel PCM Dual Conv £749.95  
 MC-16 8 channel Large Scan PC/Ch £644.95  
 MC-16 8 channel £274.95  
 3893 Micro Wing Servo (S317) £69.95  
 4990 Micro Wing Servo (S317) £89.95  
**FUTABA EUROPEAN CONSOLE SYSTEMS**  
 FC-28 9 channel Dual Conv PDA £399.95  
 FC-19 9 channel Dual Conv PDA £289.95  
 FC-19 9 channel Dual Conv PDA £289.95  
 Full range of servos/transmitters/accessories available  
 Challenger 4 servos only £123.95  
 5-48 servos with NiCad £157.95  
 4 servos with NiCad £99.00  
 FOUR X.S.1487 £37.00  
 S-3132 IS-133 w/METAL GEARS £36.95  
 Hi-Tec 101 mini servo £18.95  
**GRAUPNER wing blade kit**  
 (including all dilators/ brackets ect) £99.00  
 12mm deep blade set £99.00  
 12mm blade & box only (1 Metrel) £39.00  
 14mm blade & box only (1 Metrel) £39.00  
**ROBBE Parts**  
 Accutax (Hawk) £12.95  
 Sashit £19.95  
 ASW 19 £26.25  
 ASW 17 Royal £26.25  
 ASW 24 £33.95  
 Carbon tape 5" x 1/4" metre £4.99  
 Carbon Pulverised Rod (Wing & Tail Joiner) £4.99  
**CLOTHES/INSTRUMENTS/IN STOCK**  
 AT S.A.E. FOR DETAILS  
 READY FOR THE NEW SEASON!!!  
 TOW/LIVE KIT/BLD/SPOOL 199\* £4.99  
 GRAUPNER/HAND WINCH £19.95  
**81 CATALOGUES** CAT. P&P  
**ROBBE'S** £5.95  
**GRAUPNER BY VIDEO** £2.50  
**NEW ITEMS!** £2.99  
**MINI CAT. '81** £1.50  
**MINI-KITS-CAT** SEND AS SAE ONLY £0.50

## Electric Flight

**CHERRY II (GRAUPNER 91) AIL RTF** £119.95  
**TIPSY (GRAUPNER 91)** £49.95  
**CHILLI 10 cell F3E** £129.95  
**CHERRY 10 cell** £119.95  
**On Air RTF** £119.95  
**Elekro Junior RTF** £84.95  
**Plits S2 Robabe** £104.95  
**Islander MFA** £37.95  
**Dormier DC226E 48" Twin Scabin** £99.95  
**Arcas 78\* 3-4ch** £74.95  
**EPS 2000 (Mini-craft) RTF 78"** £69.95  
**Varia-Fly 70\* 2-3ch (inc motor)** £69.95  
**Kormoran 66\* Carrard 2-3ch** £74.95  
**Finesse 70\* 2-3ch (just cover)** £74.95  
**Gellert 58\* flying wing 2-3ch** £64.95  
**Speeder E 42\* Pylon 2-3ch** £54.95  
**Micro-Racer 32\* Pylon 2-3ch** £54.95  
**Elekro-UHU 2-3ch** £54.95  
**Silentus 70\* 2-3ch** £76.95  
**UltraFly 91\* 2-3ch** £76.95  
**Elekro-Pink 81\* 2-3ch** £54.95  
**Chip 50\* 3-4ch aileron** £54.95

## Electric Accessories

**GRAUPNER Folding Props**  
 5 x 6 x 1/8" bore collect £6.00  
 7 x 6 x 1/8" bore collect £6.50  
 7 x 4.5 x 1/8" bore collect £7.95  
 8 x 4.5 x 5mm bore collect £8.95  
 9 x 5 x 5mm bore collect £8.95  
 9 x 7 x 5mm bore collect £9.50  
 10 x 6 x 5mm bore collect £9.95  
 11 x 7 x 5mm bore collect £10.75  
 4mm bore collector centre £1.25  
 5mm bore collector collet £1.20  
 4.5mm bore collector £1.20  
 5mm ball race with flexible seat £4.95  
 5mm ball race with 13" lang £4.95  
 F33 gearbox only £8.95  
 F33 w/7 2volt SPEED 800 motor £16.95  
 ROBBE G/Box ball races (pair) £10.20  
**GRAUPNER Switches & Controllers**  
 Mini-Switch 40 £29.95  
 3294 £26.95  
 3293 £25.95  
 3292 £22.95  
 Power MOS 50 Sp-Cant £27.95  
 Power MOS 60 Sp-Cant £27.95  
 Fly-Frcht 40 £35.95  
 Fly-Frcht 70 £35.95  
**GRAUPNER DD Direct Drive sets**  
 SPEED 300 BB VS (6 x 6 prop) £49.95  
 SPEED 900 7.2V 17 x 3 prop £18.95  
 SPEED 900 4.2V 17 x 3 prop £18.95  
 SPEED 900 5.4V 18 x 4.5 prop £19.95  
 SPEED 700 9.6V (10 x 6 prop) £19.95  
 SPEED 700 BB 9.6V (Motor only) £15.95

**81 VICTORIA ROAD, NETHERFIELD, NOTTINGHAM NG4 2NN**

# Mexican Slope Safari

Featured on page 4

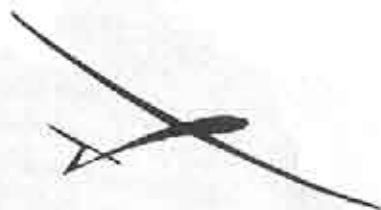


December, 1991  
 Vol. 8, No. 12

**R/C**  
**Soaring**  
 D I G E S T

# R/C Soaring Digest

A publication for the R/C sailplane enthusiasts!



The  
Soaring  
Site

The R/C Soaring Digest and Viking Models, U.S.A. will be moving, soon, if the real estate market allows. We need more room to grow, and our search finds us looking to Texas. While we can't tell you any of the specifics, we do plan on notifying each of you as quickly as we know the details ourselves. The notification will probably be by post-card (1st class & Airmail).

Viking Models, U.S.A. will be closed on a temporary basis as the Real Estate people really don't appreciate some of the finer things in life that R/C sailplane enthusiasts and their friends and families take for granted. So, there are no more planes hanging from the ceiling, for one thing.

In the case of RCSD, a quick move, no matter how well planned is bound to cause some disruption with both postal delivery and phone/FAX calls. If for any reason you have trouble getting in touch with us, just call Gordon Jones down in Texas as he will know where we're at (214-840-8116). We'll keep you posted.

### Articles on Disk

We have added a new disk drive, DynaFILE II, and can now read the following disks: 360K 5.25" MS-DOS, 720K 3.5" MS-DOS, 1.44 MB 3.5" MS-DOS, 1.4 MB 3.5" Macintosh HD. (400K and 800K Macintosh 3.5" disks can also be read as RCSD is typeset on a Macintosh.) We are not limited to the 5.25" IBM disks as we were in the past. Now we can read almost any disk (according to the manufacturer) that is formatted in MS-DOS! A special thanks to those of you who are able to provide your articles or press releases on disk, and for those we have been promising that we would get a new disk drive so we could read the 3.5".

R/C Soaring Digest (RCSD) is a reader-written monthly publication for the R/C sailplane enthusiast and has been published since January, 1984. It is dedicated to sharing technical and educational information. All material submitted must be exclusive and original and not infringe upon the copyrights of others. It is the policy of RCSD to provide accurate information. Please let us know of any error that significantly affects the meaning of a story. Because we encourage new ideas, the content of all articles, model designs, press & news releases, etc. are the opinion of the author and may not necessarily reflect those of RCSD. We encourage anyone who wishes to obtain additional information to contact the author. RCSD was founded by Jim Gray, lecturer and technical consultant. He can be reached at: 210 East Chateau Circle, Payson, AZ 85541; (602) 474-5015.

RCSD should not be considered to endorse any advertised products or messages pertaining hereto. An advertising rate card is available for businesses, clubs and personal advertising.



R/C Soaring Digest  
is printed on recycled paper.

### RCSD Staff

- Jerry Slates — Editor/Technical Editor/Jer's Workbench
  - Judy Slates - Publisher/Submission of Mat'l Via Disk (MAC or 5.25" 360K MS-DOS or any 3.5" MS-DOS formatted)
- (Printing by J. Morgan Graphics & Design, (510) 674-9952)

### Feature Columnists

Wil Byers  
Gordon Jones  
Bill & Bunny Kuhlman (B2)  
Martin Simons  
Ed Slegers

### R/C Soaring Digest

P.O. Box 6680  
Concord, CA 94524 U.S.A.  
(510) 689-0766, FAX (510) 798-6436

Copyright © 1991 R/C Soaring Digest.  
All rights reserved.

### Advertiser Index

- |       |                                     |
|-------|-------------------------------------|
| 21    | Aerial Model Aircraft Products      |
| 12    | Aerospace Composite Products        |
| 56    | Agnew Model Products                |
| 36    | Anderson, Chuck                     |
| 12    | B <sup>2</sup> Streamlines          |
| 42    | C.A. Bell Co.                       |
| 24    | Channel 1 Productions               |
| 46    | Clarke, John                        |
| 53    | Composite Structures Technology     |
| 24    | Dave's Wood Products                |
| 15    | Fabrico, Inc.                       |
| B.C.  | Gliders                             |
| 27    | Cold Coast Avionics                 |
| 59    | Greco Technologies                  |
| 61    | Jarel Aircraft Design & Engineering |
| 58    | LJM Associates                      |
| 60    | Mid Columbia R/C                    |
| 56    | Model Construction Videos           |
| 27    | Mother & Daughter Originals         |
| 30,31 | NorthEast Sailplane Products        |
| 8     | R/C Soaring Digest                  |
| 37    | RnR Products                        |
| 15    | Scale Glider Components             |
| 14    | Scott's Models                      |
| 46    | Soarcraft                           |
| 36    | Squires, Dave                       |
| 37    | Tekoa: The Center of Design         |
| 14    | Viking Models U.S.A.                |
| 57    | VMC Flight                          |

### Special Interest Groups

- |    |                                |
|----|--------------------------------|
| 39 | F3B/USA                        |
| 39 | League of Silent Flight - LSF  |
| 39 | National Soaring Society - NSS |
| 39 | T.W.I.T.T.                     |
| 39 | Vintage Sailplane Assoc. - VSA |

### Table of Contents

- |    |  |
|----|--|
| 2  | Jer's Workbench, Hints & Ideas...Gordon Jones  |
| 4  | Mexican Slope Safari...John Raley  |
| 9  | Batteries for Electric Flight...Ed Slegers   |
| 10 | On the Wing...Penumbra.4 Bill & Bunny Kuhlman  |
| 13 | Winch Line, Foam Wing Construction Part II... Gordon Jones                                 |
| 16 | Flying in Wind and Weather...Martin Simons   |
| 22 | Saturn 3.0 - The Concept Behind the Design...Layne/Urwyler                                 |
| 25 | Ridge Writer, Airfoil Polar Data...Wil Byers   |
| 28 | About the Great Race...Lee Sheets  |
| 32 | A Chance Encounter with Glider Heaven...Robin Lehman                                       |
| 40 | So! You Want to Fly at Night!...Frank Deis   |
| 43 | Development of the "Peregrine"...D. Barry Mattingly  |
| 54 | First Annual SIG/Eastern Iowa Soaring Society (E.I.S.S.) Soaring Contest...LeRoy Satterlee |

### Other Sections

- |    |                       |
|----|-----------------------|
| 21 | Events Schedule       |
| 38 | R/C Soaring Resources |
| 47 | New Products          |
| 52 | Classified Ads        |



## Jer's Workbench

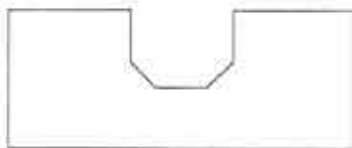
This month, I wanted to share with you some of the hints and ideas we have received from Gordon Jones. So, this month, it's Gordon's Workbench!

Looking for that new building table? Look at some of the ads from office supply places. They sell the brown conference tables on sale sometimes and, with a couple of pieces of reinforcement, make great building tables.

Having trouble covering that sheeted wing? Try using a heat gun and following along the heat with an eraser from a chalkboard.

Ever lose your plane off in the distance? Try putting a couple of strips of chrome monokote trim sheet on the leading edge of your wing. Usually about an 18" piece about 1/4" wide will do the trick. As you turn into the sun it will "wink" at you and you won't lose the plane that way.

With all the latest in shop helpers there is never the right holder for that fuselage or wing when you need them. Try cutting a couple of fuselage and wing holders from extra foam blocks. You can match the fuselage you are working on so it won't move around. One for the wing is especially helpful when working on a Falcon 880 wing to keep it off the table. (The tips do get in the way.)



If you carry your planes in the trunk of your car you might think about cutting

the bottom profile of your fuselages in a block of foam so they will not slide around while you drive. Plus, it allows you to carry more than one fuse from house to car very easily.



For those of you doing your own foam cutting, the next time you need cutting wire look at your local hardware store. They sell galvanized wire in numerous sizes to meet every need and it is cheap, too. It works great for cutting foam wings.

Having trouble cutting control cables? Try using a Dremel tool with a cut-off wheel. It makes a nice smooth cut without all of the frayed strands.

If you use the can paint from the hardware store to paint your planes, try using Flat White as a primer. It fills good and, if you are using a light color, it doesn't take much to cover it.

A simple method for cutting slots in foam wings for spars or servo wire troughs is to use a Dremel tool with a 1/4" router bit with the router attachment to cut the slots. Set the depth you want to cut the slot on the router attachment and then rig up a fence pinned in place to keep it all straight. Run the Dremel at the lowest speed and you will have some neat slots.

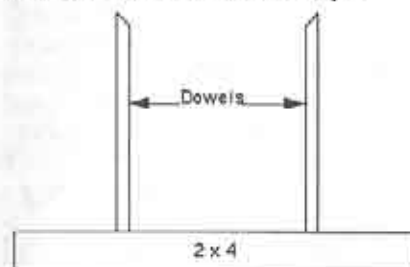
When installing wing bolts, align the wing on the fuselage and hold it in place with tape. Measure the wing and be sure the alignment is correct. Drill a pilot hole at the bolt locations; then use a small nail to hold the wing in place. Recheck your alignment and if everything is in order drill the correct size holes one at a time. This gives you a fudge factor in case of mis-measurement.

Rather than using metal wing bolts, use

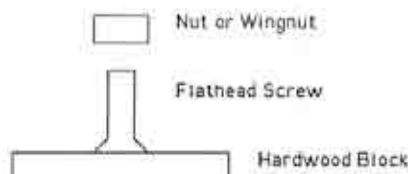
nylon wing bolts with round/flat washers. If you catch a tip on landing, the bolt will break before the wing. With the metal bolts you are in for some rebuilding almost every time. This works on everything including cross-country ships.

### Several ways to add ballast or to balance a sailplane

Build a balance stand from some dowels and a 2X4. The 2x4 has enough weight to keep everything in the right place and not move around while you are busy trying to add the weights. Be sure to either cut an angle at the top of the dowel or use rubber erasers for the tips.



Another way to add ballast is to build a block with a flathead screw epoxied to the block. Drill a center hole in each of the weights and tighten everything down with a regular nut or a wing nut.



Another item that works well is a 3 x 5 card to keep your ballast data on for field use. You basically list the weight with the increased ounces per square foot that a given weight will add for flying in different conditions. Keep it in your flight box as a ready reference.

Example:		Weight Data
Ounces	Added	Wing Load
10	4 oz/sq/in	



Once again, the holidays are upon us and, looking back, *R/C Soaring Digest* has been published for 8 years, now. The number of copies along with the increased page size has the monthly mailing up to 6 sacks, 4 trays and miscellaneous parcels going to 17 countries around the world. The sacks alone weigh over 185 lbs. and contain the bulk mailing in the U.S.A. When Jim Gray started RCSD in January, 1984, do you suppose he ever thought the Christmas list would get this large? On behalf of all of us, we wish you a very Merry Christmas & Happy Reading in the New Year! Jerry & Judy





## Mexican Slope Safari

...by John Raley  
1375 Logan Ave., Costa Mesa,  
CA 92626

All Photos by John Raley

*One of the most enjoyable aspects of soaring, for me, is finding new places to fly. Not just established sites, but "virgin" slopes hitherto unknown to R/C gliders.*

*Punta Banda, great lift, great view, good landing area and no walking.*

*On The Cover...*

*At Salsipuedes the South facing cliff rises 1,000 ft. above sea level. Cruz, with cerveza in hand, watches Rusty's Oly II, while Dale takes a break. Looks inviting, doesn't it?*

*Not all our stops were successful. Here, Dale and I have lunch while Rusty goes after his Oly. We told him not to, but he just wouldn't listen*

I've loaded up my 4 wheel drive and spent many days looking for that perfect combination of cliff, wind direction and, most elusive of all, a landing area. I have found places with lift that compares to Point Fermin, but unfortunately, landing there would be a one time event.

Last July, I took the family down to a little beach house near Rosarito in Baja California. I also brought my Swift 400. I was hoping I could fly right off the sea wall behind the house, but the coast there faces too South for the West winds. I did however get a chance to spend a day exploring the North Coast of Baja down to Punta Banda, about 20 miles South of Ensenada. I stopped to fly only for a brief time along the high ridge line of Punta Banda, but low clouds made it cautious flying at best. I took some mental notes on the way back, knowing I would return.

I reserved the beach house for the first open weekend,

*Dale tests the lift along the shore at the dunes with his Questor, while Rusty preps his Oly. In the foreground, my Swift beckons me to to feel the warmth of Mexico.*



September 13th thru the 15th. I piqued the interest of two other friends and flyers, Dale Lemmons and Rusty Hupy, and everything was set for our Baja Slope Safari.

On the morning of Friday the 13th, we headed South. Rosarito is only a two hour drive from Costa Mesa, California. We wouldn't be going far enough into Mexico to require passports or tourist cards. We did, however, get Mexican Insurance before we crossed the border. We also brought the essentials: four planes with radios, tools, some food and an extra large Coleman ice chest so we could keep a case or two of cerveza on



hand at all times. Upon arrival at the beach house we unpacked, turned the dining room table into a modeling bench and then headed for town. We each bought a case of our favorite beer, a bag of avocados, some salsa, chips and other goodies. That night we charged up, pored over the map and made our planes ready.

Saturday morning was as gray and overcast as it has been on the California Coast all summer. There wasn't a hint of wind until 11 am. We decided to take the free road (Highway 1) down to Ensenada instead of the toll road (1-D) so we could examine the possibilities along the coast and where the highway turns inland. At La Mission the free road breaks away from the coast and climbs 2,000 feet before dropping back down to the coast and Ensenada. (The cliffs that the road runs next to there looked great, but we couldn't find access to them without trespassing on ranch land.) Then, on Sunday, we would hit places I had seen closer to home. We figured that by the time we got to Punta Banda it would be around 2pm and the afternoon sea breeze should make for some fine flying.

Trying to make sense of all the jumping around we did for two days would be hard to record and harder to read, so rather than telling you about the sites we tried in chronological order I'll take them in a North to South order. On the free road and the toll road from Tijuana to Ensenada there are Kilometer markers which give you the distance you've traveled South from Tijuana. For example, our beach house is near KM 27, Rosarito is at KM 33. These markers are very helpful in locating some of the more rural (more like desolate) sites we found.

