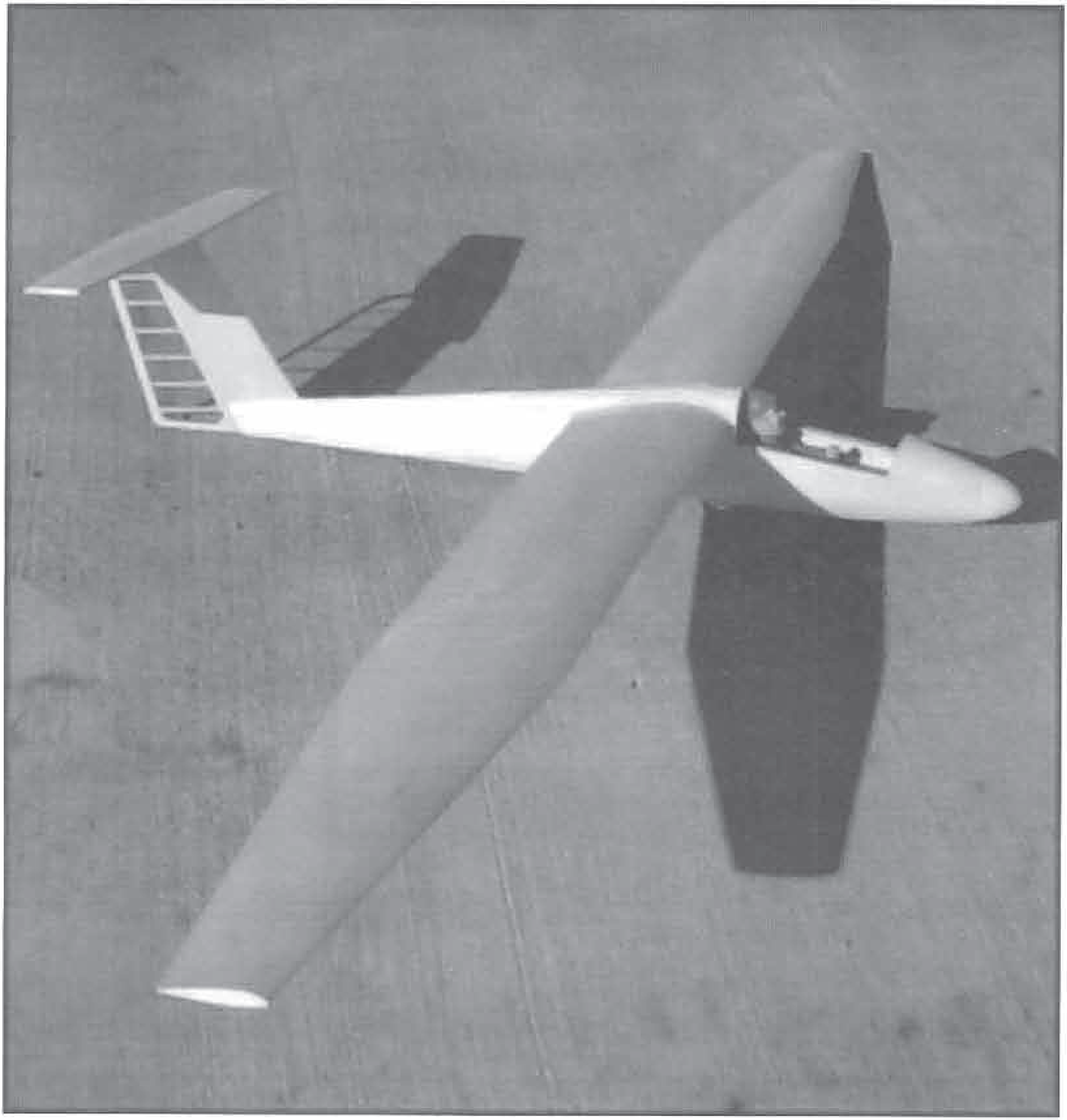
January, 1999
Vol. 16, No. 1
U.S.A. $3.50

R/C Radio controlled Soaring Digest

THE JOURNAL FOR R/C SOARING ENTHUSIASTS



R/C
Radio controlled
SOARING DIGEST
THE JOURNAL FOR R/C SOARING ENTHUSIASTS

TABLE OF CONTENTS

RCSD ON-LINE EVENT COVERAGE

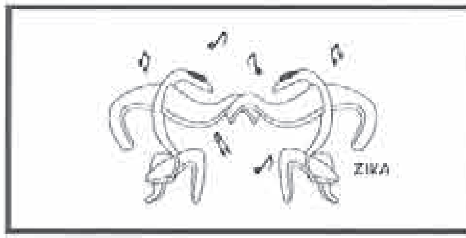
http://www.halcyon.com/bsquared/RCSD.html

BUILDING ALONG CONSTRUCTION AIDS

Additional Info. Available at the Web Site

Selected On-Line Articles
E-mail/web Addresses for RCSD Reporters
.... plus general information
.... about their areas of interest
News Items of General Interest
RCSD Index
Bookshelf Listings
Links to Clubs & Organizations
Highlights of the Current Issue
Mailing Status of the Current Issue

OTHER GOOD STUFF



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 contributed 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; (520) 474-5015, <jimpeg@netzone.com>.

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

RCSD Staff
Jerry Slates - Editor/Technical Editor
Judy Slates - Managing Editor, Subscriptions
Lee Murray - *RCSD* Index/Database
(available on-line)
Bill & Bunny Kuhlman - *RCSD* Web Masters

Please address correspondence to:
Jerry & Judy Slates
R/C Soaring Digest
P.O. Box 2108
Wylie, TX 75098-2108 U.S.A.
(972) 442-3910, FAX (972) 442-5258
e-mail: rcsdigest@aol.com
http://www.halcyon.com/bsquared/RCSD.html

Feature Columnists
Bill & Bunny Kuhlman (B²),
Robin Lehman, Lee Murray, Tom Nagel,
Mark Nankivil, Dave Register, Dave Sanders,
Steve Savoie, Jerry Slates, Gordy Stahl
Artwork
Gene Zika is the graphic artist
who designs the unique *ZIKA* clip art.

Damaged or Improperly Bound Copy?

Please let us know, and we'll replace it.
Something always slips by every month!