#### Points South

##### The Sand Dunes at Cantamar.

Located off the free road at Km 46, the sand dunes here are very big and stand out quite easily from the dusty brown coastal terrain. If you can only spend a few hours across the border from San

Diego, the dunes are where to do it. South on the free road from Rosarito you pass endless curio stands, the conspicuous arch at Popotla and a number of new condominium projects. Cantamar is a dusty strip of village that lines the West side of the highway, and getting to the parking and camping area of the dunes requires a severe U-turn back up the dirt road in front of the businesses of Cantamar. Turn left down another dirt road and you will see the entrance to the dunes. The owner wants \$3.00 for you to park or camp there which may seem unreasonable, but your car will be safe and I wouldn't advise parking along the highway and leaving your car unattended. If you have a 4 wheel drive vehicle with the appropriate tires you can drive out onto the dunes. But be warned! The sand is deep, very soft and slippery. There are many spots suitable to fly from out on the dunes, along the cliff above the shore line, or further back on the high dunes. My favorite spot was not on the highest dune but on a very steep one mid way back from the shore next to a old barbed wire fence that runs East to West through the middle of the dunes. It had excellent lift and didn't require too nasty a walk to get to. Although the ocean breeze is quite cool, the sun and sand are extremely bright and warm so bring plenty of sun block, a hat, sunglasses and something to drink. Slope soaring sand dunes is different from cliff soaring. The lift seems to have more depth and is smoother. You can fly down the side of the dune, inches from the sand, pull up and regain altitude easily. I chased my 6 year old son around this way until he was exhausted. The best thing about dune flying is landing. The soft sand cushions a fast or hard landing and you can land anywhere you wish. On the down side is walking in it and getting it out of your plane, particularly if you have tape hinges on your control surfaces. We flew at the dunes as early as 11 a.m., but the after-



*You can't miss this building on Punta Banda. Give this man a dollar, and fly all day.*

noon winds are best.

##### The free road South of Cantamar

At several points along the free road south to where it turns inland at La Mission there are flyable cliffs facing the ocean. We stopped at many but could not find one with all the necessary ingredients of a good slope site. Either the cliff face was too short or eroded, or the landing area was too marginal. We did pull off the road near Punta Mesquite at the ruins of an old building that had a cliff so sheer and high that your heart stopped when you peered over the edge. The wind was very light, but the high cliff still held Dale's Questor up for a test flight. Landing there would be rough on anything but the smallest slope planes. Rocks, cactus, and knarly chaparral cover everything but the narrow dirt road. Still, with a decent wind it might be worth it if you don't worry about your plane going down. There is absolutely no way to recover a model if it went down to the rocks below. This may not be a prerequisite for many of you, but with the abundance of heart stopping cliffs we became a little more picky.

##### Punta Salsipuedes

This location could also be called "Casa de Cruz". It is just south of the point and requires another hair pin turn off the South bound Toll Road. Slow down after you pass Km 86 and are descending from the high part of the point. There are no signs, only a widening of the shoulder as the dirt road down to the flat area below

joins the toll road. The dirt road runs back parallel to the highway and down to a expansive plateau between the toll road and the sea. You'll pass gated roads leading toward the ocean, but don't turn until the fence ends and the road turns to the coast. We were very conscious of trespassing and never went through property without getting permission or paying a fee. In this case a cold bottle of Dos Equis made us fast friends with Cruz, a local who claimed to own the land we flew from. There were other travelers there who had stopped to picnic at this scenic bit of coastline. We were able to park the van about 20 yards from the cliff and had all our planes in the air within minutes. It should be noted that this is a South facing cliff and shouldn't be bothered with when the wind is blowing in its normal Westerly direction. We were lucky for a while, but an abrupt wind change sent us scrambling for the edge. With a "Adios" to Cruz we went on our way.

##### Punta Banda

The most distant slope area we visited was at Punta Banda. It's located about 20 miles South of Ensenada on highway 23. This is as far south as you can go without a visa or tourist card. Follow the road signs to La Bufadora, a small tourist trap at the other side of the point. At La Bufadora there's a blow hole that shoots sea water high into the air when the waves come in at high tide. Unless you wish to see the "snort of the bull" or run

out of cerveza there is no need to leave the top of the point. We tried two sites there. One is on the inland side of the highway at the very top of the pass. There's a very large billboard advertising lots for lease and a graded dirt road leading up to the lots. Good slope sites can be found on either side of the road depending on the wind direction. The view is excellent and the vegetation low, although landing on the road would be a good idea. The second site, and our favorite, is a little further down Highway 1 on the ocean side. The entrance is marked by a small white building that proclaims it to be Campo Turistico Ejidal #5. Go into the office and pay the man a buck. It's the best deal around. Follow the road down and then up to the top of the small point. You can't miss it. You can fall out of your car and start flying. The view is absolutely fantastic and the flying even better. My altimeter watch put the cliff height at 800 ft. The dirt road leading up to the parking area makes a narrow but lengthy landing zone and two or three cars may park there and still leave enough room to land. Twice while we flew there locals drove up and parked their cars in the middle of our landing area, but all were happy to move their cars out of the way and neither of them stayed long. Even though it was overcast and the

winds were light there was plenty of lift for most ships. With a good wind blowing the flying would be awesome.

Non flyers can take a trail down to a small protected cove where you can swim, snorkle or SCUBA dive. Camping overnight is \$3.00 and level camp sites for tent or trailer abound. We were there on a Saturday and the place was deserted. This is a beautiful place to fly and camp.

I hope I have inspired a few of you to give Baja a try. I know there are many good slope sites we did not get to. If I missed one you know about, let me know. I want to thank my friends Dale Lemmons and Rusty Hupy who helped keep notes and yelled out, "Slow down! Turn here!" And, "I think you passed it!", while I sped down the Mexican Highways.

#### A few travel notes

Don't drink the water. Drive very carefully; highway signs can be hidden by all sorts of things and guard rails and warning signs are few and far between. Keep plenty of gas in your vehicle, the Pemex gas stations are found only in towns. Their "Magna Sin" brand of gas is unleaded and gave our car no problems. The Auto Club has a good map of Baja and a Guide Book that was very helpful.

**Buenos Suerte! ■**

#### R/C Soaring Digest Subscription Form

- Please renew my current subscription.  
 Please enter my new subscription to the R/C Soaring Digest.  
 Enclosed is my check or money order in U.S. funds for \_\_\_\_\_  
 Please send information on the availability of back issues.

USA: \$19 Bulk/Third Class or \$26 First Class (CA res., please add \$1.57 Tax)

Canada & Mexico: \$26 Air

Europe/U.K.: \$36 Air or \$22 Surface

Asia/Pacific/Middle East: \$42 Air or \$22 Surface

Return to:

R/C Soaring Digest  
P.O. Box 6680

Concord, CA 94524

U.S.A.

Please allow 4-6 weeks for  
delivery by Bulk & 3-4  
months for surface.

Name \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## Batteries for Electric Flight

...by Ed Slegers

Route 15, Wharton, New Jersey 07885

*Last month we covered what motors to use if you are getting started in electric flight. Now it's time to discuss batteries.*

Many books have been written on batteries and the charging of batteries. Most are very well written, but unfortunately they may be too technical for the beginner. To avoid some of the confusion for the beginner, I have a few suggestions that will help.

Batteries come in many sizes and capacities. The most popular is the Sub-C. This is the battery that you will see in most hobby shops that sell R.C. cars. Although this is the easiest to get and comes already made up into a pack, I personally would not recommend using them, if possible. The reason I don't recommend the Sub-C size is that they are too heavy and, in most cases, will not fit in a converted glider. The purpose of converting a sailplane into electric is to be able to get the plane up without using a hi start or winch and stay up by gliding, not motoring. So, why carry the extra weight of the Sub-C pack? The size battery that I've found to work very well in an electric conversion of a sailplane is the A size 800ma or 900ma or the 2/3 Sub-C 900ma. These will give you very good performance and a weight savings of about 3 oz. less than the Sub-C pack. They will also fit in most of the narrow fuselages that most sailplanes have these days.

The battery that seems to give the best performance for the size and will take the most abuse is the Sanyo 2/3 Sub-C 900ma SCR battery. The SCR's can take more abuse in rapid charging and discharging than the SC batteries, without showing any sign of damage. The only time I don't use the SCR900 is when I'm converting a small hand launch type

glider and do not have enough room. For these small planes I use either the 1/2 Sub-C 600ma or the 450ma AA battery. A Hint: If you're trying to save as much weight as possible and only need a run time of about 30 seconds, use the 1/2 Sub-C SCR 7 cell with an Astro Cobalt .05.

To sum up batteries, unless you're converting a very small plane into electric where you have no choice but to use a small battery, I would recommend using the 1/2 Sub-C 900SCR. It will give you the most performance for the weight and will take a lot of abuse when charging. Now we have to charge the batteries. Unfortunately, there are more chargers to pick from than batteries. Since this is written for the beginner, I will discuss chargers that work from 6-7 cells. If you want a little more performance, you could add another cell and still use the same charger. It will just take a little longer to charge.

There are a few different types of chargers. The simplest type is the resistor type with a timer. It does not have a meter and does not stop charging until the timer stops. They cannot do small batteries and, without close attention, can overcharge a pack.

The next is the same type charger but with a meter to monitor the charge. I would not recommend either type. Next is the variable rate charger. With these you can usually charge from 4-10 cells, 250ma-4000ma packs. Some have a charge-discharge switch and voltmeter jacks to monitor the voltage. In the case of the Astro Flight model 115 you also have the option of AC DC. This is handy if you want to work on your electric plane in the shop. This type of charger is worth consideration. The charger that I highly recommend is the peak detector type charger. With a peak detection charger all you have to do is plug in your battery, push a button and let the charger do the rest. This means that no matter what charge is in your battery the charger



will automatically stop charging when the battery is charged to maximum, then it goes into trickle mode. The nice part about this type charger is that you do not have to monitor the charge. As the functions of the charger increase so does the cost. It's nice to save money, but the money you save by buying an inexpen-

sive charger you may have to spend at a later date plus some, to replace a battery that overcharged. It pays to get a good charger first. To sum up chargers, at least get a variable rate charger. Personally, I would get a peak detector type charger.

#### GOOD FLYING! ■

## on the Wing



P.O. Box 975  
Olalla, Washington  
98359-0975

### PENUMBRA.4

Project Penumbra, our program for the design and construction of a successful nearly all composite flying wing, reached a milestone on April 20, 1991, with several successful flights of the fourth version of the airframe. Under the watchful eye of Dr. Walter Panknin, Penumbra.4 put in six successful flights out of seven attempts and evidenced outstanding thermal performance.

Project Penumbra was originally envisioned as a learning experience. Our goal was to design, construct, and fly an F3B capable flying wing, with the objectives of gaining experience at vacuum bagging and exploring various design philosophies along the way. A previous report within the pages of *RCSD* outlined the philosophies which guided our first design concepts, as well as our attempts at getting two of our tailless creations into the air.

#### Origins

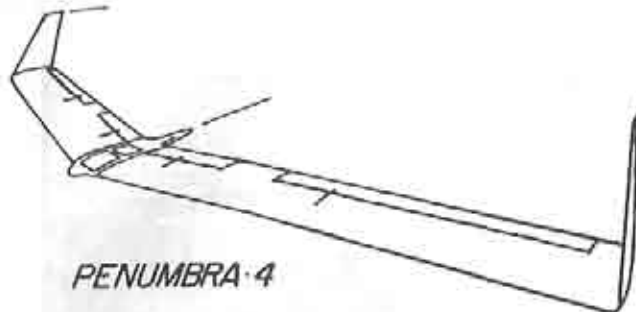
In the interests of increased performance potential, we initially determined a swept wing planform to be superior to a plank. Wider speed range, greater controllability, and efficient use of flaps were the

main driving forces in this decision. While our initial designs incorporated a central elevator placed in front of the CG, the impracticality of this planform was soon evident.

Our design gradually evolved from a tapered planform to one of constant chord, and we gradually moved from the Eppler series of airfoils to one of the more modern sections now in use in Germany. It was evident from our previous work with control systems that all servos would be mounted in the wings, rather than in the fuselage/center section.

Penumbra.1, our first attempt at vacuum bagging and one of our initial fiberglass-over-foam experiences, had but one flight. The winch launch and subsequent flight went extremely well, but while cleaning the aircraft a few days later structural failure was found in the form of upper surface compression fail-

*After a couple of successful flights! Top view shows control surfaces, pushrods and fuselage.*



PENUMBRA.4

ure of both wings. Penumbra.1 was permanently grounded.

Penumbra.2 incorporated lengthened spars but was otherwise identical to v.1; the same fuselage pod was used for both. Penumbra.2 proved difficult to tow because of a tendency to deep stall on launch, followed by a flat spin to the ground. Successful launches, which accounted for less than 50% of the total, did not achieve great height, and if airspeed became excessive large amounts of flutter were generated. It was eventually decided that the wing flex which allowed the flutter was also responsible for the deep stall and spin problem. While the lengthened spars had prevented the structural failure of Penumbra.1, the structure of Penumbra.2 was simply not strong enough in either spanwise bending or torsion. Under launch loads the wings would flex upwards, effectively increasing the amount of washout and driving the angle of attack and incurring loads ever higher. At high speed insufficient torsional strength allowed high intensity flutter.

In an effort to increase torsional rigidity and spanwise strength, Penumbra.3 used a more dense urethane foam over the styrofoam core. Strength was moderately improved, but weight was significantly higher and the wings were never finished.

#### The Current Design

Penumbra.4 is a true composite which utilizes a minimum of wood. Multiple layers of fiberglass cloth and a carbon fiber reinforced spar system provide a highly significant increase in spanwise and torsional strength when compared

with the previous models. A pod type fuselage provides volume for a 1200 mah battery pack and JR FM receiver. All servos are mounted in the wings and the antenna is entirely internal.

The first launch attempt of Penumbra.4

was very reminiscent of our experiences with Penumbra.2 - a very steep climb, deep stall, and spin to the ground. No damage was incurred, however, so we retaped, made some adjustments, and tried again. We had initially tried to get a feel for our new 'ship by attempting some hand launches over the tall grass. These were sufficiently successful to bolster our courage and attempt the winch launch, but we failed to realize an excessive amount of up trim had been added to compensate for low hand launch speeds. A towhook location a bit too far aft compounded the problem.

With some of the up trim removed and the towhook moved a half inch forward, subsequent launch attempts were all successful. All winch launches were accomplished by means of strong tension on the line, vigorous throwing of the 'wing straight out, and continuous power to the winch motor through the zoom. No tracking problems were noted and height attained off tow was very good, particularly with zoom. We did not use flaps to augment launch height, but that will be an inherent part of the flight testing program.

Penumbra.4 seems to be very sensitive to thermal activity and could be seen climbing even while traveling in a straight line. Thermal turns were a bit different than what we had expected. Our other elevon equipped 'wings require opposite aileron to prevent spiraling in. Not so Penumbra. Once aileron control is neutralized this 'wing tends to come out of the turn. A small amount of right

aileron must be input, along with up elevator, to maintain a right turn.

Speed range is very broad. With an approximate 10 knot breeze it was possible to approach a hover position when flying into the wind. A dive test to examine pitch recovery showed excellent acceleration and prolonged high speed flight in crosswind conditions.

Use of a small amount of positive flap during landing approach showed the typical nose up pitching tendency which was easily controlled with a small amount of down elevator. Landing speed did not seem to be affected by 20 degrees of positive flap deflection, but approximately 60 degrees is available.

#### Future Plans

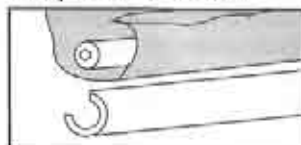
We had anticipated being able to complete Penumbra.4 in time to register and compete in the Mid Columbia Cup, the international slope race held in Richland, Washington, over the Memorial Day weekend. Such was not the case. We and Penumbra.4 will be in attendance, but will not be competing.

With the successes of the initial flights, however, we've begun to draw up full sized plans. Finalization of CG, towhook location, etc., will need to be accomplished before plan availability will be announced. We are currently estimating a release date of the end of summer. Watch for an announcement within the pages of RCSD! ■



Ready to launch! Winch was run continuously — no pulsing.

#### AEROSPACE Composite Products



#### The Quick Lock Bagging Seal

No more "mousing around" with sticky tape... Quick Lock seals snap onto your vacuum bag and make a leak-proof, easy to open and close seal... and the bag is truly re-usable!

Send \$1.00 for Complete Catalog and get a \$2.00 Discount Coupon!  
Aerospace Composite Products •  
P.O. Box 16621 • Irvine, CA 92714  
(714) 250-1107 • FAX (714) 250-0307

## B<sup>2</sup> Streamlines

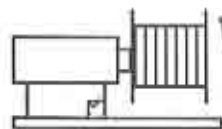
Presents

### Scale Sailplane Plans

by Jim Ealy

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

Send \$2.00 for complete catalog,  
deductible from purchase of \$10.00 or more.



## Winch Line ...by Gordon Jones

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

#### Foam Wing Construction - Part 2

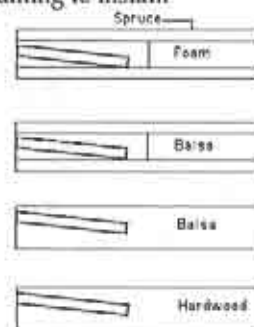
At this point we shall discuss some of the composite materials that will be used in the construction process. The first of these is epoxy resin; it is by far the best adhesive to use when sheeting foam wings. The consistency and adhesion works well whether you are sheeting with balsa, obechi, or for a total fiberglass layup. There are several on the market that work well; EasyLam from Aerospace Composites, HobbyPox now has a laminate epoxy, and West Systems makes some with options on the length of pot life. I have been using the West Systems resin for about a year and have had excellent success in every application. If you have a problem obtaining epoxy resin go to your local boat dealer that does repair work and you should be able to get some from him or find out where he gets his. And if all else fails, give myself or Jerry a call and we will put you on to a supplier.

Other adhesives are available that work adequately; regular Hobby Pox 4 hour epoxy, if cut with alcohol, will work. Some of the thinner epoxies on the market are reported to work OK, but I have never tried any of these. Dave Brown Products offers Southern Sorgum which is a contact cement for foam wings. It will work, BUT it is heavy, and if not applied correctly you could experience separation of the sheeting. I have heard that some folks have had good success with 3M 77 spray contact adhesive. I have tried the 3M adhesive and experienced sheeting separation (followed by a large crash!). All in all the best adhesive is epoxy resin. (Note: Do not use polyester resin as it attacks foam!)

The next item on the agenda is fiberglass cloth. Fiberglass cloth is easy to work with and provides excellent strength. For a foam wing application, the fiberglass cloth is used at the trailing edge of the wing to provide strength for the control surfaces. In addition, it can be used over the spar assembly to provide additional strength in that area as well. Three ounce cloth works very well for these applications as it is strong but light enough to not add much weight to the wing. Once you use the layer of fiberglass cloth for additional strengthening and find out how easy it is to use you will be hooked.

Now let's plan our wing layout. The first step is to decide what type of spar system you want to install in the cores. There are a number of options that are available and all work equally, as well. The first is the standard spruce cap type with the spruce caps running the length of the core in a trough. This method is the most time consuming but offers good strength. This system is designed just as you would design the spar system for a built-up wing with the carrythrough box at the root end of the assembly with the foam acting as the balsa ribs.

Another spar system employs the spruce cap assembly, but with a balsa filler between the spruce caps running out into the wing approximately 12 inches past the carrythrough box. Again, this method offers good strength and will carry the load nicely. As with the straight spar cap method it is somewhat time consuming to install.





Another method used predominantly in European designs is a short spar system of hardwood with a carrythrough cut at the proper angle. This system resides in a section of the wing cutout for installation and epoxied in place with fiberglass or carbon fiber reinforcement on top and bottom. The one disadvantage of this method is that the spar assembly is usually about 12 to 16 inches long. Obviously, it has worked for a long time, but under heavy loads (read max launches) the stress is not spread as well as it could be.

The latest in spar systems is good old hard balsa with the carrythrough angle cut in the end of the balsa as with the hard wood system. It is then reinforced with carbon fiber and/or fiberglass for additional strength. The difference between this method and the hardwood system is that the balsa spar assembly extends out to approximately 24 inches thus distributing the load further out on the wing for less overall stress. Mark Allen has been using this method on the Falcon for some time and has found it to be quite strong. This is probably the easiest method for spar/carrythrough installation and takes far less time than the other methods mentioned above.

Now that we have decided on the spar assembly let's look at the location of our spar, control surfaces, servo locations, and any other goodies we want to put into the wing. I usually make a core map of all the locations of the spar etc. on a sheet of paper while I am designing the wing. This pro-

vides a reference for all the various locations, and I can use it to mark down the measurements to the servo boxes and such for a reference if I have to do some cutouts after the wing is sheeted. In addition, this gives me a good representation of the wing and helps to remind me of any items I may have overlooked.

I then mark the location of the spar on the cores using a felt tip marker to provide a reference line for cutting or sanding the spar cut outs. When you mark the spar locations be sure to butt the two cores (hopefully a right and a left) together to insure that the spars come out at the root at the same point. Be sure that the root ends of the cores are at 90 degrees as a reference prior to performing all the measuring and marking. This will give you a point of reference for the remainder of your measurements. For this operation I have an 8 foot piece of aluminum stock, but a long straight piece of wood will work, as well.

I usually mark in the servo locations, control surfaces and any troughs for wires or control linkages at this time just to get an idea of where things will go and use these locations as a reference to measure and put on my core map. This way I have all the measurements done and with the locations marked on the cores I have the location of all my cutouts. The end result will look something like a set of plans on the foam, and will give you a real look at things. Now that we have a plan and layout we will look at preparing the cores next. ■

**Merry Christmas**  
Thank-you for your  
support throughout  
the year.



*Jim*



Viking Models, U.S.A.  
2026 Spring Lake Drive  
Martinez, California 94553

### Scott's Models

**TEMPEST** (Intro. Offer): Fuselage,  
Canopy, Turtledeck, & Complete  
Instructions...\$69.00 • **TEMPEST**  
Video...\$15.00 • **JACK CHAMBER'S**  
**AIRFOIL PACK** (32 pages)...\$12.00

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

Check/M.O., only. Continental U.S.A.  
All prices include S&H.



*Doc just couldn't wait! He opened his present TOO soon!*

**Fabrico Inc.**

*Sailplane Flying  
Accessories*

- High Starts
- Retriever & Winch Line
- Line Swivels
- Building Accessories

Send for free catalog:  
**Fabrico, Inc.**  
P.O. Box 30032  
Cincinnati, Ohio 45230

## GLIDER RETRACTS

Servo actuated glider retract. Over center up/down lock. Aluminum parts made on computer-controlled milling machine from 6061-T6. These beautifully crafted retractors are made from the finest materials available, and are the best offered anywhere. Made in the USA.

**1/5 SCALE** 3 oz. without wheel. 1-9/16" W x 4" L x 2" H. 2 3/4" wheel max.

**1/4 SCALE TWO TO CHOOSE FROM.**  
**STD** - FOR GLIDERS UP TO 10 LBS. 5.2 oz without wheel. 2" W x 3-7/16" L x 2 3/4" H. 3.5" wheel max.  
**HD** - FOR GLIDERS OVER 10 LBS. 6.5 OZ. 2" W x 6" L x 2 3/4" H. 3.5" wheel max.

**1/3 SCALE** 8.8 OZ. without wheel 2 3/4" W x 6" L x 2 3/4" H. 5" wheel max.

**FIVE-FOOT PUSHRODS**-1/16" Music Wire with casing.

Send stamped self-addressed envelope for pricing and more info to:

**SCALE GLIDER COMPONENTS**  
7034 FERN PLACE  
CARLSBAD, CA 92009  
(619) 931-1438

## Flying in Wind and Weather

...By Martin Simons

(This is the beginning of a new series.)

© Copyright by Martin Simons

All Rights Reserved

Martin Simons, 13 Loch Street, Stepney, South Australia 5069

### The river of air

Although we cannot see the air moving unless it is full of dust or suspended water droplets (clouds), it is not very difficult to visualise its motion. The general pattern when the wind blows is very similar to that of a fairly swift river flowing over an irregular bed. The general movement is in one main direction but there are all kinds of whirls, eddies, twists and cross currents embedded within the general stream, moving along with it, yet possessing their own distinctive kinds of motion. There are places in a river where the flow converges and others where it diverges, spreading out. The flow in a whirlpool may run contrary to the general stream for short distances.

There are vertical motions as well as horizontal. An isolated submerged lump in the stream bed causes the flow to divide and pass round but some will go up and over. When there is a rocky outcrop forming a ridge, the fluid rises over it and down the other side, perhaps with an area of turbulent 'white water' or a series of ripples, standing waves, downstream. Differences in temperature cause convection currents. Warm water tends to rise, cold sinks. A pool of cool water in some hollow may lie almost undisturbed as warmer currents pass above.

The water on the surface generally moves more rapidly than that below. The flow nearest to the bottom is much more seriously disturbed than higher up. Where the water is in close contact with the stream bed, friction slows the current down considerably. Small rocks and

ridges cause invisible swirls and ripples. A river which, from above, seems to be flowing smoothly, is full of small submerged irregularities. In times of flood when the current is stronger, mud storms are raised and small pebbles, even rocks, are rolled along.

Almost all the same principles apply to the air, except that water remains virtually constant in density at all depths. The atmosphere, because it is gaseous, has no very obvious upper surface. The air becomes less and less dense, thinning out as the pressure falls with height, so it isn't very certain where it ends. Otherwise almost everything that happens has its direct analogy in the river of water.

The wind then, is a fluid flow. The stream a few hundred feet up follows the general pattern of the pressure isobars, which are often shown on ordinary newspaper or TV weather maps. The isobars mark the shifting courses along which the aerial river at moderate levels is compelled to move. The flow low down does not follow the isobars so closely, though it is nevertheless part of the large scale streaming. When the wind is strong, the numerous irregularities in the current will be vigorous too. This means rough air low down, while at higher levels the flow is swift and smooth.

### The wind gradient

The atmosphere has a boundary layer, like any surface which has a fluid passing over it. This is termed the **wind gradient** (Figure 1) Contact with the ground slows the air down. The gradient is most pronounced in the lowest few feet, which is the few feet through which a sailplane must pass when being launched or landing. The lowest layer of air hardly moves at all, as can be confirmed on any windy day by lying down and noting the marked reduction of air movement at this level. Where ants crawl, there is virtually no wind even when a gale is blowing above. A few inches up, the flow is still sluggish. At head height the breeze is less than that

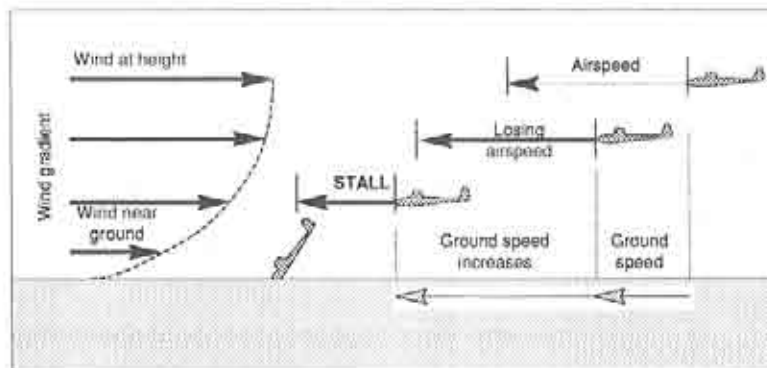


Figure 1 The wind gradient

at the top of a flagpole. The person on the ground tends to estimate the strength of the wind by that felt on the face. This is very unreliable. A better guide is the windsock, or the motion of tall tree branches, but even this is not the whole story. The wind gradient extends up for a considerable distance. Its depth varies greatly with the speed of the wind. If there is a stiff breeze some slowing of the wind is still quite detectable at 150 or more feet above open level ground. It is when we are flying nearest to the ground, at launching and just before landing, that our control difficulties are greatest. We fly our models from the bed of a flowing stream of air and at these times they must pass through the most disturbed parts of the current.

### Launching

When using a towline (hand line, winch or 'hi start' rubber bungee), the flight begins in the lower part of the wind gradient. The pilot, or an assistant, tends to judge the wind speed by the feel of the breeze on the model as it is held slightly above head height, and aims to achieve flying speed with a sufficient forward thrust. As the sailplane begins to fly, the airspeed may still be dangerously low and, with elevator up, the wing's angle of attack high. The pilot may pull back the elevator stick too soon. A stall at this point can be disastrous; a wing goes down and the model swings wildly over to

dive and crash, probably facing back the way it came. A gentle initial climb with elevator neutral or even slightly down, for a brief horizontal flight, is necessary at first, to give time for the airspeed to build up.

After successfully negotiating this phase of the launch, however, the model quickly rises through the slow moving, sluggish boundary layer into the stronger breeze at a high angle of attack and the airspeed rises as the launching line continues to pull. All aerodynamic loads on an aircraft increase rapidly with airspeed. The so-called 'square law' of aerodynamics operates. All forces generated by the motion of the sailplane through the air, vary with the **square of the airspeed**. If the airspeed doubles, the loads are four times as great. The wings of a sailplane on a launching line may often be seen to bend considerably and may break as the model, still tethered to the ground, rises into the increasingly strong wind aloft.

To a certain extent the rubber bungee of a 'hi start' launch can adjust itself to such increases of load, by stretching, so that there is a shock absorption effect. Wing breakage is less likely. The extra tension in the rubber may even help the model to climb to a higher level. A human towline runner can feel the load coming on the wings and should slow down, or even stop, walk or run back, to prevent damage if the wing seems likely



to collapse. In a real emergency the runner may even let go the line entirely, although this invalidates the launch for competition purposes.

A winch launch is less sympathetic. Even if the winch operator stops the motor, or if the winch itself has a tension sensing device which does the same, the model is still attached to the ground by a rather inelastic line which may absorb a little of the load by stretching slightly, but which cannot, unless it actually breaks, do anything further to relieve the increasing strain on the wing. The pilot may have a releasable towhook and use it if the model shows signs of distress, but the dangerous situation can be saved, as a rule, without spoiling the launch, by moving the elevator down, so reducing the wing's angle of attack.

Once the sailplane has escaped from the worst of the wind gradient, it will climb into the region of generally stronger, but smoother flowing wind and having survived so far, there should be no further difficulties, although if the pilot is inclined always to pull back too hard, the structure may still give way. More likely, if the elevator is held too far up, the model begins to swing and swoop wildly from side to side, possibly so far to one side or the other that the towline will come off an open hook. The cause is not the wind or turbulence, but merely that the wing is approaching the stall. A wing will stall at any airspeed if its angle of attack becomes greater than its stalling angle. Stalling is not caused merely by losing speed through the air, it can happen at any time if the stalling angle is exceeded. This may happen during a launch, just as it may in a steep turn if too much up elevator is used. Relaxation of pressure on the elevator stick is all that is required to save the launch in such a case.

Other than the releasable hook, correct use of which depends a great deal on the quick judgment of the pilot, a line with a relatively low breaking strain, or, in accord with full-scale practice, a definite weak link of known properties at the glider end of the

line, will often save the model if the wind gradient, or a gust, causes a severe overload. The weak link snaps and, while this may be a nuisance, it is very much better than having a broken wing and the totally wrecked sailplane which usually results.

#### Landing in the wind gradient

There is a certain airspeed for every sailplane or ordinary aeroplane, where the wing is simply not moving fast enough through the air to sustain the total weight. Even with the wing held at a high angle of attack to maximise the lift coefficient (just short of stalling), if the airspeed comes down to the critical point, the model will cease to fly. This is the **stalling speed**. Also, we rely on airflow over the control surfaces to guide the sailplane. If the airspeed is too low we may lose control even before stalling. The controls at low airspeeds commonly become sloppy and slow to act.

It is most important to remember that the stalling speed is nothing to do with the ground speed of the aircraft. It is the **speed of air flow over the model** which keeps it flying.

The speed of the model over the ground when landing is certainly very important, which is why we always land into wind, if possible. When heading into wind, the ground speed is the model's airspeed minus the wind speed, so even if we do a bad landing, the impact is slower and the risk of damage is reduced. We aim to land just at the stalling speed so that once down the model stays down. Touching down too fast can cause an embarrassing bounce or a ground loop. Landing downwind is risky, because the speed relative to the ground is the airspeed plus the wind speed. The final impact is that much harder. But this does not in any way alter the fact that it is necessary to keep the airspeed above the stalling speed all the way until a merest fraction above touch down. If the airspeed is allowed to decay too soon, the

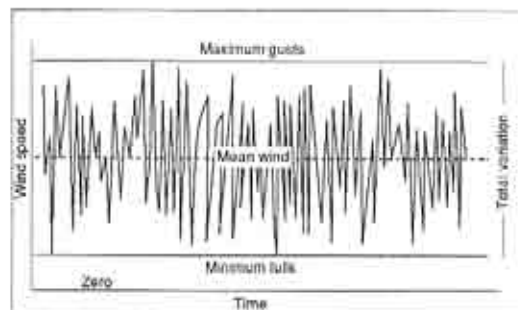


Figure 2 Variation of wind strength

model will go out of control and fall heavily.

Unfortunately the radio control pilot, standing on the ground, is always tempted to misjudge the airspeed by observing the motion of the model relative to this standpoint. In windy conditions this is the cause of a great many accidents.

The first rule for landing in windy weather, therefore, is to make quite sure that the model maintains airspeed at all phases of the approach, right up to the last instant. If there is to be an error, and very few of us can guarantee to land perfectly every time, it is far better to touch too fast and bounce a little, than to drop out of the air suddenly from three, five or ten feet high. After a little bounce or skip, a second, even a third touch down is usually safe. After a stalling crash, the model is likely to be broken.

As it approaches to land, facing the wind, a model's airspeed will initially be determined by the wing angle of attack, which is governed as usual by the elevator. Coming down into the wind gradient the sailplane meets air which is moving over the ground at progressively less and less velocity. The aircraft feels the wind gradient as a loss of airspeed which causes the wing lift to be reduced (Figure 1). The model nose goes down and the glide steepens as the sailplane tries to recover the lost airspeed. The inexperienced pilot sees the nose go down and, fearing a heavy landing, pulls the stick back.

The cause of the nosing down was loss of airspeed in the wind gradient. The pilot's action is to raise the elevator and so lose more airspeed. Lift declines further, the model noses down again, trying to recover. More height is lost. The lower the model gets, the more pronounced the wind gradient effect. The airspeed decays, the model sinks more into the most severe part of the gradient, the stick comes back further, and so things get progressively,

and rapidly, worse.

The model stalls and pitches nose down into the ground, or drops a wing and cartwheels. With a powered aircraft, if the pilot recognises soon enough what is happening the situation might be saved by opening the engine throttle and using the extra thrust to recover the lost airspeed before it is too late. With a glider this cannot be done. If air brakes or spoilers are open, they must be quickly closed, which, by reducing drag, has the same effect as opening the throttle, though only for a short time. This saving action can only be performed once on an approach.

#### Trim early for more airspeed

As soon as it is decided to prepare for landing, at a good height, re-trim the sailplane to give it an **ample margin of airspeed** so that descending into the wind gradient will still leave enough flow over the wings and control surfaces to maintain flight all the way down to the ground, with enough control for a final 'flare out'. The trim and flight speed should be adjusted well in advance, preferably on the downwind section of the landing circuit, to give the model time to take up its faster trim and settle down. It is too late to think of this on the base leg of the circuit before turning in towards the landing spot, or on the last run in after the final turn.

Pilots in full sized sailplanes sometimes say, add ten knots airspeed above the normal touch down speed for the wind gradient, and another five knots



for the wife and children. Such a rule, although pointing the right way, is not to be followed rigidly. When the wind gradient is very pronounced a good deal more than fifteen knots extra is needed. When in doubt, more speed, rather than less, is safer. When I was in the early stages of solo flying in a Slingsby Prefect glider, which had a landing speed of about 35 knots, my instructor told me on a particularly windy day that the conditions required an approach speed of 80. This, to me, seemed excessive. I had never flown the open cockpit Prefect faster than 60 at that time. I trimmed in good time, but only for 70 kts. I had a very nasty few moments when about five feet up before landing. The airspeed suddenly seemed to disappear, the controls ceased to work, and the glider dropped with a bang, fortunately onto the skid and wheel without dropping a wing. I was lucky not to break anything. On my next flight I trimmed for 80 knots, and this was not too fast at all. I never had to be told again. All this applies equally to model sailplanes. It is better to have a little too much airspeed and hence a slightly longer ground run after touch down, than to stall and spin.

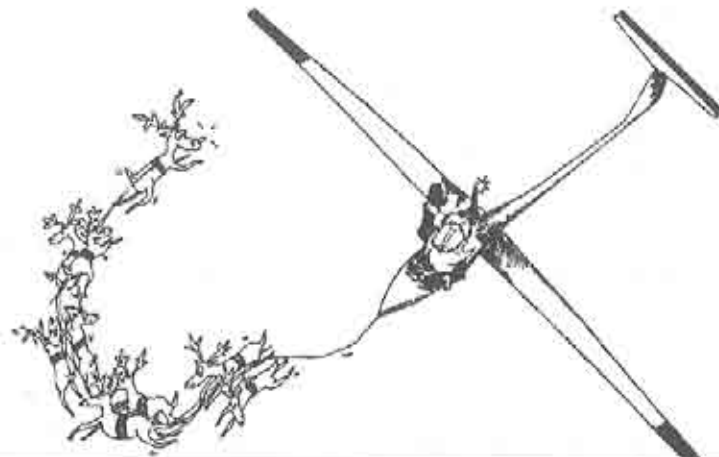
A point worth noting is that while the airspeed of a model is fading as it descends through the gradient, its ground speed may rise. The ground speed, as already said and will be said again, is the resultant of airspeed and windspeed. Thus, even as the model's airspeed decays in the wind gradient, it begins to move over the ground faster because the wind is less low down. This tempts the inexperienced pilot to make errors. The sailplane, having turned to face the wind at some height, seems to come in slowly as it begins its landing approach. It is at a moderate height where the breeze is quite strong, so the ground speed is low. As it sinks into the gradient it begins to come forward more rapidly. Its airspeed, nevertheless, is dropping. The novice makes the common mistake of judging airspeed

by looking at the rate of progress over the ground. The aircraft may look like overshooting the landing place yet suddenly it falls heavily short. The airspeed is what keeps the model flying and under control. The pilot should not be deceived by the apparent excess of ground speed in the last stages of the descent.

A further interesting point is that, if a model is landing downwind, everything is reversed. Now coming down into the wind gradient gives the model extra airspeed but the ground speed gets less. The pilot (who ideally should not be landing downwind at all, of course) notes the reduction of ground speed and expects the model to touch down, but it has actually gained airspeed and is not ready to land. It floats on much further than expected. Even when at last it does lose flying speed, it is probably still moving quite rapidly over the ground as it stalls. At this moment control is lost. Even if the touchdown is gentle, the glider slides or rolls along completely out of control. If the model does not perform a severe ground loop, the pilot is very lucky. In the last moments before coming to rest, the air is actually blowing from the tail to the nose, reversing all the control effects.

#### Turning near the ground

The wind gradient also increases the danger for large span sailplanes making turns near the ground. A turn within the wind gradient finds the higher and lower wings in airflow of different speeds, with correspondingly different lift forces. At a critical moment, the model may roll over and crash. The same sort of thing can happen if a sailplane flies too close to the soaring slope, with one wing tip tucked well into the wind gradient (which is present on the face of the hill just as much as elsewhere) and so lose lift. A wing tip drop and sudden roll into the hillside is very probable. If you must show off by skimming the ground with a wing tip, make sure there is plenty of airspeed before trying it. ■



Schedule of Special Events			
Date	Event	Location	Contact
Feb. 1-2	Southwest Winter Soaring - Unlimited	Scottsdale, AZ - 444 (D)	Iain Glithero (602) 831-1905
Mar. 14	Hand Launch	Irvine, CA	Scott Smith (714) 651-8488
May 29-31	Mid Columbia Scale Int. Fun Fly	Richland, WA	Roy (509) 525-7066 Gene (509) 457-9017
June 13/14	S.O.A.R. Great Race	Osewego, IL	Lee Sheets (708) 748-8934
July 25/26	World Inter-Glide 92	Fairlop, London	Les Sparkes 81-505-0191

#### AERIAL MODEL AIRCRAFT PRODUCTS (213) 965-9504

AMAP cutter with one bow: \$179.00  
AMAP power supply: \$49.00  
Anodized available: Add \$10.00

**FLAIR - SLOPE**  
Fuselage: \$60.00  
Length 49" • Width 2 1/2" • Height 2 1/2"

Three-piece fuse, with "T" tail or "V" tail

We also sell cut cores available in these airfoils: MH42, MH43, MH62, MH64, 7003, RG15, RG14A  
Foam cores: \$50.00

Blue Foam 2 lb. Density 24" X 96" X 2": \$29.00  
Will cut for shipping 12 X 48, or please specify.