UNDER CONSTRUCTION
1/5TH SCALE PILATUS B-4

In October 1998, Jerry Slates began construction on a 1/5th scale Pilatus B-4. There is still a great deal of work to be done, but as you can see, it's proceeding nicely. Construction details are included in his monthly column, "Jer's Workbench" and, for those of you building along, a couple of the photos from this month's column and brief summary are included in our new "Building Along" web page section.

Digital photography by
Jerry Slates, Wylie, Texas.

The Soaring Site

Soaring with Nature

This month's issue kicks off the New Year with a new column entitled "The Natural Side of Thermal Soaring". The author, and Keeper of the *RCSD* index, needs little introduction, as it's Lee Murray, who has written articles for you since the first issue of *RCSD* was published in January of 1984. We hope you enjoy your new role, Lee!

P.S.S.A.

We received a note from Alan Hulme, England, who is the editor of the quarterly *PSSA (Power Scale Soaring Association) Newsletter*. He enclosed 3 copies of this well done, pocket-sized newsletter, which is written "For PSS Flyers by PSS Flyers". For those of you interested in PSS, rather than type out all the pertinent details on how to obtain the newsletter, we're providing a copy of the membership form here, in-tact.

Happy New Year!
Judy & Jerry Slates

PSSA

Membership Form

NO:43

Please use this form (or a copy) to obtain your subscription to the Power Scale Soaring Association. Alternatively, please photocopy it for someone else to use.

Annual renewal rates for 1997 are:
U.K.-£8.00, Europe-£12.00, International-£15.00

For Official use only	
Last issue number	________
Entered on records	________

What name are you known by?: ____________
Initials: ____________
Surname: ____________
House name: ____________
Street Number/Name: ____________
Town/Village: ____________
Postal Town: ____________
County/District: ____________
Post Code/Zip: ____________
Country: ____________
Telephone (including codes): ____________
Fax: ____________

Please say which Radio Control equipment you use for PSS.

____

Please return your completed forms to:

Alan Hulme, 52, Mountway, Waverton, CHESTER, CH3 7QF.

Cheques/ Euro Cheques/Postal Orders made payable to 'J.A. Hulme - The PSSA.'
Access/Barclaycard details to: Alan Hulme at the above address.

STOP PRESS!

Late breaking announcement. As many of you know, Raul Blacksten, archivist for The Vintage Sailplane Association, offers selected books on vintage gliders for sale. Raul currently carries 3 of Martin Simons' marvelous books: "World's Vintage Sailplanes, 1908-45", "Slingsby Sailplanes", and "German Air Attaché". Raul will also be carrying "Sailplanes by Schweizer", which has just been released but not yet available in U.S.A., co-authored by Martin and Paul Schweizer. See details with Lee's column. *Ed.*

Jer's Workbench

Jerry Slates
P.O. Box 2108
Wylie, TX 75098-2108
(972) 442-3910
RCSDigest@aol.com

Pilatus B-4, Part IV

Last month, I started strip planking the fuselage, and worked up to the area of the wing root. At this point in the construction of the Pilatus B-4, it was time to take a break, giving some thought as to how the wings should best be mounted onto the fuselage. There are a couple of ways to go. One method would be to simply glue the root ribs onto the side of the fuselage, drill a hole in the root rib, and insert the wing rod tube. However, what happens if I don't glue the root rib on properly, into the correct position? If not done properly, the root rib would have to be cut off, and the task of getting it just right would have to be done all over, again. Yes, I could make a set of metal clamps, clamp the wing rod tube in place, mount the wings onto the fuselage, and then check for the correct alignment. And since this sounds like the easiest way to go, I elected to go with the clamps.

First, of course, we'll need a set of wings.

The wings were constructed of white foam core, sheeted with 1/16th inch balsa wood. While I don't plan to cover the construction of the wings at this time, having discussed the topic in prior issues, if any of you are new scratch builders and would like to know how to construct a sheeted, foam core wing, please let me know, and I'll include details on the next model I build, or help you out if you're building along on this project.

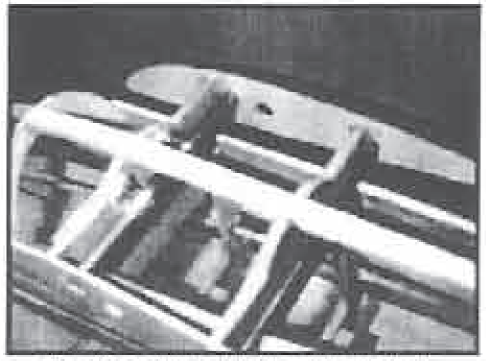
Having completed the wings, I made a couple of small clamps, clamping the wing rod tube in place as shown in Photos #1 and #2. Next, the wings were installed onto the fuselage and alignment was checked as to accuracy. As luck would have it, only one 1/64th inch shim was required in order to bring the wing into perfect alignment. This was easy to do, as it required that one of the clamps needed to be unbolted; the shim was slipped in place, and the clamp was bolted back on, again.

Now that the position of the wings has been determined, the root ribs have been glued in place, allowing me to begin strip planking, again.

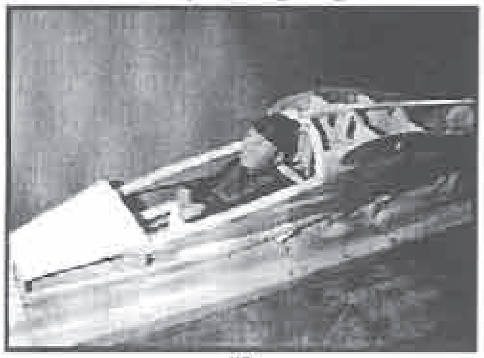
Once the strip planking was completed on the top half of the fuselage, the fuselage was then removed from the keel; all the stand-offs were cut off. Turning the fuselage belly side up, the remaining glue on each former was removed. Once done, the last stringer was glued in place on the bottom of the fuselage. Photos #3 and #4 depict the last stinger added, as well as a bracket constructed to hold the Pilatus' wheel, and how the wheel bracket was glued onto the fuselage.

Photo #5 shows the strip planking complete, and a nose block has been added. Rough sanding is now required and, when done, as shown in photo #6, the wing roots will be completed. By sanding the fuselage first, it should be easier to work around the wing roots.

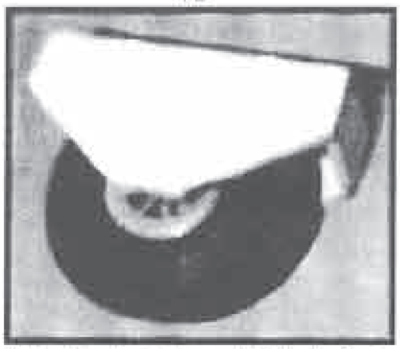
So, that's it for this month. I've got a lot of sanding to do! ■



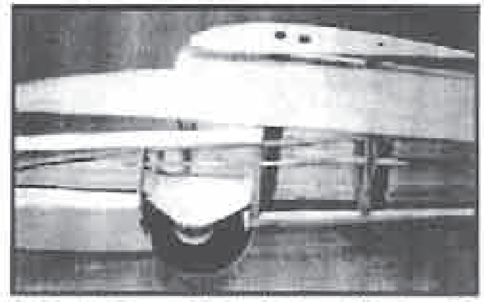
#1 - Note clamps holding wing rod tube.



#2

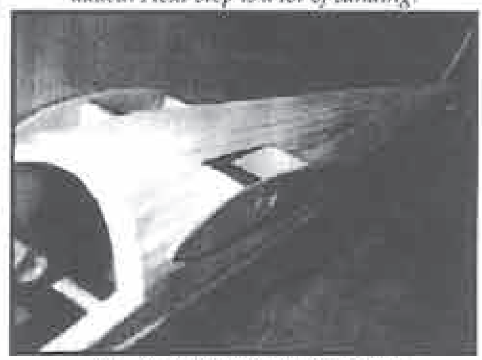


#3 - Wheel bracket to be installed into fuselage.



#4 - Last stringer added to bottom of fuselage after the stand-offs were removed and wheel installed.

#5 - Strip planking completed. Nose block added. Next step is a lot of sanding.



#6 - Root ribs will be back filled after fuselage has been sanded.

Building Along The Pilatus B-4

In October, 1998, Jerry Slates started building the 1/5 scale Pilatus B-4. Photographs depicting more detail, and in color, can be viewed at the *RCSD* web site; they're intended as an aid for those that are also building along.

A Bit of History

The full-size Pilatus B-4 is a popular, all metal, single seat, standard class sailplane, suitable for pilots who have finished solo flight, due to the simple handling characteristics. More experienced pilots also appreciate its good performance. The first flight of the B-4 prototype, designed as a private venture by Ingo Herbot, was in 1966. Pilatus, of Switzerland, took over, developed the B4-PC11, and its first flight was in 1972.

Current Plan Sources

Pilatus B-4, #MT 637-G
Bob Holman Plans
P.O. Box 741, San Bernardino, CA 92402
(909) 885-3959

Pilatus B-4, #MW2210
'98 - '99 Plans & Construction Guide
Traplet Publications, Ltd.
U.S.A.: (626) 836-6931
e-mail: general@traplet.co.uk
Web: http://www.traplet.co.uk

on the Wing

B²

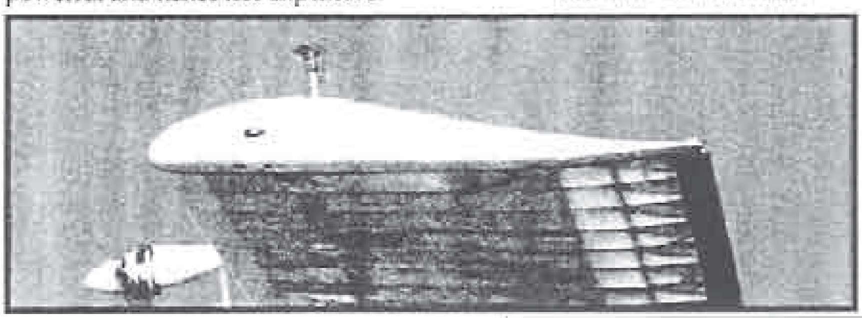
P.O. Box 975
Olalla, Washington
98359-0975
E-mail: bsquared@halcyon.com
http://www.halcyon.com/bsquared/

AeroVironment's non-polluting visitors to the stratosphere

AeroVironment, headed by Paul MacCready, is developing a number of "proof-of-concept" aircraft for a wide range of applications, including military and civilian surveillance, weather monitoring, and communications. Pathfinder, Pathfinder-Plus, and Centurion are solar powered radio controlled aircraft dedicated to high altitude, long endurance flight profiles. Such aircraft will eventually be capable of continuous flight for periods of weeks or months, relying on solar panels to both directly power flight motors and charge storage batteries to be used at night.

The performance of these aircraft, which look very much like grossly enlarged models for indoor flying, borders on astounding. Pathfinder, for example, flew to a record altitude of 71,500 feet in 1997. Pathfinder-Plus, slightly larger than Pathfinder, has flown to over 80,000 feet. Centurion, with a wingspan of 206 feet, more than double that of Pathfinder, will be able to fly at altitudes in excess of 100,000 feet.

Aircraft like these, acting as replacements for satellites, could collect weather data over extremely long periods of time, relay pager and cell 'phone data, and serve as surveillance platforms. Placement on station would be far less expensive than the satellites they would replace. Operating at much lower altitudes than satellites, radio transmissions would not need to be so powerful, thus allowing use of less powerful and hence less expensive equipment. Since they are much more easily recovered than satellites, on-board equipment could be replaced as soon as technologies improved.