**Precision AMAP Wing Cutter**

Single wire tracking

Cuts straight or any tapered wing  
flex, stabilizers.

Full Money-Back Guarantee

**FLAIR-SLOPE 11 / SPORT ELECTRIC**  
Fuse Complete: \$60.00  
40 & 60 Size Motor Recommended

Slip-on Nose Cone

Laser Templates Available  
by Lee Murray  
(414) 731-4848

Fuselage made with EZ Lam Epoxy. Aerospace Composite Products. Drawing by M. Nelson

ASW 17 1/4 Scale 4 M Basic Kit: \$285.00 "Thermal Phase" Hand Launch 60" E - 387: \$50.00

## Saturn 3.0 - The Concept Behind the Design

...by Layne/Urwyler  
Designers & Kit Manufacturers

*Our goal was to design an unlimited class thermal competition sailplane with the broadest possible range of performance to accommodate the wide variety of flying conditions inherent to the task of precision thermal duration.*

The boundaries of sailplane design are virtually limitless; however, we felt our task was fairly specific, and therefore required a practical design formula which would equal the desired sum of performance.

The sport of precision thermal duration and spot landing requires, in our opinion, a sailplane with a performance envelop that encompasses specific capabilities:

- 1) The capability to winch launch to extremely high altitude without the risk of extreme wing failure, or overstressing the airframe;
- 2) An appropriate airfoil and wing loading which provide maximum thermal duration capability even in light lift or break-even air;
- 3) A speed range fast enough to cover a large area of sky to find lift, and slow enough to effectively work the lift once you've found it;
- 4) Predictable, slow landing characteristics which provide accurate spot landing capabilities.

When we compared all of these desired capabilities, we found that they are difficult, at best, to incorporate effectively into one sailplane design, as they are mostly opposites. This is where the true "black art" of compromise had to be heavily injected into the formula.

### The Formula

It was quite obvious to us that an all composite airframe was the only option available to provide the strength to weight ratio to endure extremely hard

winch launching, while maintaining a wing loading light enough to work well in light lift.

We designed this composite airframe around a unique spar/wing "rod" tube system which adds substantial strength over conventional spar systems, without additional weight penalties. Saturn uses a 3/4" O.D. x 36" T6 Aluminum alloy tube, which weighs all of 7.5 ounces, for both a wing rod, and the inboard spar system. The balance of this true composite spar system consists of 1 1/4" x 48" carbon fiber spar caps. This system allows us to use a light weight glass lay-up on the wings (finished wings without servos weigh 15.5 oz. each) to keep the overall weight of Saturn within the desired light wing loading while still maintaining the strength more common to F3B sailplanes. Saturn's 3/4" diameter wing tube is also perfect for ballasting.

The next element of the formula was our choice of airfoil and the accompanying wing plan design. We chose the HQ 2.5/9 as we feel it is one of the best choices for thermal duration tasks, with enough camber to work light lift, yet thin enough to provide the speed to cover a lot of sky searching for lift. Quabeck airfoils are also specifically designed to employ full trailing edge camber change, which greatly broadens the already superb performance range of the HQ 2.5/9 airfoil. We developed a wing plan that would accept our unique spar system, having flat inboard panels with the dihedral outboard. The outboard trailing edges are raked slightly forward to eliminate the tip stall tendencies of wings with straight trailing edge designs. The outboard dihedral provides a very stable wing plan on launch and provides additional stability and handling in thermals.

We designed Saturn as a "T" tail in combination with a long tail boom moment and small yet very efficient tail surfaces to reduce weight and drag. For overall durability and proper support of Saturn's "T"

tail, we used a very strong yet light fuselage lay-up. This lay-up consists primarily of epoxied glass cloth; however, we use three layers of cloth over the entire fuselage to achieve a great amount of shear strength and we encapsulate spectra reinforcement between the glass layers to provide superior strength and durability. The fuselage is a one piece design using the wet lap seam method to join the fuselage halves during the molding process.

The overall weight of Saturn was a great concern in our design formula. We wanted the strength of a glass composite airframe without the weight most often associated with all glass sailplanes. We achieved a true flying weight of 78 ounces which nets a wing loading of 11.47 ounces per square foot. This weight compliments our choice of airfoil extremely well, providing both an excellent speed range, and the capability to float in light lift or break even air. Saturn's wing loading, and overall stable design, combine to deliver the ideal qualities for consistent, and proficient spot landings.

After designing, building, and testing Saturn, we knew we really had a design that worked, but we wanted to perfect and refine the product before offering it to the rest of you. Subsequently, we designed a molded glass rocker assembly to solidly mount and support the horizontal stabilizer, and we refined our pigmenting, bagging, and molding techniques to offer our customers the highest quality, and best performing competition composite sail-



*The highest quality epoxy glass composite components, plus, all the necessary hardware including push rods, clevises, molex connectors, and a custom tow hook.*



*For your convenience and to assure accuracy, we've already installed the wing rod tube and the locator pin tube in the fuselage.*



*We've finished the wing roots with plywood and drilled holes in each wing for the servo wires.*



*We've molded and installed an epoxied glass rocker assembly onto the fuselage fin for simple and secure stabilizer attachment.*

*The result is a high quality all glass composite sailplane that you can simply put together right out of the box. The remaining finish work is simple with our complete set of instructions.*





planes that we possibly can.

### The Result

The sum of our formula is, in our opinion, a perfect blend of "compromises": Saturn's ultra strong airframe is a thrill to launch; it's HQ 2.5/9 airfoil and stable wing plan design are exciting to fly, responding to the lightest lift, or moving out across the sky in search of lift; and landings are predictable, slow, and stable.

### The Kit

The Saturn kit is very complete. We've installed the wing rod tube and locator pin tube in the fuselage to insure the proper incidence. We've pre-fit and finished the wing roots with plywood for the perfect fit, and drilled a hole down through each wing for the servo wires. We've installed the molded glass rocker assembly in the tail fin to insure proper stabilizer alignment and we've included all the hardware you will need to finish Saturn, right down to the custom tow hook. All of the flying surfaces are ready to assemble onto the fuselage right out of the box. You simply cut out the flaps and ailerons, finish sand the leading edges, and install the linkages and your radio.

We believe in value and we believe Saturn is a value in both performance, and price: Saturn Kit \$500.00 plus shipping and handling. For more info. contact: David Layne or Peter Urwyler, Layne/Urwyler, 2821 Lou Ann Dr. #B211, Modesto, CA 95350; (209) 544-8779, (209) 529-8457. ■

### Dave's Wood Products

**Obechi Available in  
Large Sheets**

Please call (404) 642-0645

or send SASE to:

**#7 Creekpark Ct.  
Roswell, GA 30076**

CHANNEL

1

PRODUCTIONS



### Instructional Videotapes

Channel 1 Productions  
19827 Bishops Gate Suite #1  
Humble, TX 77338 • (713) 540-3944

**"HOW TO VACUUM BAG FIBERGLASS WINGS AND WHERE TO BUY MATERIALS" & "MAKING FIBERGLASS MOLDS"**...These videotapes give the A.B.C.'s of making fiberglass molds and wings, and explain what equipment and material you will need. These tapes allow you to manufacture most any fiberglass part with this technique.

**"CUTTING FOAM CORES AND MAKING TEMPLATES"**...Covers step-by-step technique on foam wings. The plans to an Automatic Hands Off Foam cutter that will give you sharp trailing edges will be given with this videotape as a bonus.

Available in VHS or BETA  
Price Per Video...\$34.95 &  
\$3.50 S&H

(TX res. add 8% sales tax)

**"DRAWING PLANS & PHOTOS FOR A BATTERY POWERED BUBBLE BLOWER"**...This Bubble Blower puts out a million bubbles. Its application is to study thermals. (Great for hand launch thermal flying.)

\$6.99 (TX res. add 8% sales tax)  
Prices Subject to Change Without Notice.

## Ridge Writer

...by Wil Byers



RT. 4 Box 9544, W. Richland, Washington  
99352; (509) 627-5224 (7:00 PM - 10:00  
PM weekdays, after 9:00 AM weekends)

To continue from last month's column on flying too slow, we will now discuss Reynolds number (RN), sinking speed and airfoil angle of attack.

Remember that we said the airfoil data we were observing was only two dimensional data and that it was not corrected for aspect ratio (AR). Well, in last month's column I made a major error, unfortunately mixing two terms. The two terms were AR and RN. In the paragraph where I said the section had an L/D of 47.06 but was not corrected for RN, it should have read AR. Also, in the paragraph where the airfoil has an angle of attack of 6.5 degrees it should not have indicated that it needed to be corrected for RN but rather AR. Yes, it could be corrected for RN too, but my main concern with a two dimensional section is that it isn't corrected for AR. So much for burning the midnight oil when writing these articles. Forgive me and you will find the skies filled with wind and generous lift!

Moving quickly away from my glowing error, Reynolds number is a non-dimensional number that is proportional to the product of the ratio of the speed of a section to the mean speed of the molecules and the ratio of the size of the section to mean free path of the molecules. Wow, what a mouthful huh! That statement isn't nearly as mentally strenuous as it might seem. It does say, however, that if Reynolds number is constant throughout a comparison of sections all comparative coefficients would also remain constant. This is kinda like saying we will compare apples to apples. The above

statement does also tell us that there are some physical and dynamic characteristics that will affect the value of Reynolds number. Those characteristics are the speed with which the fluid moves about the section and the viscosity of that fluid. It does also indicate that the chord of the section will influence the value of Reynolds number.

Therefore the Reynolds number is a quantity that allows us to compare airfoil coefficients without regard to size of the airfoil or its flying speed, as long as the Reynold number is the same. But since  $RN = \rho VR/\mu$ , (where  $\rho$  = the mass density of the fluid

$V$  = the velocity of the airflow, expressed here in feet per second

$\mu$  = the coefficient of viscosity of the fluid, in pound-seconds per ft<sup>2</sup>

$R$  = a characteristic dimension of the test object. (For the airfoil, its chord)), if any variable changes it too will change. So if our model speeds up or slows down it will change the Reynolds number of the airfoil and, as a result, it will change the performance of that airfoil.

For example's sake let's calculate the Reynolds number of our model's airfoil at two very different speeds. I'm going to use a wide variation in speed so we can clearly see what happens to the section and its associated RN. Therefore, let's use a chord of 10 inches and speeds of 20 miles per hour and then 60 MPH.

First, note that the ratio of  $\mu/\rho$  is known as the kinematic viscosity, which under standard conditions is  $1.576 \times 10^{-4}$  at 59°F. Also, one should know that if we divide one mile (5280 feet) by the number of seconds in one hour we arrive at 1.467 feet per second. As a result, one can calculate the velocity ( $V$ ) of a section by multiplying the speed in miles per hour times the value 1.467. So, if our section is traveling through the air at 20 MPH it would have a velocity of 29.340 feet per second. Since our calculation is also based on the characteristic dimension, in this case our airfoil chord of 10 inches, we must also bring it into the equation. In this calculation our standard dimension is feet so we must consider what fraction of a foot 10 inches is and it is, of course, .833 feet. Thus, the prod-



uct of 29.34 and .833 is 24.45. When this product is divided by the ratio of  $\mu/p$ , which equals  $1.576 \times 10^{-4}$  the resultant value of 155,139 becomes our numerical representation for the RN. Simple stuff, huh?

Now, compare what happens to the RN for that section 10 inches in chord travelling at 60 MPH.  $RN = ((60 \times 1.467) \times (10/12)) \div (1.576 \times 10^{-4}) = 465,419$ . This new RN is a significant increase in the RN over the same section travelling 20 MPH. Therefore, it is relatively easy for one to see that as speed increases so does RN. Likewise, it is important to note that as speed diminishes so does Reynold number. It is also important to point out here that as the chord increases so does RN and vice versa.

Now for us to discover the meaning of the article. Remember from the discussion last month that we picked a polar on our airfoil data that represented an RN of 300,000. This polar was typically lower than the other four polars. It also yielded better performance for a given  $C_L$  than the other RN polars. Is the picture starting to come clear yet? You should start to see the correlation between speed, RN, and L/D. As Dr. Horner pointed out, a number of years back in his book "Fluid Dynamic Drag", as Reynolds number increases, drag will decrease for a given coefficient of lift. (This is, of course, until the flow approaches compressibility, which is a condition we certainly won't have to deal with.) In other words there is a price to be paid in performance for flying your model too slow. A price that you can avoid simply by flying your model in a speed range that doesn't hinder its L/D or sinking speed.

An example might help you to better understand this relationship. So look at the airfoil performance polar where the  $C_L$  equals .5. At this value it is not hard to see that as RN diminishes so does the performance. As a radical comparison look at the polar that represents a RN of 60,000. For this value the airfoil only yields an L/D of =25.6. This is certainly not good when compared to the two dimensional L/D data of

=52.6 for the same section, when it is operating at a RN of 300,000. So, the statistical evidence should be clear as to what effect RN has upon airfoil efficiency. Reynolds number can either enhance performance or it can diminish it.

If a model is flown slower than necessary, the chances are great that the model's airfoil and its overall performance will adversely be effected. Therefore, if the lift should get light during the course of a model's flight and the transmitter stick is pulled back to preserve altitude thus slowing the model, that piloting response may not be appropriate. It may cause a number of unwanted aerodynamic repercussions to arise. First, this up elevator response will probably do what it was intended to do, that being slow the model down, but it will also cause the model's RN to drop off by some fraction. Depending upon the airfoil's drag bucket, this change in RN could hinder the performance and thus the L/D of the model and actually increase rather than decrease its sink rate.

Pulling back on the elevator stick will most assuredly raise the angle of attack of the airfoil, which will also raise the  $C_D$ . When angle of attack increases  $C_L$  will also increase, but as it does so does  $C_D$ . So, it must be remembered that  $C_D = D_o + D_i$  for the wing in flight. Thus, when the airfoil angle of attack increases, so do both profile drag and induced drag increase, thereby lowering the overall L/D of the model. Moreover, if the airfoil angle of attack is increased, then the drag penalty resulting from diminishing RN may be even worse than at the previous angle of attack because the  $C_D$  will move up the polar. Can you see the serpent starting to get its tail in its mouth?

Additionally, other things happen such as the drag of the elevator is increased because the incidence of the stab is increased to facilitate the model's slower flight regime. So, if what we said about the wing is true, then it will also be true for the elevator, which, of course, is summed with the problems of the wing. Then, if the model uses a tapered wing, this change in speed may

become more critical to the short chord length of the wing tips. This phenomenon happens because RN is also affected by chord. Thus, where a root chord of 10 inches may not be impacted adversely by a change of 5 MPH, a tip chord of 4 inches may no longer fly in that flow environment. As a result, the model could become tip stall sensitive and very hard to control.

Also if the model is now travelling at a slower rate of speed it is easy for it to get trapped in unfriendly sinking air, unable to cover the necessary sky to find lift. It may even begin flying so slow that it becomes stalled during a gust or sudden shift in relative wind. Or it may just move into a flight regime that yields a very high sink rate, a rate that exceeds the rising air of the slope. Lastly, it could mean that the model begins to slowly porpoise, oscillating between different flight

regimes. And, as a model moves through these different flight regimes its performance cannot be maximized or possibly even controlled. All the conditions above are at a cost to a model's performance and its ability to stay in the air during adverse or light lift conditions.

So, think about the physics of your model's flight the next time you find your glider in a light lift situation and maximize its L/D. Fly it in its performance envelope and don't be afraid to let it roam the face of your favorite slope. If there is lift there you will eventually find it. When your model does fly into that elusive lift you can then trim back for minimum sink, which by the way is usually different from best L/D, and then climb up and out of the valley where you might have otherwise landed. It is fun and it will certainly hone your flying skills. ■



## Mother & Daughter Originals

"Gift Baskets for All Occasions"



- Texas Gift Baskets -

All items made exclusively in the state of Texas

- Beerbeque Rub & Margarita mix in Texas Longnecks •
- Cheese Sticks • Jalapeno Lollypops • Whistle Britches Tequila Cake •
- Pralines • Salsa • Chili Con Queso • Texas shaped Tortillia Chips •

We ship nationwide and accept Visa and MasterCard

Contact Peggy Jones (214) 840-8116

## VORTEX

A NEW HIGH TECH 2 METER  
THREE YEARS OF DEVELOPMENT  
TRIPLE TAPER WING PLANFORM  
FOAM CORE, Balsa SHEETING  
SELIG 4061 AIRFOIL  
Balsa AND PLYWOOD FUSELAGE  
4 OR 3 CHANNELS WITH FLAPS  
40 OZ WEIGHT, 582 SQ IN AREA



Call or Write for Free Catalog

### Gold Coast Avionics

Retail Price: \$112.90  
(407) 622-7262

908 Alamanda Drive, No. Palm Beach, FL 33408

December 1991

Page 27

## About The Great Race

...by Lee Sheets

The Great Race was started in 1976 by Dan Pruss of S.O.A.R. as a 76 kilometer cross-country race. Originally, multiple on-course relaunches were allowed. The winner was determined by the fast time around the whole course. Three years later, no on-course relaunches were allowed; the winner being the team furthest around the course. It took 7 years of the Great Race before a team finished the course on 1 launch.

Evolution has taken the Great Race to a 42.5 mile course between corn fields south-southwest of Chicago. The single best flight of two days flying has been the team score. A finishing time of 2 - 2:5 hours was excellent.

In 1990, Joe Wurts came and shook things up! Joe's best was an astounding 1:27! In 1991, one Great Race team (Todd Billman, Don Vickers, Jim Hemphill, and Chip Stevens of Inland Soaring Society) must have wondered if they should have even tried to fly. They found their thermal sniffer was being interfered with by the plane's radio. Switching to JR's X347 radio cured that problem. However, it took many months for the right frequency to arrive (their frequency for the Great Race), and they were sweating it out.

Friday, June 7 (a practice day), Todd cartwheeled their plane necessitating an eight hour repair session at the motel.

Saturday, June 8, arrived. This was the first official day of the Great Race, and the weather was beautiful with booming thermals. All the teams "skied out" and left the field onto the course by 11:00 leaving the C.D. all alone. Strange feeling!

The first team back in was Eastern Iowa Soaring Society (Rusty Shaw, Charlie Fox, John Pohlman, Sandy Searle, and Bill Shaw) with a Joe Wurts record beater of 1:27! Ken Bates of the Ann Arbor R/C Falcons came in next with a flight of 1:58. Suzy Lipp (Byron Ohio Soaring Society) and Dave Batey (Milwaukee Thermal Soarers), set personal bests

by finishing the course after many years of trying. In all, seven of thirteen teams finished the course.

What of the I.S.S. fellows — Billman, Vickers, Hemphill and Stevens? Well, they weren't satisfied merely finishing with a 1:59. Their plane was "skied out" on return, so they turned around, went back on the course and turned an incredible 1:16!

Sunday, June 9, arrived cloudy with a stiff headwind for the first half of the course. E.I.S.S. and S.O.A.R. still finished the course, but a bit slower. (E.I.S.S. came in at 1:44!) For the final placings:

1st Inland Soaring Society (I.S.S.) 1:16

2nd Eastern Iowa Soaring Society 1:27

3rd Ann Arbor R/C Falcons 1:58

Suburban Aero Club) 2:12

Silent Order of Aeromodeling by Radio 2:16

All the teams flew ships with glass fuselages and Thermal Sniffers. There were two built-up wings (one SD8000), and the rest were foam either with balsa skin or composites. There were two non-polyhedral ships — Falcon 880 style. The top three ships all had RG15 airfoil wings.

Aside from Ace Thermal Sniffers (at 100%), Bob Sealy of Quality Fiberglass had the greatest representation with just about everybody using a fuselage or complete kit. The only other "kit" plane was a pre-production RnR SB/XC which was completed Friday morning. I wondered where the other cross country kits and ARF's were...can't they compete?