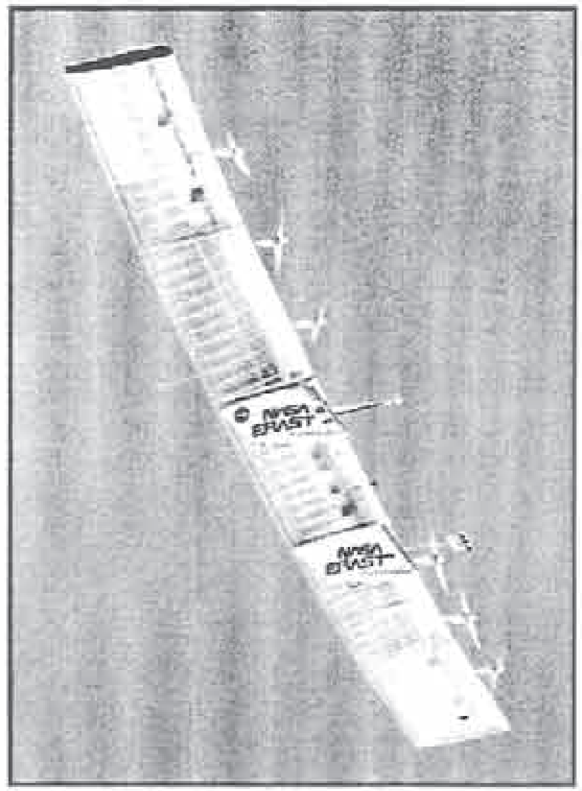
Pathfinder is a rather large aircraft, with a span of 99 feet. Construction materials for the constant chord wing include foam, carbon, and Kevlar. It's covered with mylar, and solar panels are mounted across the upper surface of the wing. The solar cells generate power from sunlight striking both the upper and lower surfaces of the solar cells. Flying over clouds therefore improves performance, as the light coming from below dramatically increases power output. Control surfaces are actuated by conventional model aircraft servos.

Lightness and strength are imperative in high performance aircraft like Pathfinder. The structure is primarily foam, with Kevlar reinforcement. Clear Mylar is used for the bottom surface covering.

Pathfinder-Plus was constructed by modifying Pathfinder in a number of ways. The wingspan was extended from 99 to 121 feet by replacing the original center section, 22 feet long, with a 44 foot section. This new center section utilizes the Centurion airfoil and a more efficient solar panel array. Pathfinder-Plus is powered by eight electric motors, two more than Pathfinder.

Centurion had its maiden flight on 19 November 1998 at Dryden Flight Research Center, Edwards, California. Initial performance met all expectations.

AeroVironment, Inc., of Simi Valley, California, is the primary contractor for Pathfinder, Pathfinder-Plus, and Centurion.

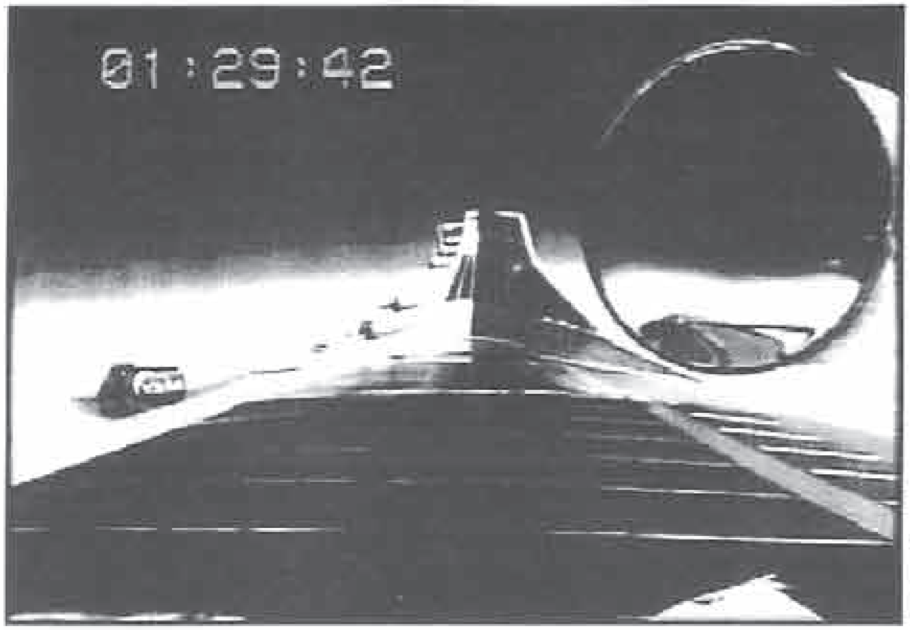


A beautiful photo of the Pathfinder which shows off its high aspect ratio constant chord wing and clear Mylar covering.

(Below) This small segment of a large photo of Pathfinder shows the airfoil to advantage. The reflex is noticeable but not severe.

PATHFINDER/CENTURION

Aircraft	Span	Motors	Record(s)
Pathfinder	99'	6 (~1,250w each)	50,500', 11SEP95 67,350', 09JUN97
Pathfinder-Plus	121'	8	80,285', 07AUG98
Centurion	206'	14	100,000' plus (potential)



This photo was taken from a camera mounted on the left wing tip of Pathfinder-Plus. All eight motors can be seen. Note the dark sky, evidence of the 80,000' altitude. The circular object on the right is a mirror so camera coverage approaches 360 degrees.

Current flight testing is being conducted by ERAST, NASA's Environmental Research Aircraft and Sensor Technology program, in conjunction with Dryden Flight Research Center, Edwards, California. The record breaking flights have taken place at the U.S. Navy Pacific Missile Range Facility (PMRF) at Kauai, Hawaii.

Sources:

Wurts, Jan. E-mail message posted to the RC Soaring Exchange (internet e-mail service) by Joe Wurts, 14 June 1997. (Jan was on site in Kauai for the Pathfinder record flight on 09 June 1997.)

AeroVironment web site <http://www.AeroVironment.com/area-aircraft/unmanned.html> and <http://www.AeroVironment.com/news/news-archive/news-pthfdr-newrecord/news-pthfdrx1-1.html>.

MSNBC News web site <http://www.msnbc.com/news/216567.asp>.

Dryden Flight Research Center web site <http://www.dfrc.nasa.gov/PAO/PressReleases/1998/98-64.html>.

Photos from <http://www.dfrc.nasa.gov/gallery/photo/Pathfinder/> and <http://www.AeroVironment.com/news/news-archive/news-pthfdr-newrecord/>

■

TECH TOPICS

Dave Register
Bartlesville, Oklahoma
RegDave@aol.com

Building Your Own Bow

If you're still with us from last month's foam cutting power supply discussion, then you're probably still serious about putting your own equipment together. That means you're a penny pincher (like me) and are looking for a few good ideas to do this safely but with your own skills. So, let's look into making a bow for foam cutting. This adventure actually takes us where you might not have expected to go - a brief digression into material science. But first....

The things we'd like to see in a simple cutting bow are:

1) Lightweight but rugged,
2) Simple and reliable means of connecting power to the bow,
3) Enough clearance to cut as deep a chord as you'll want,
4) Enough length to cut as wide a core as you'll want,
5) Some means of positively tensioning the cutting wire to eliminate 'sag' when the wire is hot.

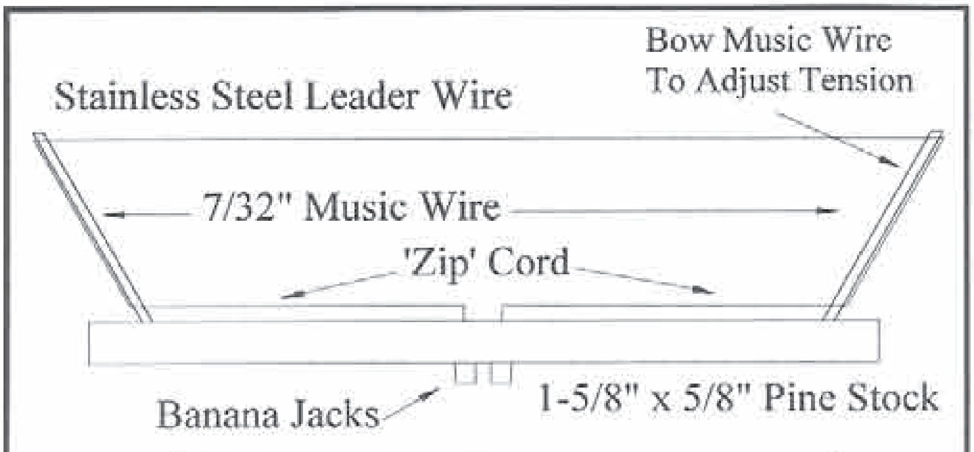
All of the above can be met with the simple bow shown in the accompanying figure. I first saw this structure described in an *RCM* publication on foam cutting. I've long since lost that volume, but for those looking for more information (albeit, somewhat dated), check in the publications section in the back of any *RCM* to see if it's still available.

The pine stock is readily available in 8 ft. or 16 ft. lengths in any building supply store, as is the 'zip' cord. I made mine capable of cutting 48" cores and have never used another bow since. Obviously, you can make several bows of different lengths from a single 8 ft. pine piece depending on your preferences.

The music wire is available from your local hobby supply. 7/32" is a convenient size due to the tensioning available. Larger diameter music wire would be appropriate for larger diameter cutting wire so you can 'tune' this system to meet your needs. The holes in the pine stock for the music wire are ~ 1" deep and angled outwards at about 30 degrees. I use ~ 13" length of music wire, which leaves 12" sticking out for mounting the wire. This easily cuts a 10" or slightly wider chord with no clearance problem.

The music wire is notched about 1/4" in from the tip with a Dremel carbide disk. This slot accepts the cutting wire. I've found that 2 wraps around the music wire, a twist around the cutting wire, two more wraps around the music wire and then twisting about 1" of the cutting wire back on itself will make a slip-free connection to the bow. After attaching to one end, bend the music wire to the appropriate position for tensioning (more on that later) and then repeat the wrapping technique at the other end.

The zip cord is run from the banana jacks



CUTTING BOW SCHEMATIC
(See text for details)

along the bow and out the music wire supports (taped appropriately with electrical tape), and then about 1" of the bare wire is twisted around the music wire connection at each end. You could tape the entire music wire lead for insulation or even cover it in shrink wrap if you want full insulation protection out to the cutting wire.

I've found banana plugs and jacks to be a very reliable means of connecting low voltage electrical circuits like this. You can find several styles of these at Radio Shack. The banana jacks are part number 274-725B and sell for $0.99. The banana plugs come in two styles. Part number 274-721C ($1.59) contains two separate plugs. Part number 274-717 ($2.59) is an integral two-plug connector. If you use this plug, the jacks must be mounted in the pine board on 3/4" centers. To mount the jacks, first cut the zip cord a bit longer than needed and solder one end of this wire to each jack. Then drill two 1/4" holes on 3/4" centers through the pine board. Run the zip cord through each hole and then smear the threads of the jack with a little silicone glue and shove them in, which might take a little twisting. When the glue sets, you'll have a permanent connector suitable for either style of plug. (This implies you're using the banana plug to connect to your power supply. If not, substitute the appropriate connector of your choice.)

Tensioning the Bow
A Little Basement Science

We mentioned we needed to do a little material science before finishing this project. That has to do with tensioning the bow properly. Obviously we'd like to have as much tension as possible in the cutting wire since it expands a little when heated (as determined by the Cte or Coefficient of Thermal Expansion of the material). Although this isn't a lot of movement, any loss of tension during cutting will allow the wire to sag so that the center of the wire lags behind the edges. This leads to scalloping or inaccuracies in the final wing section.

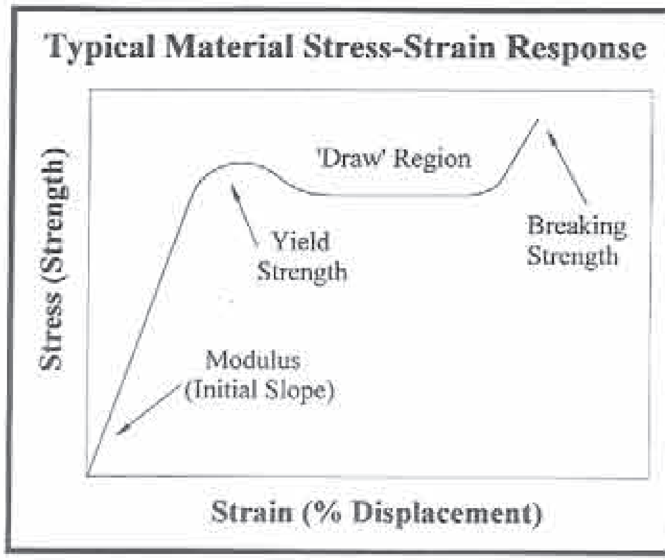
How much tension is enough? In most cases, especially if you're using the leader wire noted in last month's column, you know the breaking strength of the wire ('test' rating for fishing wires). But that's a deceptive number because the wire actually fails at a value significantly lower than the final breaking strength. Refer to the diagram on material properties for a brief discussion.