The teams mentioned changes they would like to see instituted for the Great Race in 1992. Their voices were heard, and ears are still open. Some of the changes for 1992 are:

- 1) The Race is open to TEAMS of AMA members.
- 2) All 50 channels are available. (Prior entrants will have first option on their previous frequency.)
- 3) The Race will be scored as a two day event. The single best flight of each day to count. Several formulas are under review.

# S.O.A.R.\*

## DAN PRUSS MEMORIAL

# GREAT RACE XVI

## JUNE 13-14, 1992

# THE ULTIMATE CHALLENGE

### Silent Order of Aeromodeling by Radio (S.O.A.R.)

The original 42.5 mile cross country race! Open to teams of AMA members. All 50 frequencies available; two day scoring.

Oswego, Illinois (Chicago area)

For more information, contact:

Lee Sheets, C.D., 113 Westwood Drive, Park Forest, Illinois 60466-1333; (708) 748-8934

4) Group discount room rates have been secured at a "Better" motel (\$35.00 per room, 1 or 2 people, per night).

5) S.O.A.R. is looking at either a barbecue at the field Saturday or a banquet Friday or Sat. night possibly with a guest speaker.

S.O.A.R.'s many thanks go out to Airtronics for their continued support of the Great Race. Interested parties with opinions, wanting more info. or to enter the 1992 S.O.A.R. Great Race should contact me at the address above. ■



## Alcyone \$149.95



The Alcyone is a high performance 12' thermal plane designed to offer the thermal pilot a competitive ship without the need to buy a computer radio and several servos. Alcyone is a three-servo airplane (ailerons mixed with rudder, elevator, and flaps), and features a unique mix of the SD7032 and SD7037 airfoils allowing for the advantages of full camber changing without the cost. The Alcyone is a perfect plane for the flyer looking to enter the world of high performance thermalling.

## Sparrow \$99.95

The Sparrow is a highly refined slope soarer designed to offer incredible versatility. Due to its high performance SD7080 airfoil and its light (9 oz.) wing loading this plane will fly in very light to very strong conditions (ballasted). The Sparrow features a sleek fiberglass fuselage, balsa-sheeted blue foam core wings, a balsa V-tail, and a complete hardware package. The control system on this 66" sloper is aileron-elevator, and construction is simple. If you enjoy slope soaring then the Sparrow is a must-have airplane!



## Pinnacle Hi-Start \$69.95



The Pinnacle is simply the finest Hi Start made! It features UV-protected rubber, specially made DAY-GLO ORANGE line (no more hunting for your line!), a custom-designed no-tangle chute, the highest quality fittings, a metal stake, and a strong high speed reel. We designed the Pinnacle based upon feedback from our customers on what would make "the best Hi-Start". We'll refund your money if you don't agree it's the best Hi-Start you've ever seen. Call us for information on the sizes offered.

# Northeast Sailplane Products

16 Kirby Lane Williston, Vermont 05495 (802) 658-9482

Santa says...



NSP is the place to shop for all of your RC Soaring needs. Call NSP today for the latest and greatest, including the fine products featured here!

ASK ABOUT OUR 103 PAGE CATALOG!



## A Chance Encounter with Glider Heaven

...by Robin Lehman, New York City,  
New York

In the wintertime I had planned a business trip to Europe with my wife and we decided to visit some friends of ours who live in Luzern, Switzerland. As Switzerland has mountains which make our hills look like pimples, it was logical to assume that somebody somewhere flew gliders! So, I asked my friends to hunt up the local model shop and find out where I could see some action.

When I arrived I was told that the next two days (June 29 and 30, 1991) would be the airtow meeting of the IGG (Interessengemeinschaft Grossegleiter - more on that later) in Belpmoos - only an hour away! What I was told, however, sounded like a full-scale glider get together - air towing from the local club's glider field. Now you have to understand that nobody here spoke English and my German was fairly limited. So what did I have to lose? Full-size sailplanes are beautiful to watch and so I decided to go.

It had been raining in Switzerland for approximately six weeks non stop, but on Saturday, June 29th, miraculously the sun came out, the clouds disappeared and it was a beautiful day. Off I went. Along the way my German vocabulary was sorely tested, "Wo ist der Flughafen?" "Links und dann rechts und dann gerade aus!" But, I finally did find the Flughafen.

As I drove up I knew I had come to the right place (photo a) - telltale model airplane transport boxes on top of cars! As I had gotten there a little bit early (flying started at 10:00 a.m.) people were putting the gliders together. The first thing I laid my eyes on was a one-third size Elf (5.20 m. wing span, 10 kilos) built by Peter Georgi (photo b). I later saw this ship perform and it was beautiful. There was frantic activity as more and more modelers arrived and signed in, followed by a pilot's briefing.

Soon there were 3 lines of gliders ready



Photo A



Photo B

to take off on the field with 3 lines of towplanes (eight or nine towplanes participated in all) (photo c). And from then on until the end of the day (with a lunch break) there was non-stop air towing.

Both days were similar and both were ideal for flying, although there was not much thermal activity. From what I could tell, more than 50 radio-

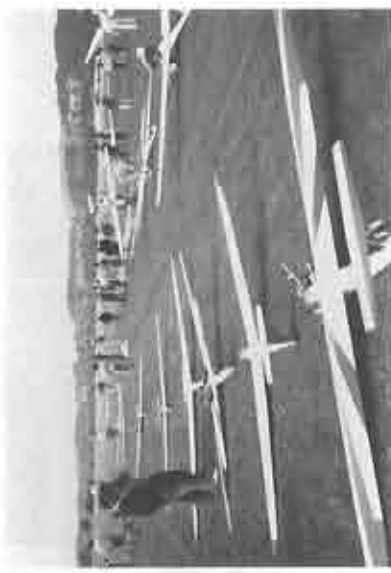


Photo C



Photo D

controlled airplanes could be flown at one time without any frequency interference. It was quite a phenomenal spectacle! I was struck by how sophisticated the European radios are compared to ours. And 5 different frequencies! The towplanes had their own.

Several other things impressed me. The quality of workmanship in the glid-



Photo E



Photo F

ers was superb. One or two looked like they had been flown before, but the rest were absolutely pristine - not a speck of dirt or a scratch on them. Many of the scale cockpits were world class with much attention paid to detail (photo d).

A few ready-made all glass ships, some A.R.F. kits like the 1/4 sized Roke ASK 18, but most seemed to be glass fuselages with built-up wings and tail feathers.

Photo G



Photo I



Photo H



Photo J



#### Superb workmanship!

The ICG literally means "those interested in large gliders". It's an international group that meets twice a year, once to do air towing, and once to do "slope soaring" but the real description should be "gigantic mountain soaring". They certainly have a wonderful turnout! I have never seen amassed in one place so many large and gorgeous sailplanes. There was nothing less than quarter-size, and fully half of the ships were

one-third size or larger!!!! When they say "Cross" they mean enormous!

Typical of what could be seen were the following: a one-third size SB10 - talk about flexing wings (7 m. wing span!); several one-third size Pilatus B4s (5.75 m. wing span, 16 kilos), this one built by Hans Marfurt and very aerobatic (photo e) - a Roke kit; a large ready-made 1/2.5 Twin Astir flown by Jorg Pfaendler (7 m. wing span, 27 kilos, all glass) (photo f); a beautiful ASK 13 by Rolf Studer (photo

Photo K



Photo L



Photo M



Photo N



g); a 1/2.5 Minimoa requiring over a thousand hours of work to complete built by Alois Buhlmann (6.80 m., 24 kilos) (photo h); an ASW 22 (6 m. wing span, 8 kilos) by Victor Hurbin ( photo i), etc., etc. You name it, they flew it!

There were everything from vintage sailplanes to the latest high-tech open class.

A number of other things impressed me. There was a safety net to prevent

airplanes from hitting spectators on take-off (photo j). I didn't count how many flights there were, but there must have been hundreds!

Most of the towplanes were quarter to one-third sized. There were two Wilgas (photo k), a quarter-size Piper Cub, a large Sukoi, several Caps (photo L). The airplane with the largest motor of all towed the largest gliders with a Quadra 100 flown by Hans Messmer from a



Inside the local club's hanger.

be quiet without loss of power.

I was left with a few lasting impressions.

Large-scale sailplanes fly better and slower and more realistically than small ones!

What an unforgettable sight - 4 gliders on tow at once and already 14 in the air!

The European state of the art kits are out of this world!

WAKE UP, AMERICA! HOW COME ALMOST NO ONE AIRTOWS HERE? We are really missing out on a wonderful and beautiful aspect of our hobby!

The lunch break inside the local glider club's hanger was really nice - "Bratwurst, anyone?" (photo n).

Blue sky, green Swiss hills, snow capped mountains in the distance, warm sunshine, calm winds and over seventy large-scale gliders being towed - that's glider heaven for me!

They tolerated my attempts at communication: "Wo ist die Toilette bitte?"

My thanks to Jack Kagi who served as my translator when he wasn't flying!

And last but not least, my thanks to the IGC for their warm, friendly hospitality!

If any of you plan to visit Switzerland, you might want to contact the IGC and experience this yourself. Contact: Peter Aeberli, Erlengutstrasse 7, 8703 Erlenbach, Switzerland. ■

wheelchair! He flew all day long on both days with the precision of a Swiss watch (photo m)! All of the tow pilots were excellent and experienced. Some of them also flew gliders.

Perhaps the most impressive thing about the motor planes was how quiet they were. These people flew Quadras and G62s which were quieter than my muffled OS300 4-stroke which is the quietest large motor I know! 200 yards away at full throttle and you couldn't hear them. We could learn a lot about noise reduction from these Europeans. Their mufflers were mostly homemade from small butane cans! So these motors can

### Case-Hardened Tool Steel

#### ☆☆ WING RODS ☆☆

For All Sailplane Types

- Guaranteed to NEVER set a bend on the winch or in flight!  Competition Proven!
- From 5/32" to 1/2" Dia.; 7" to 25" Lengths
- Falcon 880 Drop-In Repl. \$10.00

Includes S&H

Dave Squires, 668 Robin Dr.

Santa Clara, CA 95050

Send SASE

(408) 243-3388

for Free Catalog

### MODEL PLOTTING SOFTWARE

AIRFOIL PLOT PROGRAM...\$25

Plots airfoils up to 42 in. chord

MODEL DESIGN PROGRAM...\$40

Includes airfoil plot program plus wing plan program & more.

Send SASE for more details

(615) 455-5788

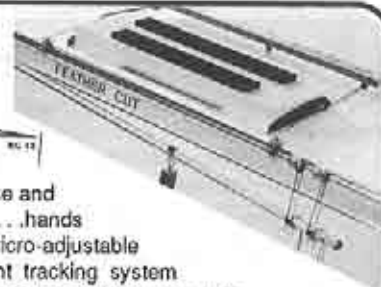
Chuck Anderson

P.O. Box 305

Tullahoma, TN

37388

### HOT WIRE FOAM WINGMACHINE™



"FEATHER CUT" creates a new standard in the ease and accuracy of cutting white or blue foam wing cores...hands off! Precise single wire tracking in concert with micro-adjustable balance weights guided by an exclusive three-point tracking system guarantees ripple-free surfaces. No more trailing edge burn-out common with two wire systems. Couple "FEATHER CUT" with Tekoa's "THERMAL GENERATOR" for fool proof temperature control and you'll be a "Pro"...first time out.

- Cuts straight or taper wings, fins and stabilizers — automatically.
- Mounts with tape to the edge of any workbench, even your dining table and stores in its own heavy duty mailing tube.
- Complete kit with anodized and plated components - no hardware store trips.
- Instructions include "cutting your first wing", "making templates" and more.
- 28" fold-bow, 40" and 52" available. Power supply required.
- Guaranteed to out perform the rest.

FEATHER CUT  
\$139.50 + 8.50 S&H  
THERMAL GENERATOR  
POWER SUPPLY  
\$94.50 + 4.50 S&H



TEKOA: THE CENTER OF DESIGN  
3219 CANYON LAKE DRIVE  
HOLLYWOOD • CA • 90068  
PHONE 213-469-5584  
FAX 213-469-3006

NEW! ALUMINUM "FOLD-BOWS"  
8' SPOOL "T370" HOT WIRE \$3.00

28" FOLD-BOW \$24.50  
40" FOLD-BOW \$29.50  
52" FOLD-BOW \$34.50



### The ROLLS ROYCE of R/C Soaring

RnR PRODUCTS  
1120 WRIGLEY WAY  
MILPITAS, CA 95035  
(408) WINGS 51

### SYNERGY 91 Thermal - F3B



\$600.00

Phone us or write for our catalog.

Features: High performance & strength; easy flying • Molded composite hollow core wings, stabs and rudder • Color coat molded into fiberglass; no painting required! • Complete kit - quick building time!

NOVA  
SLOPE RACER

EVOLUTION  
2 METER THERMAL

SYNERGY III  
F3B

SBXC  
CROSS COUNTRY



\$295.00



\$175.00



\$650.00



COMING SOON



## R/C Soaring Resources

Do you hold seminars and workshops? Would you like to be included as a contact to answer questions on soaring sites or contests in your area? If so, please contact RCSD. Our address and telephone numbers are on page 1.

### Seminars & Workshops

Free instruction for beginners on construction and flight techniques.

Friday & week-ends (Excluding contest days) Bob Pairman, 3274 Kathleen St., San Jose, California, 95124; (408) 377-2115

Free instruction for beginners on construction and flight techniques. Sunday - Thursday. Bob Welch, 1247B Manet Drive, Sunnyvale, California 94087; (408) 749-1279

Fall & Winter 1 day seminars on composite construction techniques. Free with purchase of Weston Aerodesign plan set (\$35.00) or kit. Frank Weston, 944 Placid Ct., Arnold, Maryland 21012; (301) 757-5199

### Reference Material

Madison Area Radio Control Society (M.A.R.C.S.) *National Sailplane Symposium Proceedings*, 2 day conference, on the subject and direction of soaring. 1983 for \$9.00, 1984 for \$9.00, 1985 for \$11.00, 1986 for \$10.00, 1987 for \$10.00, 1988 for \$11.00, 1989 for \$12.00. Third class postage included. For 1st class include additional \$1.50 per issue. (U.S. funds) Walt Seaborg, 1517 Forest Glen Road, Oregon, WI. 53575

### BBS

BBS: Slope SOAR, Southern California; (213) 866-0924, 8-N-1

BBS: South Bay Soaring Society, Northern California; (408) 281-4895, 8-N-1

Reference listings of RCSD articles & advertisers from January, 1984. Database files from a free 24 hour a day BBS. 8-N-1

Bear's Cave, (414) 727-1605, Neenah, Wisconsin, U.S.A., System Operator: Andrew Meyer

Reference listing is updated by Lee Murray. If unable to access BBS, disks may be obtained from Lee. Disks: \$10 in IBM PC/PS-2 (Text or MS-Works Database), Macintosh (Text File), Apple II (Appleworks 2.0) formats.

Lee Murray, 1300 Bay Ridge Road, Appleton, Wisconsin, 54915 U.S.A.; (414) 731-4848

### Contacts & Special Interest Groups

California - California Slope Racers, John Dvorak, 1638 Farringdon Court, San Jose, California 95127 U.S.A., (408) 259-4205.

California - Northern California Soaring League, Mike Clancy (President), 2018 El Dorado Ct., Novato, California 94947 U.S.A., (415) 897-2917

Canada - Southern Ontario Glider Group, "Wings" Program, dedicated instructors, Fred Freeman (416) 627-9090 or David Woodhouse (519) 821-4346

Texas - Texas Soaring Conference (Texas, Oklahoma, New Mexico, Louisiana, Arkansas), Gordon Jones (Contact), 214 Sunflower Drive, Garland, Texas 75041 U.S.A., (214) 840-8116.

Maryland - Baltimore Area Soaring Society, Steve Pasierb (Contact), 21 Redare Court, Baltimore, Maryland 21234 U.S.A., (301) 661-6641



## Special Interest Groups

### F3B/USA

*The Newsletter for the Multi-Task Soaring Enthusiast*

Subscriptions: \$12 / Year / Six Issues

Write: F3B/USA  
Byron Blakeslee  
3134 Winnebago Drive  
Sedalia, CO 80135  
(303) 688-9572

### LSF

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

The LSF program consists of five "Achievement Levels". These levels contain specific soaring tasks to be completed prior to advancement to the next level.

League of Silent Flight  
10173 St. Joe Rd.  
Ft. Wayne, IN 46835



### You are invited to join the NATIONAL SOARING SOCIETY

- OFFICIAL AMA SOARING "SPECIAL INTEREST GROUP"
- YEARLY NSS "SOAR-IN" TOURNAMENTS
- NATIONWIDE "EXCELLENCE AWARDS PROGRAM"
- EXCELLENT BI-MONTHLY NEWSLETTER
- NSS FULLY SUPPORTS THE F3B SOARING TEAM & LSF SOARING PROGRAM
- NSS IS INVOLVED IN THE ORGANIZATION AND OVERSEEING OF THE SOARING PORTION OF FAMA NATS (INCLUDING AWARDS BANQUET)
- YEARLY DUES ARE \$15 U.S.A. AND \$20 OVERSEAS (SPECIAL FAMILY RATES)
- NSS OFFICERS ARE FROM ALL 11 DISTRICTS



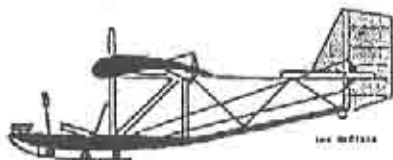
For information, contact:  
NSS Secretary/Treasurer  
Robert Massmann  
282 Jodie Lane  
Wilmington, OH 45177  
(513) 382-4612

### T.W.I.T.T.

#### *(The Wing Is The Thing)*

T.W.I.T.T. is an organization of engineers, scientists, pilots, sailplane enthusiasts, model builders and many other persons having an interest in flying wing/tailless aircraft technology. Write to T.W.I.T.T., P.O. Box 20430, El Cajon, CA 92021 to find out how you can participate.

Send SASE for membership application and flyer: "What is T.W.I.T.T.?" or, send \$2.00 for full information package including one back issue of our newsletter, postpaid. Full membership is \$15.00 per year and includes twelve issues of the newsletter. Back issues of newsletter are \$.75 each, postpaid.



### The Vintage Sailplane Association

VSA is a very dedicated group of soaring enthusiasts who are keeping our gliding history and heritage alive by building, restoring and flying military and civilian gliders from the past, some more than fifty years old. Several vintage glider meets are held each year. Members include modellers, pilot veterans, aviation historians and other aviation enthusiasts from all continents of the world. VSA publishes the quarterly magazine BUNGEE CORD. Sample issue \$1.-. Membership \$10.- per year. For more information write:

Vintage Sailplane Association  
Route 1, Box 239  
Lovettsville, VA 22080

## SO! You Want to Fly at Night!

...by Frank Deis

Pikes Peak Soaring Society (PPSS)  
Colorado Springs, Colorado  
© Copyright by Frank Deis 1991  
All Rights Reserved

*The Pikes Peak Soaring Society recently held a night contest and everyone had a great time. We enjoyed 26 flights and only dinged one sailplane because it cart wheeled on landing. That is pretty good - even for daytime flying - when you note that only three contestants had flown in the dark before.*

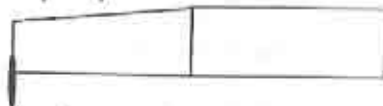
Aside from the heart stopping excitement of releasing your pride and joy sailplane into the darkness, the real thrill is seeing your sailplane soaring against a Milky Way background. Given the 6000-7000 foot altitude of our club field, a clear Colorado night and Pikes Peak for a back drop, it is all pretty majestic! We had so much fun that I thought I would pass along some lessons learned in case there is a hardy - fool hardy - band of pilots elsewhere who would like to give this a try.

The chemical light sticks work fine as temporary lights for a sailplane. If they are long enough and warm enough they provide adequate light. Where to put the lights on the sailplane is, by far, the most important consideration. This sounds simple, but it is not. The lights must be located where they can be seen no matter what the position or attitude of the sailplane. Putting them on top is not very good because you look at the bottom most of the time it is flying. When landing or in steep turns, of course, you see the top and not the bottom so no location is perfect.



We found that putting one light stick on the belly just in front of the tow hook as shown in the figure above and one on each wing tip worked fine. All three were

held on with scotch tape so that they could be removed and moved to the next sailplane quickly.



It is very important that the light sticks be attached as shown to the wing tips. They must stick out in front of the leading edge or behind (as shown) the trailing edge as much as possible. A minimum of two or three inches is necessary. This keeps the wing from blocking your view of the lights at some viewing angles. In addition to the sailplane, a light stick must be attached to the parachute so you can find it when it falls to the ground, and you need one to mark the landing circle as well.

It is surprising how quickly you adapt to night flying. Almost instantly, you learn to rely on "secondary cues" that are always there but that you do not even notice in the daylight. For example, you can tell the bank angle from the wing tip lights and the pitch attitude by the air speed. You can estimate the winch line tension by the sound of the winch instead of seeing the wing flex and so on. The first few seconds are absolutely terrifying and then everything seems "strangely normal" and the fear - but not the excitement - passes.

Night flying sounds impossible but it is surprisingly easy if you know a few tricks. The following points capture some of the do's and don'ts of night flying as well as some of the lessons learned at our contest.

- 1) It helps to tell the neighbors and the local police what you are doing. It keeps down the UFO reports.
- 2) Safety is a primary concern! Get everyone to the event before sunset and get everything ready to go before the pilots' meeting. Set up the contest area more rigidly than you would normally. Get all the cars in one place and out of the landing pattern. Similarly,

identify a specific area for contestants, their sailplanes and equipment. Keep this area safely away from the winch and the landing circle. Cover the field layout at the pilots' meeting and stress the importance of safety. (At our contest we even required everyone to fly a right hand pattern when landing.)

- 3) Do not allow anyone to bring a camp lantern! They cause severe night blindness and can easily cause a crash. Plan to use the absolute minimum light. The chemical light sticks work fine for score keeping, winch hookups, etc. A small flash light can be used for emergencies. You must make sure that no one points a flash light in the direction of a pilot who is flying at the time! Flash pictures are a definite no-no! Headlights on cars coming and going during the event are a problem, as well.
- 4) Take a minute and think about eye glasses. I wear prescription sunglasses whenever I fly. They do not work very well at night! If you need glasses, bring a pair that works in the dark. As Dave Kurth pointed out, any vision problem you have will be aggravated by the darkness. Your iris must open wider to gather more light and that is like going to a lower f-stop on your camera. The depth of field is reduced, ruining your depth perception, and any lens problems will have a bigger effect.
- 5) The chemical lights must be matched to the ambient light conditions. As a rule of thumb the four inch long Light Sticks are OK for flying before "moon rise" when there is no moon or on the night of the new moon. However, they are totally overcome by the full moon. The six inch long Cylume lights seem to be OK for full moon flying.
- 6) As most people know, some push rod materials are very sensitive to heat and humidity (NyRods, for example). If a sailplane has this problem, it can suffer major trim changes in the cool, damp night air.

- 7) Some sailplanes go into a nose dive when the spoilers are opened. During the day this is not a problem because the pilot can add some up elevator when he sees the nose drop. At night however, he cannot see the nose! Landing this type sailplane in the dark can be exciting!
- 8) The Light Sticks weigh less than 1/2 oz, so they do not disturb the balance of the sailplane noticeably.
- 9) Because you only see the sailplane in silhouette it can be very difficult to tell whether the sailplane is flying away from or toward you. You can solve this problem in several ways. We used differently colored lights on the wing tips (red for left and green for right, for example). If you use all one color and get confused you can give a rudder command and discover the direction of flight by the response. (If you command right and it turns left you know it is coming toward you.) It helps to have a co-pilot with you and to tell him what you are doing or trying to do. Two pairs of eyes are better than one, even in the daylight, but they are nearly essential at night.
- 10) Wind shears are common at night and can cause trouble when launching because you cannot see the wings flex before they break. I recommend using a standard club winch that everyone is used to. You can tell how hard the sailplane is pulling by the sound of the winch. If the winch bogs down or if it reverses quickly between taps you know you are pulling pretty hard and should ease off a bit. If you use a high start you can estimate the tension by the pitch of the line singing in the wind.
- 11) Task T4 - "15 minute add-em-up" is a very good event for night flying. We eliminated the seven minute maximum on each flight just to simplify things a bit. There is a surprising amount of light lift at night caused mostly by the fact that the ground cools more slowly

than the night air. Therefore, careful flying of a well-trimmed sailplane can produce long flights. I got an eight minute flight an hour and a half after sunset, for example.

- 12) It is surprising how bad depth perception gets in the dark. It is also surprising how hard you can land when you think you are setting down gently. Therefore, pick a simple landing option. We used two concentric circles. Landings inside the ten meter radius were worth 75 points and landings within the LSF Level I radius were worth 100 points. About half of our landings were zeros and only 10% were 100's.
- 13) Night contests go more slowly than day contests because you cannot have several sailplanes flying at the same time. Remember, they all look the same! We found you could safely launch the next flight when the previous pilot committed to the landing.
- 14) Everything that can go wrong in the sunlight can also go wrong in the dark so be prepared for broken lines, dead winch batteries and the like.
- 15) The chemical light sticks are very sensitive to temperature. The cooler they are the less light they emit. Therefore, I would not try this on a winter night! (Putting the lights in the refrigerator extinguishes them completely.)
- 16) Looking for hawks to indicate the presence of thermals does not work because hawks do not fly at night. Besides, they don't have lights! Owls on the other hand do fly at night and contrary to popular belief do have lights. They just do not turn them on when anyone is watching. This is one of life's great mysteries along with, "Does the refrigerator light really go out when you close the door?"

Of course, the question at the top of the list is, "What about crashing?" Don't worry about crashing! YOU WON'T DARE CRASH! Everyone you know will think

you are nuts for trying to fly in the dark and if you crash they will all say you got what you deserved. Imagine asking your wife for money to buy a new sailplane because you crashed yours flying in the dark! Believe me — You won't crash with that kind of pressure waiting for you!!!

Try something really different. Amaze your friends. Be the first on you block to fly three for fifteen in the dark... excuse me I get carried away at times. All kidding aside this is pretty easy if you use a little common sense. The payoff is one of the prettiest sights you will ever see - three erie lights soaring in a strangely familiar formation against the starry night sky. (It is especially nice if you have Fresh Air 6 from Mannheim Steamroller playing in the background.) Try night flying; you will not soon forget the experience. You cannot see thermals anyway, so - Why Not? ■ (Not me, Frank! ED.)

**GLIDER TOWLINE PARACHUTES**



- ☆ Quality Crafted
- ☆ High Visibility 13" Nylon Canopy
- ☆ 8 Shroud Lines
- ☆ 2 Metal Attach Rings

**\$5<sup>95</sup>** ea. plus \$1.00 P & H  
Calif. add 6% Tax

**C.A. BELL CO.**  
P.O. BOX 1198  
SAN ANDREAS, CA 95249

**FAST SHIPMENT FROM STOCK**

## Development of the "Peregrine"

### An Open Class Thermal Soarer

...by D. Barry Mattingly, Performance Products, Designer & Kit Manufacturer  
6312 Newlin St. #E, Whittier, CA 90601  
(213) 693-3932 10:00 AM to 9:00 PM, PST.

*The Peregrine is a competitive, advanced, "state of the art" design Open Class sailplane designed for AMA and SC2 competition. The Peregrine was not intended to be "everything to everybody", but rather was optimized for the performance required to excel at the 3/5/7 minute duration and 25' tape/6' circle landing task so common in AMA/SC2 contests.*

I recently re-entered the sport after a nine-year absence, and I'm amazed at the progress that competitive R/C sailplane design has taken in that time. I quit R/C to build a (full-size) HP-18 with composite flying surfaces, and decided to start flying R/C again after selling the

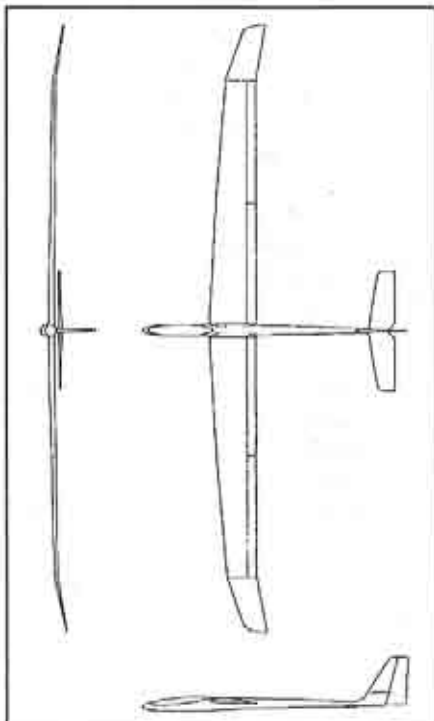
-18. I'm no newcomer to R/C; I started in 1970 and won the Jr. Modified Standard title at the '77 Nats and the Sr. 2-Meter title at the '78 Nats (with my own designs). So naturally I decided to start flying Competition again, and needed a competitive multi-function sailplane.

After examining the choices available, I decided that I'd design my own Open class ship, and thought that I could meet or better performance with a straightforward, easy to build, reasonably easy to fly and very attractive design. In addition, many of the recently announced "High Tech RTF" sailplanes seemed to be optimized more for F3B flying and slope racing than for the tasks I envisioned for my new sailplane.

Some minimum requirements were set for basic design goals. For example, a minimum wing loading of 11 ounces/square foot was chosen to insure a good minimum sink rate and reasonable approach speeds while not sacrificing (unballasted) penetration ability. A fairly large span (i.e. over 100") was desired for good visibility. (Besides, I like big gliders!) A long tail moment (for stability) and a cruciform tail (for strength and simplicity of elevator linkage) were also necessary. And last, it had to be strong enough to withstand the "gorilla" style launch from neophytes to the zoom technique.

#### "Peregrine" Specifications

Wing Span	120.25 In.
Wing Area	971.25 Sq. In.
Airfoil	SD7037 (SD7003 Option)
Flying Wt.	75 to 85 Oz.
Wing Loading	11.12 to 12.6 Oz./Sq. Ft.
Aspect Ratio	14.27:1
Stab Span	24 In.
Stab Area	116.25 Sq. In.
Fin Area	75.5 Sq. In.
Fuse Length	60.5 In. OAL
Tail Moment	33 In. (1/4 Chord)
CG Span	33% to 40% MAC
Flap Area	62.5 Sq. In.
Aileron Area	62.5 Sq. In.





The "Peregrine" was born after many hours were spent studying "Soartech 8", Lister's "Sailplane Designer's Handbook", all of Martin Simons' RCSD articles, reviewing all my old Cal Poly aero engineering texts, and talking to the local experts. After much thought to desired performance characteristics and intended task (i.e., AMA and SC2 thermal competition), the SD7037 airfoil, in a 120" span, three-taper Schuemann planform wing, was chosen. The planform is a true Schuemann type, including the use of swept back tip panels with crescent tips (a la full-scale Discus and several Dornier regional transport designs) to control spanwise flow and tip vortices.

The stab uses the SD8020 airfoil for smooth, linear pitch response, and is 10.7% of the wing area for excellent low-speed pitch authority and stability. After much searching and poring over catalogs, a glass fuselage designed and produced locally by a fellow Pasadena Soaring Society member (Mark Levoe) was chosen. The fuse features a very low cross section, long tail moment (allowing greater pitch stability with a smaller, lower drag stab), and absolutely beautiful lines, reminding one of the full-size D-36 or ASW-12.

The fuselage is extremely strong, with up to 1/8" of glass in high stress areas (wing roots, front/rear canopy cutouts) and a Spectra-reinforced tailboom. A thick, blow-molded canopy, requiring no frame or support structure, is used (it comes clear, but looks even better painted a light gray). The fuselage is available direct from Mark for \$90.00 and is highly recommended. While narrow, the fuse still allows side-by-side mounting of two mini servos, or in-line mounting of two standard servos, with a 900 mAh battery pack and full-size receiver up front.

When I quit flying, the "kite" launch was used, with the "zoom" type launch being rare. As I was not well versed in the "zoom" technique, I decided to design the Peregrine with an extra degree of strength

to tolerate the occasional mistake, and in this I believe that I have succeeded. Peregrines #1 and 2 used a white-foam core with a full-depth, 70% of span spar of 1/2"x1/8" spruce with 1/2" medium-grain balsa vertical shear webs. Over the cores I have one layer of 4.5 oz. unidirectional carbon cloth, tapered from full-width at the root to 2" at the tip panel break. The bottom of the wing has a similar layer of carbon, but only 4" wide at the root and 1" at the tip break. Trailing edges are reinforced with a 1" wide layer of 3.27 oz. glass cloth and .5 oz. carbon mat, and wings are completely sheathed with 1/16" medium balsa with a spruce LE.

The wing joiner is 3/8" case-hardened steel rod or titanium (at half the weight, but +50% of the cost of the steel rod), and extends 5" into each panel. Believe me, this wing is strong! I've fluttered the wing with no sign of bending, both on launch and on a 100+ mph slope speed run (at a ballasted 18 oz. wing loading).

The Peregrine appears unusual in that the main wing panels have only 3 degrees of dihedral (per side), and the tips have 14 degrees of dihedral. My intent was to follow both Dr. Eppler's and Michael Selig's remarks regarding tip layout (Eppler says 25 degrees; Selig about 10 degrees per panel). Whatever the theory (there are many), this configuration seems to work, as the Peregrine will go around on a wingtip, 20' off the ground, with no sign of tip stall or falling off. In fact, this characteristic is one of the key features of this design. At a recent club contest, about four of us were trying to scratch a weak, broken thermal at about 150'. The Peregrine quickly outclimbed everyone (Falcon, Gemini, and a Prodigy) and made time. Later, the Prodigy and Falcon pilots came over to scrutinize the Peregrine, and commented that they fell out while trying to match the Peregrine's tight, thermal-coring turns.

The control linkages are straightforward, and use pull/pull cables on rudder and a very tight elevator pushrod/bellcrank

setup using a "triangle" layout, .060" thick T6061/T6 aluminum bellcrank, 1/4" hollow carbon pushrod and 4-40 threaded pushrod ends and clevises. This may seem like overkill, but rumor has it that a recent spate of F3B aircraft failures have been traced to collapse of the elevator bellcrank and/or pushrod flex leading to flutter and disintegration of the horizontal stab. Four Airtronics 94141 servos are used in the wing, screwed to 1/16" ply hatch covers that are in turn hard-mounted (using countersunk wood screws) to hardwood rails epoxied to both cores and skins. Again, this may be overkill, but I've seen too many taped-in servos come loose after a hard landing or extensive use.

Both flaps and ailerons are 24" in span by 2.5" in width, and are hinged using a clear, flexible tape. With the taper present in the Schuemann planform, this means that the ailerons increase from 25% of chord to almost 36% at the tip break. Besides making construction easier (I use a 1/8" bit router to cut the surfaces free from the main panels, then face with 1/16" hard balsa), this should provide a greater rolling force towards the tip with less aileron deflection (and thus less drag).

But now for the fun part - flying! Final weight, with painted fuselage, Monokotod wings and stab and the CG at 33% of mean aerodynamic chord, came out to be 82 ounces for a wing loading of 12.5 ounces. With a bit of trepidation (new design jitters, etc.) it was off to the local slope for a test flight. As the wind direction was not ideal, and very light to boot, I nervously tossed the Peregrine off the hill. Much to my surprise, only a bit of down and right trim were required as she quickly climbed out to about 500' or so. My fears were unfounded, as the Peregrine was very stable in pitch and roll, but still extremely sensitive to lift. After several practice approaches (to set up the flap/elevator compensation mix), I tried out some point rolls (got to remember to turn off the rudder mixing first!), followed by a couple of speed

runs and a smooth, if slow landing. (I wasn't used to the rapid deceleration caused by +90 flaps and -15% ailerons.) Wow, was I pleased!

The Peregrine, with the forward CG, turned out to be very easy to fly. In fact, a pilot with only three months of rudder/elevator experience successfully flew the prototype for 25 minutes or so on the 3rd test flight. (He later purchased Peregrine #3 as his first multifunction ship.) Later early-morning test flights on the winch with an aft CG (39% of MAC, which also lowered the wing loading to the design goal of 11.1 oz./sq.ft.) demonstrated that the still-air times of the Peregrine are better than similar SD3021/RG15 airfoil sailplanes, and that the SD7037 with about 3-5 degrees of positive camber would dramatically outclimb those aircraft as well. A number of local experts have flown the Peregrine and commented on its excellent handling and climbing ability. One even switched to the larger SD8020 stab and SD7037 airfoil on his similar original design sailplane after flying the Peregrine.

After about 200 flights or so and 4 contests, it's clear that the airplane is still quite a bit better than I am. I've yet to miss making my air time, and in fact my most memorable flight to date was spending the last 4 minutes of a 6-minute task in zero sink, 20 feet off the ground. (Yes, I did make the landing spot.) It's probably obvious that I am very pleased with the Peregrine design. So much so, in fact, that I have built a total of 5 for other people, and will be starting a limited production run of wholly glass-bagged versions (2 lb. Dow PRB foam, carbon skin, arrowshaft hinges), selling for around \$500 (unpainted, but hinged and with servo wire channels pre-cut).

For those who want to "roll their own", semi-kits for both glass-bagged and balsa-sheeted versions will be offered for \$175 and \$160, and will include fuselage, canopy, wing/stab cores, machine-cut plywood servo tray and root ribs, and CAD-drawn

plans. A hardware package will be available (pushrods, aluminum elevator bellcrank and control horns, pull/pull hardware, case-hardened wing rod and all music wire and brass tubing required) for \$55.00; add \$7.00 extra for titanium rod.

What's next? Well, a 2-meter version (smaller fuse, bolt-on wing) prototype has been flying for several weeks and seems to share the same good flying characteristics as its big brother. A good friend wanted to go slope racing, so a 118", SD7003 wing (with integral ballast tubes) was built for his Peregrine (#4). This version is mighty fast, but very smooth with the long tail moment, and should be quite competitive. In fact, to counteract what I said in the opening paragraph, "the wing's the thing"

(with apologies to B2) and thus the Peregrine could be quite competitive in SMTS and/or F3B competition with a wing change.

Those interested in obtaining a spec sheet and 3-view of the Peregrine can call me or write. I'd also like to hear your questions or comments. ■

#### About the Author/Designer

In addition to Barry's original "Apertyx" design, he tells us his other projects have been the "Terminator", an all-glass Q-500 pylon racer, the "Kestrel" pitcheron sloper and the "Sirocco" slope racer; he is a Sales and Marketing Consultant based in Southern California, specializing in the high-end computer industry, with a BA in Marketing Management and BSEE. ■

### PRECISION SERVO MOUNTS

AVAILABLE FOR:

FUTABA S33  
AIRTRONICS 94141

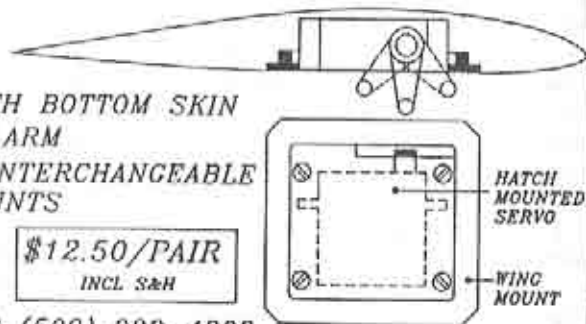
MOUNTS FLUSH WITH BOTTOM SKIN  
ACCESSIBLE SERVO ARM  
MOUNTED SERVOS INTERCHANGEABLE  
BETWEEN WING MOUNTS

SOARCRAFT

N. 615 FARR RD

SPOKANE, WA 99206 (509) 926-4803

\$12.50/PAIR  
INCL S&H



#### NEW VIDEO

\*\*\* SUPER TOW HOOK...\$5.95 + \$.50 S&H

"ATRACS VERSION 3.0 UPGRADE FOR VISION 8 & AIRTRONICS 7 SP" video covers NEW features and advanced mixing options of the ATRACS Version 3.0.