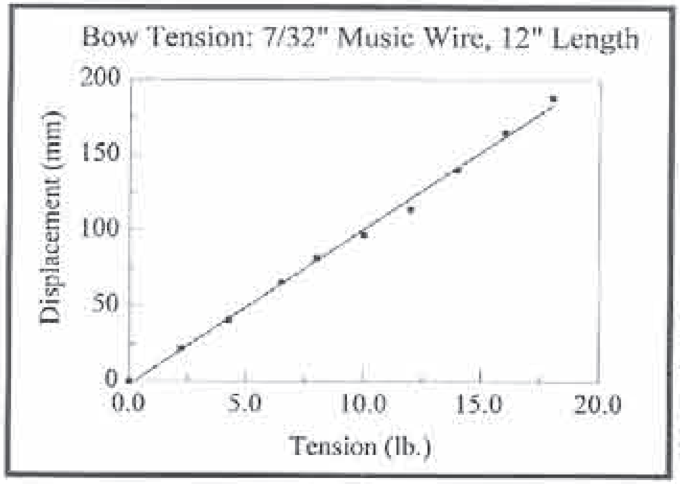
The stiffness of any material is described by the initial slope of the stress strain curve for that material. The steeper the curve, the stiffer the material. This number is known as the Young's modulus or modulus of elasticity (OK - compliance for the hard core ME's among us!). It's measured at or very near to the origin of the curve and is called an elastic modulus since in this area once the stress is relieved, the strain (or displacement) fully recovers to its unloaded length.

Now out at the other end of the curve we have the breaking strength of the material. This is the number usually quoted for the material strength. Although it's good for bragging rights, it's a totally useless number for design purposes. How come? Because somewhere between the initial loading and the breaking strength, the material will yield (that point is noted as the yield strength). At this point, the material physically deforms and will not return to its original unloaded length. So you really want to design to the yield point and not the breaking point.

For most materials, the yield values (stress and strain) are quite different from the breaking values. Two notable exceptions come to mind. Consider the common rubber band. Definitely a low modulus material, but essentially completely recoverable in physical dimensions up until it breaks. The yield stress and strain are the same as the breaking strength and strain. At the opposite end of the spectrum, consider the composite wing structures we're using these days. These are brittle materials but with incredible stiffness. However, they have very little strain to failure (typically ~ 3%) and the yield and breaking points are essentially identical. That's why your composite birds give you no warning of failure in the air. No flex, no flutter. They just go 'boom' in the sky.

Metal wires used for cutting foam are intermediate to these examples. They are quite stiff but will definitely yield or 'draw'





at some load level less than breaking. To prove this point, I set up a little cantilever experiment in the basement and used a coffee can and lead shot to determine the breaking and yielding points for that 0.016" leader wire that I like so much these days. Indeed, the breaking value was ~ 20 lb. (as advertised), but the onset of yield occurred at around 14 lb. If you let the wire sit under an 18 lb. load, it will draw almost 40% with a consequent loss in diameter from 0.016" to 0.013" (as measured with my micrometer). Definitely not a situation conducive to good tensioning in the bow.

But the problem gets a little more complicated since most materials get weaker when they're heated. So we set up the cantilever again, but this time running enough current in the wire to reach a good cutting temperature. At this point, the break point is now about 14 lb. and the yield point is about 10 lb. So putting this all together, I'll want to tension my bow at around 7 lb. (~ 50% of the breaking strength when hot or ~ 70% of the yield strength of the material). Since this measurement might be a little awkward for most folks to do, a good rule of thumb would be to tension the bow at about 1/3 of the room temperature breaking (or 'test') value of the leader wire. In this case, that would be about 7 lb.

Final Setup

Now that we know what kind of tension we can support, finishing the bow is quite easy. To set this up, hang an empty coffee can from one end of the bow with the other in contact with the floor. Measure the tip-to-tip dimensions of your bow and then add weight to the can. Measure the opening for several different weights and then draw a graph of your results. An example using my bow is given in the attached figure. As you can see, the 7/32" music wire is easily capable of exceeding the yield strength of my wire (and did in a couple of trials).

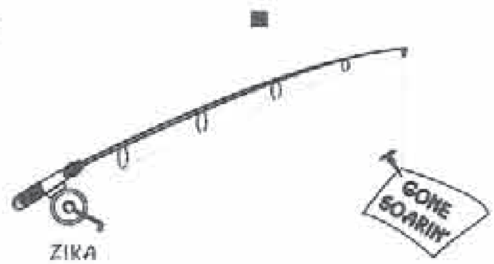
From this graph it's apparent that for 7 lb. of tension, I want the total distance between the music wire ends to be about 70 millimeters less than the unloaded bow. I've got this set up on a piece of scrap 1/2" PVC tubing and can now reset it to this point anytime I need to change wires.

As a final touch, you may want to add a small wheel in the middle of the bow as is done with the Feather Cut™ system. Simplest way to do this is head to your local hobby store and buy a steerable tail wheel. Yeah, I know, you've just contaminated the purity of the sport with some gas stuff. But it's cheap and works pretty well, so swallow your pride and be done with it. If you go this route, I'd recommend using a low profile tapered wheel rather than a normal wide tread. The wide tread ones tend to keep steering in the same direction and can throw the tracking of your bow off when you do taper cuts.

We're almost through with this series. I'll wrap up next month with a discussion on setting up templates and some of the materials recommended for making them. I'll also share Dave's secret template technique for getting exceptionally smooth cuts. See you in February!

Another Source for Foam Cutting Wires & Power Supplies

Last month, we discussed foam cutting wires and power supplies. Wing Manufacturing is another source for foam cutting power supplies and bows. Although they do not supply a 'drop arm' or other type of semi-automated cutting device, they do have the bows and a power supply for cutting by hand. Check them out at their web site (http://www.wingmfg.com) or give them a call at 309-342-3009.



THE NATURAL SIDE OF THERMAL SOARING

By Lee Murray
1300 Bay Ridge Rd.
Appleton, WI 54915
(920) 731-4848 (after 5:30 p.m.)
lmurray@athenet.net
http://www.athenet.net/~atkron95/pcsoar.htm

I believe my interest in gliders began early when my dad made me a glider from orange crate wood. Soon, I progressed to balsa hand launch models, a towline model and control line power models. I didn't do much flying while in college, graduate school, or early in my career as a chemist. A job change in 1976 brought me to Wisconsin. I rekindled my latent interest in modeling to occupy my time during the long winters. My interest in things scientific led me further into understanding sailplane performance and using a personal computer. This was the birth of LJM Associates and PC-Soar, a performance analysis program for R/C sailplanes. My quest has continued to understand the other side of soaring performance, the role of weather conditions.