- "AIRTRONICS VISION 8" Step-by-step video guide to programming a basic and a state-of-the-art aileron/flap sailplane.
- "FOAM WINGS & THINGS" Cutting cores to vacuum bagging balsa skins.
- "FIRST STEP" Takes the novice flier through all the usual questions on what type of plane to fly. Includes building tips, radio installation, and how to set the sailplane up for first flight.
- "LISF ESL '91 CONTEST"
- "AIRSHOW '90"

All tapes \$15.00 ea, includes S&H. VHS, only.

SHIPPED 1ST CLASS,  
PRIORITY MAIL!

JOHN F. CLARKE, 911 COVERT AVENUE, N.H.P., NY 11040

## NEW PRODUCTS

The information in this column has been derived from manufacturers press releases or other material submitted by a manufacturer about their product. The appearance of any product in this column does not constitute an endorsement of the product by the *R/C Soaring Digest*.

### "Gift Baskets for All Occasions"

...from Mother & Daughter Originals

Based in Garland, Texas, a suburb of Dallas, Peggy Jones and daughter Melinda Molinario started their gift basket business just over a year ago. They sell a variety of their gift baskets at three malls in the Dallas area as well as phone orders across the U.S. One of their gourmet food baskets of particular interest is the "Taste of Texas". This basket (actually a wooden crate) is filled with products made exclusively in the state of Texas. Some of those items have such wonderful names like Whistle Bitches Tequila Cake and Old San Antonio mesquite flavored fajita seasoning. Imagine receiving a basket filled with a BBQ spread and Margarita Mix in Texas longneck bottles. What fun...fun enough to send to friends, family, and hard to buy for business acquaintances.

Gift baskets are gaining popularity in many parts of the country as an alternative to traditional gifts. Peggy and Melinda use the motto "A Gift inside a Gift". Not only do they use all styles, shapes, and sizes of baskets, but they use all sorts of containers as well to display the contents. Their fisherman gift basket is actually a Styrofoam cooler filled with fishing tackle and a bag of fish crackers just in case the fish aren't biting, but the fisherman is. For the football nut they have a basket (created for your favorite team) that includes a longneck of sausage, beer nuts, cheese, crackers, and other second quarter goodies to munch on during the game. And for the R/C sailplane enthusiast, a sailplane basket is on the drawing board!

Mother & Daughter Originals is home based and one that takes pride in creat-



ing one-of-a-kind, personalized gift baskets. They are equally proud of the quality presented in each and every basket and their customers can always know they will be giving a gift that will be well received and long remembered. They can fix you up with just about any type of gift basket...from get well, anniversary, birthday, you name it. Give them a call at (214) 840-8116. They accept Visa and MasterCard for your convenience. ■

### Foam Wing Cores & Vacuum Bagging Services

...from Del Technical Service

We are pleased to announce that we provide custom high quality foam wing cores and vacuum bagging services. The cut wing cores vary in cost from \$25.00 to \$55.00 dependent on the size of the wing. Vacuum bagged wings with carbon fiber and glass with surface color vary in price from \$200.00 to \$400.00, which is dependent on the size and the number of panels in the wing. The composite wings are extremely strong and light weight. I can provide any airfoil and, if I don't have it, all I need are the coordinates and a xerox copy of the airfoil along with a simple sketch describing the planform and how



you intend to ultimately finish the wing. You can make any choice of color as I currently use K&B epoxy paint. I am looking into other brands that may work, as well. Other options available include things like moulding your AMA number into the wing...Please call me for a quote as all wings are custom built and prices vary.

**Super Hinging Tape & Super Towhook**

...from Performance Products

Performance Products is pleased to announce the availability of its new "Super Hinging Tape". Available in 1 inch widths, the tape is constructed of polyethelene plastic with an adhesive compound designed for excellent adhesion in both hot and cold environments. However, the truly "special" qualities of this tape only become apparent when you remove it! Super Hinging Tape will not leave any residue behind in most circumstances, and will not lift paint (from properly prepared surfaces).

The superior abrasion resistance of polyethelene also allows Super Hinging Tape to be used as an excellent nose and wingtip scuff-guard. If it becomes torn or too "scuzzy", simply peel off and replace! In addition, Super Hinge Tape will not fatigue or become brittle like mylar. 36 Yard by 1 inch rolls of Super Hinge Tape are available for \$4.50 each. Please include \$1.00 per order for S&H (up to 3 rolls).

A new design, STRONG, adjustable towhook is also now available from Per-

**The E-Z Retriever**

...from Innovative Product Design

The E-Z Retriever is patterned after an open face spining reel. The "bale" is pulled across the face of the spool and hooked into the open position prior to launch. Upon release the line is guided back onto the spool by a roller at the end of the bale. The retriever mechanism is belt driven by a 12vDC motor. The guide

Also available are video tapes of the "Columbia Scale Fly-In", "Mid-Columbia Cup Slope Race", and "How to Vacuum Bag Wings and Cut Foam Cores". Each tape is approximately 2 hours in length and costs \$25.00 including S&H at 1st class mailing. Del Technical Service, 6054 Emlyn Court, San Jose, CA 95123; (408) 629-1325. ■

formance Products. This towhook is designed to provide the range of adjustment typically required to "trim-out" most sailplanes (1.5 inches of towhook range) in a compact and light package. Measuring only 2 1/4" long by 1/2" wide, the towhook uses a split top/bottom case with an internally captured hex nut for mounting the 8-32 thread stainless-steel towhook. Adjustment requires only a single 9/32 inch wrench or pliers.

The towhook case is machined from T6061/T6 aluminum bar stock, and is only 3/16" thick, allowing it to be mounted either internally (flush with bottom sheeting) or externally with little drag penalty. But the real beauty of the split-case design is apparent when used in glass fuselages, as only two 3/32" holes with a 1 1/2 inch by 9/32 inch slot between is required. When mounted in this mode, only 3/32" of the case protrudes below the fuselage.

Super Towhooks are available for \$8.00 each plus \$1.00 S&H, or \$15.00 plus \$1.50 S&H for two. Performance Products, 6312 Newlin St. #E, Whittier, CA 90601. Dealer inquiries invited. ■

eyelet, which could be considered the first eyelet on a fishing pole, is positioned 2 ft. off the ground and the retriever angled upward to keep the line off the ground and reduce payout drag. The retriever mechanism is made of steel and has an acrylic enamel finish, the box is plywood with a clear finish.

**No more tangles lines** - If you have ever used or seen a retriever of the old



and hook it in the open position. To retrieve, simply depress the push button switch as soon as the plane is off the winch line. The bale is automatically released and the line begins to wind in. As the line nears the ground, shift to low gear by pushing the lever at the top of the box to the side. Release the switch as the line approaches, reset the bale, shift back to high

standard design, made from a 20" bicycle wheel, you probably are aware that one of its major draw backs is the way that constantly tangles the line. It is inherent in its design that every turn of the wheel produces a twist in the line. However the E-Z Retriever, because it winds the line onto the spool just as it came off, never tangles the line, You can even use monofilament!

**Light weight and easily portable**

The complete unit, less battery, weighs about 20 lb. Overall size is approximately 14" x 12" x 12". The guide eyelet, switch, wires, and line etc, all store inside the box.

**Efficient 12vDC permanent magnet motor**

I've made over 200 retrieves at a contest off a single 50 amp/hr battery with power to spare. For fun flying, run it off the same battery as your winch. A new feature just added to the retriever is a variable speed drive. This allows you to pull the line out of the air quickly in high gear, and then shift to low gear to pull in the line when it nears the ground. This provides more pulling power and reduces wear on the line, winch, and retriever.

**Set-up** - Stake the retriever to the ground to the side of your winch. Push the guide eyelet into the ground 4-5 feet in front of the retriever. Feed the line through the eyelet and attach it to your winch line. To prepare for a launch pull back the bale

and you're ready for another launch. Average retrieve time is about 30 sec.

The hands off operation of the E - Z Retriever makes it possible to retrieve your own line. This is particularly easy with an optional foot pedal switch. Just run the line to the ground and then bring it in after your flight.

One other use you can put your E - Z Retriever to is as a winch for hand launch or light 2 meter planes, Run the line thru a turn-around and get up to 4 - 500 ft. launches. (Of course you may need a second retriever to retrieve your retriever line.)

**The bottom line** - A complete ready to use unit (less line) sells for \$325.00, I am also offering a kit version where you build the box and install the completed mechanism and motor etc. This sells for \$250.00. In addition I also have 3000 ft. spools of braided dacron for \$20.00. If you plan to use your retriever for solo flying request a foot pedal switch. For contest use, where someone other than the flyer is operating the retriever the push button switch is more convenient. Availability is somewhat variable but you don't need to send your money until I am ready to ship. Just let me know you want one, and if its not immediately available I'll put you on my list and send you a card when it is. Jim Harger, Innovative Product Design, 1911 Wolcott Drive, Columbia MO 65202; (314) 443-6708. ■



**Sparrow & Swallow Slope Gliders**

...from NorthEast Sailplane Products

Northeast Sailplane Products is pleased to announce the introduction of two new high performance slope gliders called the Sparrow and the Swallow.

The Sparrow is a V-tailed slope ship featuring a streamlined design, simple construction, and outstanding performance. The ship has a 65 inch wing constructed of blue foam cores covered with balsa. The wing employs the SD7080 airfoil, which results in a wide speed range and excellent slope handling. Also featured is a very sleek epoxy glass fuselage with removable canopy and a complete hardware package. The Sparrow is controlled via ailerons and elevator functions, and micro servos are required.

Given its light 23 ounce all-up weight, the Sparrow will fly in very light lift, however, it will also withstand high winds when ballasted and provide high speed aerobatic performance that will satisfy even the most experienced slope pilot. The primary design goal in the creation of the Sparrow was condition versatility, and test flights have proven that this challenge has been met. Beauty, performance, and versatility make this a must have plane for the slope enthusiast.

The Swallow is very similar in basic design to the Sparrow but features a wing constructed of of grey foam which is vacuum-bagged with



fiberglass and carbon fiber. Also, the wing uses the SD8000 airfoil, and the fuselage is slightly different allowing for the characteristics of the airfoil and the ability to add more ballast. The control design calls for two servos in the wing to accommodate camber changing and to offer added speed control for landing. A carbon fiber wing spar and composite tail feathers round out the high-tech accompaniments of this super sloper.

The Sparrow and Swallow sell for \$99.95 and \$169.95 respectively. Both kits are available exclusively from Northeast Sailplane Products at 802-658-9482. ■

**Pinnacle Hi-Start**

...from NorthEast Sailplane Products

The Pinnacle Hi-Start is a high-quality launching system designed by the experts at NorthEast Sailplane Products. Actually, the design of the Pinnacle Hi-Start is based upon feedback solicited by NSP from its customers regarding what the ideal Hi-start would be. This truly is a product that was created with the customers needs in mind.

The Pinnacle features UV-protected one piece rubber tubing (no joints to pull apart!), specially made DAY-GLO or-

ange line (no more squinting for your hi-start!), top quality fittings, and a custom made wear-resistant parachute that won't tangle! Also, the reel used for the Pinnacle has a great design which makes it very durable and easy to use. A capped steel stake is included, and snaps onto the reel for easy carrying.

NSP sells the Pinnacle in a variety of sizes for various needs. The most popular size, the Pinnacle-L, is designed for 2-3 meter sailplanes and sells for \$69.95. Call NorthEast Sailplane Products at 802-658-9482 for more information on this outstanding soaring accessory. ■

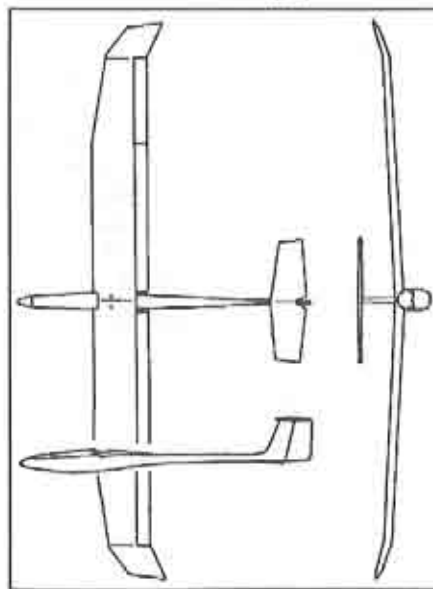


NorthEast Sailplane Products  
Pinnacle Hi-Start

**VORTEX**

...from Gold Coast Avionics

Gold Coast Avionics proudly introduces **VORTEX**, an advanced two meter competition sailplane kit. High tech without high cost! **VORTEX** combines the best available sailplane design technology with affordable construction. The wing design uses the European inspired triple taper Schuemann leading edge configuration combined with a high performance



Selig 4061 airfoil and drag reducing NASA vortex control tips. This combination results in an extremely good L/D and very low sink rate. The wide speed range will allow you to penetrate and find the lift on every flight and then climb fast once you do find it. You will love it.

**VORTEX** uses conventional balsa and plywood fuselage construction to reduce costs and permit assembly without fancy tooling. The wing is one piece construction to get the maximum strength for those zoom launches. Balsa sheeted foam cores produce the accurate and smooth airfoil contours so important to high performance. Flaps are used to get all the lift you could ever want on launch. A tee-tail stabilator reduces the drag at the back end and improves low speed handling.

This unique wing design adds spiral stability to allow hands-off thermal circling and exceptional high speed stability. **VORTEX** can be built in either the aileron or rudder-only configuration by changing the outer wing dihedral angle only. The flaps will deflect to 90 degrees for the slowest landings you have ever made, with absolute control.

**VORTEX** is currently available in the following packages:

- \* Plans (Sold factory direct only) ..\$12.50
- \* Full kit with hardware package ..\$112.90
- \* Semi-kit (Needs only balsa sheet stock) ..\$64.95

Vortex is available either factory direct or through Northeast Sailplane Products, Gold Coast Avionics, 908 Alamanda Drive, North Palm Beach, Florida 33408; (407) 622-7262. ■

**Specifications**

Wingspan	78.75 In.
Area	582 Sq. In.
Weight	39 - 41 Oz.
Wing Loading	9 Oz./Ft <sup>2</sup>
Airfoil	Selig 4061

### Classified Advertising Policy

Classified ads are free of charge to subscribers provided the ad is personal in nature and does not refer to a business enterprise. Classified ads that refer to a business enterprise are charged \$5.00 per month and are limited to a maximum of 40 words. The deadline for receiving advertising material is the 5th day of the month. (Example: If you wish to place an ad in the March issue, it must be received by February 5th.) RCSD has neither the facilities or the staff to investigate advertising claims. However, please notify RCSD if any misrepresentation occurs.

#### For Sale - Business

**SAILPLANE DESIGNER'S + DRAG REDUCTION & STRUCTURES HANDBOOKS**, \$7.95 each. Size/locate stable components, many low Reynbr airfoils via breaking Eppler's code, define speed/glide slope, design wing structure, drag reduction techniques. Eric Lister, 2214 Regina Dr., Clarksburg, MD 20871.

**3-VIEWS scanned to CAD!** Re-design/modify a current or favorite plan into your next contest winner! Catalog of CAD services and products \$3 (includes sample diskette). Collins Scientific, Inc., 6957 NW Expwy, Suite 311, Oklahoma City, OK 73132.

**ATTENTION DESIGNERS:** Would you like CAD plans drawn for your next plane? M&M CAD WORKS is now accepting drawing projects. Will convert hand drawn plans or work from your sketches. Reasonable rates. M&M CAD WORKS (608) 831-1941 CST

Find a good home for your "mature" models, excess radio gear, parts and accessories. List them free with **CLASSIFIEDS**. Sailplanes, Electric, slope ships and anything that helps them fly. Send your list with asking price, name, address, phone #, to: **SILENT FLIGHT CLASSIFIEDS**, 329 Little Ave., Ridgeway, PA 15853; (814) 772-4851. Subscriptions are \$9.00/year or \$1.00/issue.

**GREETING CARDS**, humorous, assortment package in groups of 10 for the sailplane enthusiast. We have a card to fit any occasion. Send \$10.95 plus \$1.00 postage (CA residents please add 6.25% tax) to Curt Nehring, SOAR TOONS, 469 N Central Ave. Ste. #261, Upland, CA 91786; (714) 920-1261. Please allow 3-4 weeks for delivery.

#### For Sale - Personal

**HOBIE HAWK**...\$275.00; Jade Aircraft **SHOGUN**...\$60.00; **ROBBE-GEIER** (flying wing), w/electrics...\$80.00; P-51, 50" glass fuse, pre-sheeted wing, etc...\$85.00; Mark Grand Designs **SHREADER**...\$90.00. Call Nick on (415) 728-7709.

Dodgson's Designs **PIXY**, built & flown, S-3021 foil...\$200.00; Flite Lite Composites **FALCON 800**, built & flown...\$400.00; Airtronics Spectra 7 (PCM), new w/4 servos, Ch 26...\$250.00; All of the following are kits - New in Box: Dodgson's Designs **TODI** (both wings)...\$200.00; Dodgson's Designs **MAESTRO III**...\$200.00; Dodgson's Designs **PIXY** (new style E214)...\$150.00; Dodgson's Designs **CAMANO 100** (old style E214)...\$150.00; Dodgson's Designs **HI-JACKER** (slope ship)...\$100.00; Airtronics **GRAND ESPIRIT**...\$225.00; Airtronics **AQUILA GRANDE**...\$150.00; Multiplex **DG-300** (w/spoilers)...\$450.00. All will be shipped UPS insured paid by me except for the DG-300. Jim Thomas (317) 497-6345 wkdays, (317) 474-9671 wknts, (616) 399-8337 wkends.

**HOBIE HAWK**, new in box, never rigged, white fuse, black wings, near perfect w/ photocopy of manual...\$300.00. Bob Furman, 22351 Woodbluff, El Toro, CA 92630; (714) 454-2415.

**FALCON 880**, brand new, never flown, built by an experienced Falcon builder, six pin connector for wing servos, 1/64 ply reinforced tail feathers, great Christmas gift...\$700.00. Gary (619) 429-8281.

1/4 scale Multiplex **DG-300** fuselage only w/wing joiner, new...\$75.00; 4.0 meter **SALTO**, fuselage, canopy & frame...\$95.00; 1/5 scale **GRUNAU IIb**, looks & flies good...\$295.00; **SAGITTA 600**, super mint cond...\$125.00 O.B.O.; 4.0 **SALTO** (Hermuflug), ready to fly...\$695.00. Dan Troxell, 25812 La Serra, Laguna Hills, CA 92653; (714) 831-8013.

**PROPHET 941**, quality built, not flown, radio ready, 100", 941 sq. in., modified E193, rud, elev, spoil, priced to fly...\$100.00. Gregory (510) 671-7121; 1946 N. 3rd St., Concord, CA 94519.

High Performance Sailplanes **WARRIOR**, pre-sheeted wings, SD7032, built composite stab & rudder, Kevlar/fiberglass fuse...\$225.00. Les Akers (214) 262-2378.

Hi-tech 4 Ch FM RCD Rec., 3 mini-servos, new in box...\$125.00. Les Akers (214) 262-2378.

Multiplex **FLAMINGO** with spoilers and 2 S-33 servos in wings, RTF...\$400.00. Dale King (214) 475-8093.

Scale enthusiast's dream come true, Fiberglassflugel, all-glass, 4.25 meter, beautiful 1/4 scale **SALTO**. Plane is air-ready equipped with spoilers & flaps for excellent glide path management and scale appearance. Flawless factory workmanship w/custom tapered aeroshaft hinges...\$1200 (Available w/servos for additional charge. Super smooth flight characteristics for slope or thermal flying in all conditions.); Contest Winner, Dodgson's Designs **Saratoga WINDSONG**, trusty contest-proven multi-channel ship with that classic look, never crashed, in very nice condition with new paint on fuse...\$275.00. Call Scott Condon in the eve. at (619) 471-2453 or call Steve Condon days at (619) 594-7823.

#### Wanted

**MULTIPLEX Ka6E** finished or unfinished. Robin Lehman, 63 East 82nd St., New York, NY 10028; (212) 879-1634.

**DYNAFLITE SENSOR**, new in box or partially built. Jim Bonk, 270 Mountain Spring Rd., Farmington, CT 06032; H (203) 677-7951, W (203) 233-9881 X250.

**ASW-17**, still in kit form. Send info. to: Ray Zatrka, 11539 Wilson Ave., Belleville, MI 48111.

**PULSAR & PANTERA**, complete and ready to fly, radio eq. not required. Curt Nehring, WK (714) 972-6282, HM (714) 592-2105.

## FREE! VACUUM BAGGING INFORMATION KIT

#### Includes:

- **FREE \$5 Gift Certificate**
- **FREE Catalog**
- **FREE Tech Notes Newsletter**
- **FREE Article Reprint: COMPOSITE MATERIALS FOR MODELING APPLICATIONS**
- **Unbelievable Periodic Special Offers**
- **Fast Same Day Shipping**

Send \$3 for postage & handling: CST, Dept. MD, P.O. Box 4615 Lancaster, CA 93539

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_

STATE \_\_\_\_\_

ZIP \_\_\_\_\_

COUNTRY \_\_\_\_\_



**Composite Structures Technology**  
BUILDING WITH TODAY'S TECHNOLOGY



## Press Release

### First Annual SIG/Eastern Iowa Soaring Society (EISS) Soaring Contest

...by LeRoy Satterlee, Event C.D.  
Waterloo, Iowa

*This is a summary of the results of the 1st Annual SIG/EISS Soaring Contest, which was held at Blakesburg Iowa, on September 7, 1991.*

The Antique Airfield, at Blakesburg, is a super site for a sailplane contest. It is located in south central Iowa, which is quite convenient to flyers from Iowa, Missouri, Illinois, Minnesota, Wisconsin, and Nebraska. The site is home to a museum of old time aviation artifacts, which includes restored antique aircraft, engines, clothing, memorabilia, etc. The site includes a campground with flush toilets, shower facilities, and plenty of shade. There is also a resident flock of Turkey Vultures to help you find the lift. These birds are the best lift finders that I've ever had the pleasure to fly with. If you can't find lift at Blakesburg, you just ain't gonna find it, period.

SIG manufacturing was the major sponsor this year, with some assistance from Airtronics. SIG furnished all of the trophies to the prize winners. The top three flyers in each class, and the contest high point winner, were awarded a trophy, a SIG kit, and a SIG "goodie" bag which had a retail value of over \$40.00. As a matter of fact, every flyer who registered, received one of these "goodie" bags, whether he placed in the contest or not. As is the usual practice at all SIG sponsored contests, there was NO ENTRY FEE. How's that for a deal? One of the SIG employees, Barb Pratt, wrote up a superb computer scoring program to handle the score keeping chores. This worked so well that I'm trying to encourage them to offer it for sale.

Eastern Iowa Soaring Society provided

the launching and landing equipment, and the man-power to run the event. We also saw to it that a lunch was available on the grounds for those who needed it. Four wheel ATV's were used to retrieve the winch lines. Three were available, but only two were used most of the time. Jon McVey from EISS did a superb job of organizing and running the Transmitter impound. He was one tired camper at day's end!! We insisted on all narrow band equipment, including receivers, so that maximum frequency utilization could be achieved. This didn't seem to create any problems, as nobody complained, and there were no interference problems all day. I was the C/D for this one, and found myself in the most enviable position a C/D could be in. I had more helpers than I had jobs to give them. My thanks for a great turn out by the EISS for that.

We flew hand launch first. Any 1.5 meter wingspan ship qualified to enter the H/L event. The tasks were 2 minute, 4 minute, and 6 minute duration. The club furnished two small, matched, high-starts for launching. The landing was on a small runway which was marked into scoring zones of different values. A limbo pole was set up at one end of this runway. If you flew under the limbo before you landed, the score in the box you ended up in was doubled. If you bypassed the limbo, you got the score written in the landing box you ended up in. If you missed all of the boxes, you got no landing score.

2 meter was restricted to SIG Riser 2 meter ships only, and was divided into two competition classes: sportsman and expert. A sportsman must never have won a trophy at an AMA event, or must be LSF level 1 or less. All others were classified as experts. The sportsman flyers were allowed no modifications to their airplanes. The experts could change anything that didn't change the basic outline of the airplane, like different air-



*Harold Clark prepares to launch for Ralph Colby. Colby started this contest as a Sportsman contestant, but went home an expert. His comment about the flight was, "That was 6 minutes of sheer terror..." First contest experiences tend to be that way for beginners...*

foils, spoilers, flaps, wing sheeting, ailerons, etc. The task for this group was the AMA 3 for 15 accumulative duration. A landing bonus of 10% of your flight score was added if you ended up with the nose of your ship inside of a 25 foot diameter circle.

Standard class was restricted to SIG Riser 100 ships. It was divided into two competition classes exactly the way the 2 meter class was. The same criteria were used to separate the classes, and the modifications allowed were the same, too. The task for standard class was 3 minute, 5 minute, and 7 minute duration with a 10% landing bonus if inside of a 25 foot diameter circle.

Unlimited was open to any sailplane of any size or brand. There was no division of skill levels in the unlimited class. The task was 3 rounds of 10 minute duration, with the 10% landing bonus being applied if you got into the 25 foot circle.

Even though the wind came up a little as the day progressed, everybody that attended had a blast. I recall seeing only two broken airplanes all day. A couple were temporarily lost off field in the woods, but they were returned to the field by day's end.

#### And the Winners Were:

H/L	2M Sportsman	2M Expert	STD Sportsman
Mike Fox	Al Grier	Kent Woods	Bill Chase
Paul McIlrath	Dale Rohr	Paul Seitz	Al Grier
Bob Baker	Ralph Colby	Mike Gretz	Paul McBeath
STD Expert	Unlimited	Contest High Point Winners	
Harold Clark	Rusty shaw	Harold Clark	
John Cyr	Rich Fox	Mike Fox	
Wayne Messner	Terry Edmunds	Bill Chase	



**Model  
Construction  
Videos**

Video Tapes  
for the  
Soaring  
Enthusiast

MCV welcomes your suggestions as to what kits or other projects you would like to see. Drop us a line & thank you for your support!

"Building the Legend" • "Building the Mariah"  
"Building the Falcon 600" • "Building the Falcon 880"  
"Soaring in Mid-America -- 1990 AMA Nats"  
"Visalia '90 Meet"

"An Evening with Selig & Donovan"

"Launching Equipment & Techniques"

-- Covers hand-tow, high-start and electric winches and retrievers. Shows tow-hook type and placement.

Order Today • All Video Tapes are  
Only \$24.95 (plus \$4.05 S&H)  
Okla. residents add 7.5%

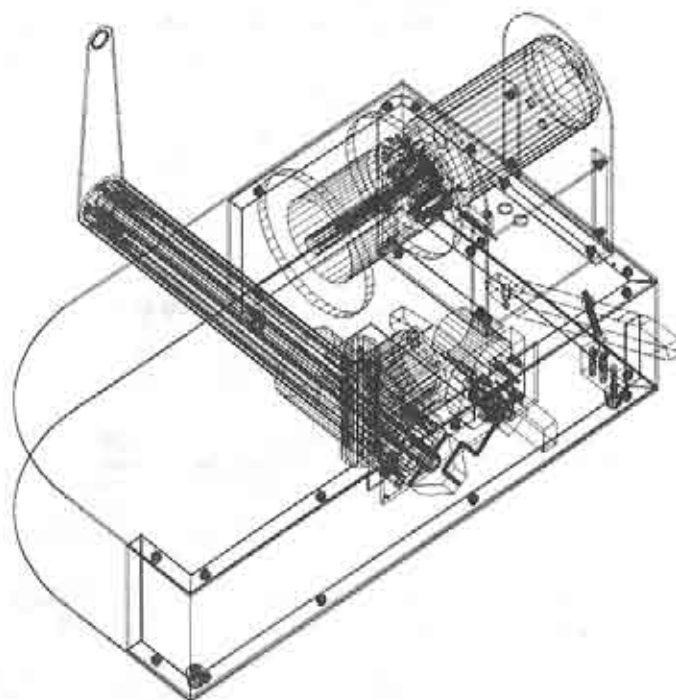


MCV • 4227 E. 83RD ST, TULSA, OK 74137 • (918) 481-5855

## Model 20

### High-Start & Winch Retrieval System

"A bold new concept that eliminates tangled and twisted lines and puts an end to chasing that chute!!!"



Features easy to use, ultra-reliable system that operates with either high-start or winch • Requires 12 Volt battery; winch source, OK • Launch and retrieval takes about a minute and the ring is ready for the next launch • 2 foot activated levers facilitate solo operation; no line finger contact • Works with all sailplanes from Gentle Ladies to Hans Muellers!

**\$319.00 Plus S&H**

Complete with Retrieval Line, Untwisting Device, Battery Hook-up Leads, Instructional Video and 30 day, money back satisfaction guarantee! CA res. please add 8.25% tax.



**Undecided?**

**QUALITY RETRIEVAL SYSTEMS**

Please send \$10 for a demo video refundable on system purchase!

18971 Fernbrook Ct.  
Saratoga, CA 95070

Line Untwisting Device Patent Pending

To Order Toll Free: (800) 225-0364; Tech Support: (408) 973-3333

## VERTIGO The Fastest Building, Highest Launching, Best Flying R/C HLG Available!



Buddy Roos of Woodstock, Georgia w/his beautiful Vertigo.

**Vertigo** - Winner of the 1991 NATS & the prestigious 8th Annual ISS Contest in Riverside, California.

**Kit Features** - High quality foam core wings and stabs, CAD drawn plans, machine cut and sanded parts, detailed instructions.

**New** - Standard Tail Version requiring no special mixing.

**Specs:** Span: 60"; Weight: 13.5-15 oz.; Area: 386 in<sup>2</sup>; Wingldg: 5.0oz/sqft; Wing Airfoil: E387; Stab Airfoil: NACA 8%.

**Kit: \$59.95 (includes S&H)**

Also, available pre-sheeted; add \$50.

NEW - Videotape on building & flying Vertigo, with competition strategy...\$19.95.

Club and group discounts available.

**\*\*Coming Soon\*\***  
New 2-M featuring  
E387 w/plug-in wings  
& fiberglass fuse.

Agnew Model Products, 1275 Bennett Dr. #113, Longwood, FL 32750; (407) 260-6223

# MaxSoar/PC-Soar

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

## Features:

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

## Polars Included:

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

## Sailplanes Included:

Falcon880, Prodigy,  
Sagitta 600, Sagitta 900,  
Sagitta XC

MaxSoar Price: \$49.95

MaxSoar V2.0 Requirements:

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

PC-Soar Price: \$39.95

PC-Soar V3.0 Requirements:

IBM PC, XT, AT, PS-2 or Compatible Computer, Floppy Drive, CGA, EGA, VGA or Hercules Graphics Adapter, Monochrome or Color Graphics, Graphics Compatible Printer or Printer Driver. Please specify floppy disk size and density.

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

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

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

## Also Available From LJM Associates:

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

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

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

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

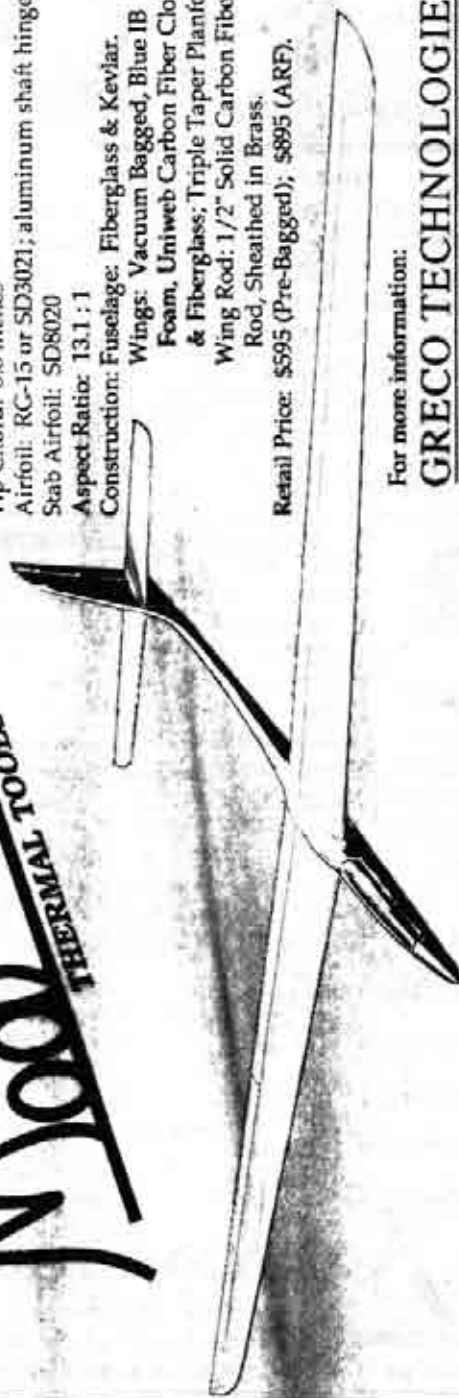
To order PC-Soar items, Laser Templates and Airfoil Plots, send price plus \$3.00 S & H to:

LJM ASSOCIATES  
c/o Lee Murray  
1300 N. Bay Ridge Road  
Appleton, WI 54915-2854  
(414) 731-4848  
after 5:30 p.m. weekdays

## SPECIFICATIONS

Type: Unlimited Class Sailplane  
Wingspan: 116 inches  
Wing Area: 949.21 square inches  
Fuselage Length: 50 inches  
Weight: 81 ounces  
Wing Loading: 12.29 ounces per square foot  
Root Chord: 10 inches  
Tip Chord: 3.6 inches  
Airfoil: RC-15 or SD3021; aluminum shaft hinges  
Sail Airfoil: SD8020  
Aspect Ratio: 13.1 : 1  
Construction: Fuselage: Fiberglass & Kevlar.  
Wings: Vacuum Bagged, Blue IB  
Foam, Uniweb Carbon Fiber Cloth,  
& Fiberglass; Triple Taper Planform  
Wing Rod: 1/2" Solid Carbon Fiber  
Rod, Sheathed in Brass.  
Retail Price: \$595 (Pre-Bagged); \$895 (ARF).

Modi  
THERMAL TOOLS  
906



For more information:

**GRECO TECHNOLOGIES**  
TECHNICAL CONSULTING • ENGINEERING

Post Office Box 10  
So. Pasadena, CA 91031  
(213) 680-2070



**GRECO 1-800-34-GRECO**

The Name: Modi comes from Germanic and Teutonic mythology. Thor, the god of the sky had a son named Modi, a personification of his mighty strength.

# J R R a d i o s

and accessories

## JR RADIOS

JRP70	X-347 Radio: 7-ch., Computer, PCM, Four 517 servos	\$429.05
JRP75	X-347 Glider Radio: 7-ch., Computer, PCM, 901 servos	\$425.75
JRP714	X-347 Radio: PCM, four 3021 servos	\$548.54
JRP770	X-347 Pattern Radio: FM, four 507 servos	\$343.84
JRP41	Max 4: FM, 2 stick, three 507 servos	\$134.54
JRP54	Max 5: PCM, four 501 servos, 5-channel	\$218.49
JRP61	Max 6: FM, Pattern, four 507 servos	\$183.99
JRP63	Max 6: PCM, 6-channel, four 501 servos	\$275.99
JRP65	Max 6: PCM, 6-channel, Computer, Helicopter, five 501 servos	\$327.74

**Receiver & Transmitter Module for X-347, PCM-10**  
**\$135.69**  
 JRPRF

## SERVO

JRS315	Micro Servo, .65 oz. weight, 28.0 Oz inches	\$32.76
JRS321	321 Mini Servo, Cored Motor	\$34.49
JRS341	341 Micro, Light weight .6 oz., 32.0 Oz inches	\$39.75
JRS507	JR 507 Blister Pack, 40.2 Oz inches of torque	\$12.77
JRS517	517 Hi-Speed Servo Ball Bearing	\$25.29
JRS3021	3021 Mini Coreless, Hi-Speed, Hi-Torque 41.66 Oz inches	\$49.44
JRS4001	4001 Coreless, Ball Bearing Servo, 55.5 Oz inches	\$47.14
JRS4011	4011 1/4 Scale Servo, Double Ball Bearing, Coreless	\$49.44
JRS4021	4021 1/4 Scale Hi-Torque 72.2 Oz in., BB, 72.0 Oz inches, Coreless, 3 sec. transit	\$50.01
JRS4721	4721 1/4 Scale Ultra High Torque Servo, 100+ Oz inches	\$52.43
JRS901	901 Servo, Double BB, 41.66 Oz inches, 27 sec. transit	\$31.68
JRS9001	9001 Coreless, Double BB, 41.66 Oz in., 19 sec. transit	\$42.49
JRS9021	9021 High Speed Servo, Hi-Torque, BB, 55 Oz inches	\$52.43

## RECEIVERS

JR 7 Channel PCM  
 Micro G Series ABC&W  
 Rx for X-347, Max 5 PCM,  
 Max 6, PCM 10, 50, 53 and  
 72 Mhz

JRP627Z \$106.25

## ELECTRIC & SUPPLIES

ASTQ6605S	AstroFlight 05 Cobalt FAI motor	\$105.40
ASTQ6626	AstroFlight Cobalt 25 FAI motor	\$147.36
AST 6660	AstroFlight Cobalt 60 FAI motor	\$241.16
ASTQ205	AstroFlight Electric Speed Control with brake	\$129.56

## AIRBORNE PACKS

JRP7P	Airplane Airborne Pack: Four 517 servos & accessories, deluxe switch harness, 550 mAh battery pack, std. charger, aileron extension, servo trays, DSC cord	\$131.09
J7XGPK	Glider Airborne Pack: Two 901 servos & accessories, deluxe switch harness, 550 mAh battery pack, std. charger, aileron extension, servo trays, DSC cord.	\$118.44

Prices Subject  
 To Change  
 Without Notice!



## MID-COLUMBIA R/C

1-800-627-4683

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

Please Write or Call for Additional Products, Info. & Prices



# IMPULSE



MADE IN THE USA  
 (ELECTRIC CONVERSION SHOWN)

**It is everything you've always dreamed of.  
 It is nothing you'd ever expect.**

Introducing Impulse, the only 2-meter class sailplane designed to provoke an emotional response!

Tired of having to make decisions? Then don't! Impulse does it all; Thermal, slope, winch launch, high-start, (even electric power!)

Remember the laws of Gravity? Forget them! Impulse punches holes in that envelope you've been carrying around for so long!



Impulse's innovative design won't go to pieces on you after a hard landing. In fact, if you can break Impulse's CrashGuard™ thermoplastic alloy fuselage, we'll replace it! (Its guaranteed!)

If you're getting the feeling that things are going to be a whole lot different from now on, you're catching on! Impulse was designed to unleash the kind of impulsive behavior that quickly turns weekend pilots into rulers of the sky!

Deluxe kit features: CrashGuard™ Thermoplastic alloy fuselage, wing tips, V-tail pedestal, tail skid, fuselage formers, wing fairing and canopy • Precision machined wood parts • Foam wing cores with built-in washout • Quality balsa wing sheeting • Pre-shaped hardwood leading edges • Photo/illustrated instruction booklet including electric conversion • Complete hardware package!

### WINCH LAUNCH • HIGH START • ELECTRIC • SLOPE

Wingspan.....	74.5 in.	Loading.....	10 oz./sq. ft. & up
Wing area.....	550 sq. in.	Airfoils.....	SD6000 & S3021
Aspect ratio.....	10:1	Optional power.....	Electric, 09
Weight.....	38 oz.	Radio.....	2-chn. req'd.

To order, send \$79.95 (check or money order), plus \$4 shipping and handling. Sorry, no COD or credit card orders accepted.

**JAREL AIRCRAFT DESIGN & ENGINEERING**  
 12136 Braddock Dr. Culver City, CA 90230  
 (213) 390-1348