I've been indexing *R/C Soaring Digest* since its start in 1984, and have been an occasional contributor on various topics, having written several articles on soaring performance. I'm taking on a new roll as a writer of this column, looking into the environmental contributions to thermal duration soaring. In a way, the column began with an article that appeared in the August '98 issue of *RCSD*, in which I questioned why soaring was so good on July 25th of that year. That question triggered a discussion with Martin Simons and Joe Enhuei, which led me into an in-depth analysis on instability in the lower atmosphere, where we fly. The first article for this column is written by Martin Simons, a well known authority on the subject, whose writings include popular reference books such as "Model Aircraft Aerodynamics", "Airflow", "Model Flight", "The World's Vintage Sailplanes 1908-45", "Slingsby Sailplanes", "German Air Attache", "Gliding with Radio Control, A Beginner's Guide to Building and Flying Model Sailplanes", and "Sailplanes by Schweizer", a recent release co-authored with Paul Schweizer. We're very pleased and honored that he has found the time to assist in the initial development of this column.

Future columns, focusing on these and related factors, will build on the information gathered from my study of July 25th and enable those of you with like interests to do similar studies using the Internet.

Thermals, Moisture and Lapse Rates

By Martin Simons
Stepney, South Australia

Introduction

Thermals are convection currents. The ground (or sea) is heated by short wave radiation from the sun which then passes its energy to the air, chiefly by direct conduction. Water vapour in the air intercepts some long wave heat radiation from the ground, so humid air tends to warm up more rapidly than drier air, but this is not a very large influence. The air heated from below becomes buoyant and rises, not usually en masse but as discrete plumes or sometimes roughly circular blobs or 'bubbles' which may, as they rise, develop into rising vortex rings.

Whenever and wherever the sun's energy warms the land (or body of water) convection will occur, although the rising currents may not be sufficiently powerful and organised for us to be able to use them. Nevertheless, the soaring pilot should consider it strange indeed if there are no thermals.

Since in summer solar heating is usually more intense, there are on average more thermals than in winter. However, it is not so much the absolute temperature that makes the thermal, but contrasts in temperature from place to place. When the land becomes more or less uniformly very hot everywhere, as in a desert region under cloudless skies, thermals may not be well organised and become difficult to use. The fierce heating causes a large number of small thermals to develop, each of which may be short lived and turbulent. A very crude analogy is a pan of water boiling very hard and fast, with a myriad of hot but small and irregular bubbles, compared with a slower, steadier warming, more organised with a regular system of well defined currents. However, no generalisations are valid for all situations. As shown below, the temperature structure of the air-mass in a particular region is what may make any particular day good or bad for soaring. Good soaring days are not uncommon in winter, while summer can produce some bad situations.

Assuming for the moment that the sunlight arriving in a particular region is spread more or less evenly, the nature of the surface has a direct effect on the temperature reached in the contact zone with the air. For example, a light coloured surface, such as snow, reflects rather than absorbs radiation. The surface temperature does not rise much. The same is true, to a much less extent, of any light coloured, reflective surface such as white roof tops, and white limestone rocks; while dark surfaces, like recently ploughed land, dark rocks, bitumen roads and runways, absorb radiation readily and become hot quickly. Some of this heat passes to the air and a thermal is very likely to arise from such a source.

Wet and dry land

The specific heat capacity of water is greater than that of dry soil or rock. That is, it takes more energy to raise the temperature of water than to raise the temperature of dry land by the same amount. So lakes, swamps, or areas of wet soil, in sunlight heat up more slowly than adjacent, drier areas. Moreover, the warming of the water by the sun encourages evaporation. This itself tends to lower the air temperature above the water because evaporation takes energy. In addition, since water is liquid, it has its own motions and currents that may carry heat away. For instance when a lake or swamp drains into a river or canal, energy is removed downstream and cooler water comes in from tributaries, all tending to keep the lake water cool. Hence air over the sea, a lake, marsh or sod farm during the hottest times of day is normally cooler than over the dry land.

(It is a fact that air containing water vapour is less dense than dry air and tends therefore to be more buoyant. The water evaporating from wet land areas reduces the density of the air locally by a small amount, but the effect is small compared with the general cooling effect. It has to be remembered also that air in the atmosphere is never totally free from water vapour, so the comparison is not between totally dry air and very humid air, but between air which is slightly more humid than the rest, but considerably cooler.)

However, as the day draws on towards evening, the specific heat capacity of the various substances acts in the reverse sense. The dry areas that absorbed heat quickly during the sunlight hours, also lose it quickly when the sun begins to set (or when cloud obscures the sun). The wet areas lose their heat more slowly. So as the general temperatures everywhere begin to drop, they do so less over the wet lands than the dry. The air over lakes, rivers, sod farms, etc., is warmer than over the dry regions, and thermals may well develop over areas which were unproductive during the hotter periods.

Dry and saturated adiabatic cooling

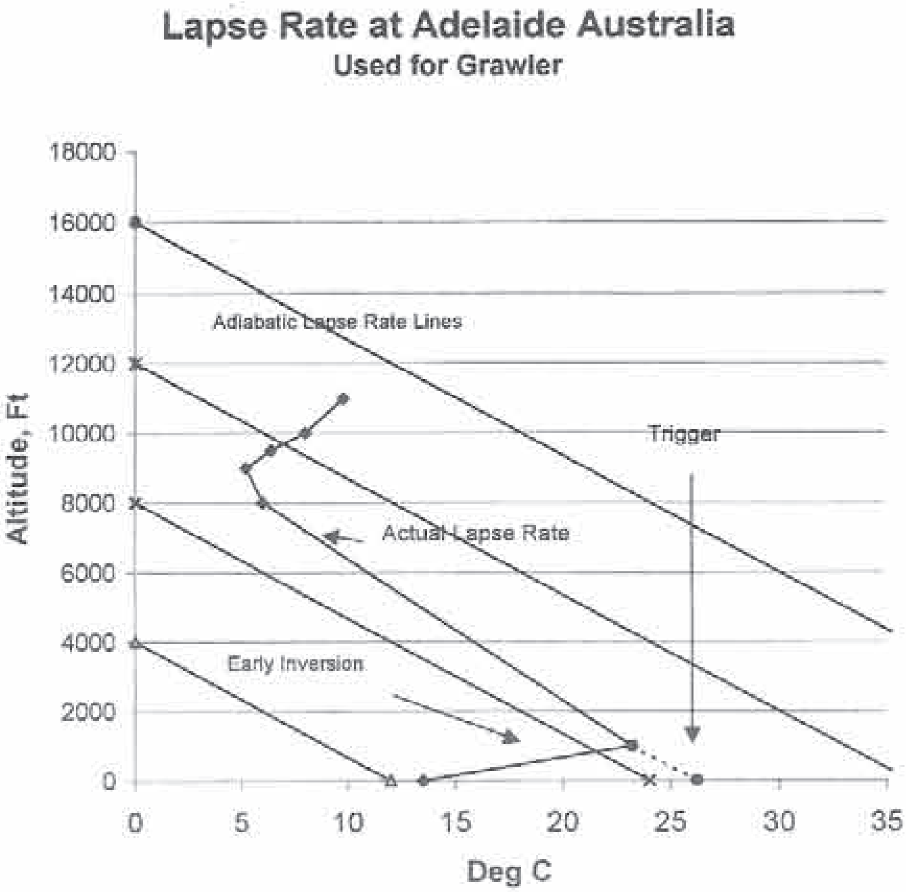
When the air in a thermal begins to rise, it cools at the dry adiabatic rate close to 3 degrees Celsius per thousand feet. [Also, -9.8(C/1,000 meters, 5.4(F/1,000 Ft.).] This is not affected by any moisture content in the air, unless the cooling brings the air to its so-called 'dewpoint' temperature (see below). If the air in the thermal at ground level is at a temperature of 30(C (86(F), and it rises to 3,000 feet, it cools to 21 degrees C. This is a constant. If another package of air on another occasion and another place starts at 20 degrees and rises to 3,000 ft., it will cool by nine degrees to 11, and so on.

On the kind of chart used by meteorologists, the so-called Tephigram (T for temperature, Greek letter phi for entropy), a series of straight horizontal lines, called entropy or dry adiabatic lines, represent this physical constant.

Glider pilots use a similar, slightly simpler kind of chart on which the entropy lines are drawn diagonally, but the principle is the same. On any chart of altitude versus air temperature, a line showing a 3 degrees per thousand feet rate of cooling, is a dry adiabatic line.

If the thermal rises far enough it will cool until it reaches its dewpoint. This is the temperature at which the moisture contained in the air condenses and forms a cloud. There is always some moisture present in the air and the amount may be measured easily by comparing the readings of a wet bulb thermometer with an adjacent dry bulb. (More of this below.)

When the dewpoint is reached, the energy that was used to evaporate the water and



turn it into vapour, is returned to the air. (This is the 'latent heat of condensation'.) The heat released to the air by condensation, reduces the rate at which the rising air cools. It now follows, instead of the dry adiabatic, the saturated adiabatic rate of cooling.

Saturated adiabatic lines are not straight on the Tephigram, since the saturated rate of cooling varies with the local pressure level in the atmosphere. But sufficiently good results for practical use over the first few thousand feet of altitude, are obtained if the saturated adiabatics for a particular region on the earth are charted as straight lines, but at a different slope from the dry adiabats, on the simplified chart. A typical saturated adiabatic cooling rate for South Australia is 1.25 degrees per 1,000 ft. (-4.1(C/1,000m).

The precise figures for the saturated adiabatic cooling are not especially important for glider pilots. But it is significant that when a thermal has risen far enough and cooled sufficiently for it to reach the dewpoint, if it rises any further the rate of cooling of the air will be much less and the strength of the upcurrent inside the cloud is likely to increase. For model soaring pilots, this can mean trouble. If a model has climbed high enough to reach the base of the cumulus cloud forms when the thermal reaches the dewpoint, it is quite possible for the model to be 'sucked in' and disappear. It may be carried up even if it is totally out of control.

The actual moisture content of the air at ground level, varies from day to day and hour to hour, depending mainly on the history of the air mass, whether, for example, it has recently passed over a large body of water or a dry desert, and whether it has recently descended from high altitudes in response to a general shifting of the weather pattern, high and low pressure zones, etc.

The moisture content may be expressed in grammes of water per kilogramme of air. The amount of water that a given quantity of air is capable of absorbing as vapour, depends chiefly on the temperature. Its capacity may be stated in terms of its relative humidity: the percentage of water actually contained, compared with the amount it could absorb at this temperature. Thus 100% indicates the air is saturated (at its dewpoint), 50% means it could hold twice as much water as it in fact does and so on. Hot air can absorb more water than cold. Warm air which has passed recently over an ocean is likely to have a high water content, air which has come from a desert region, even though very hot, is likely to be comparatively dry. Humid but cool air reaches its dewpoint after a relatively small further cooling, so clouds and even fog will form at relatively low altitudes. Air with little water vapour will have a much lower dewpoint temperature and any clouds will then be high, or may never form at all.

The lapse rate

At most major airports and weather stations, and at many (full scale) gliding clubs, it is a matter of routine to make an atmospheric sounding early in the morning to measure the temperature of the air at altitudes from the ground upwards. It is also normal to use wet and dry bulb thermometers to establish the relative humidity of the air and from this, using a standard table or chart, to find the dewpoint temperature (i.e., the temperature at which any moisture contained in the air will condense to form cloud).

The measured temperatures are usually plotted on a chart, the Tephigram of the meteorologist or the simple altitude/temperature chart at the gliding club. The resulting line on the chart represents the temperature lapse rate and its shape is of great significance.

First, in general terms, if the lapse rate line on the chart has a slope generally less steep than the dry adiabatic lines, the air is unstable. Any thermal that begins to rise will cool at the dry adiabtaic rate and as it rises, it will find itself in air a good deal cooler than itself. It will become increasingly buoyant and rise faster. There will be strong thermals. If the air is relatively humid, as found from the wet and dry bulbs, the strong thermals will rise to their dewpoint, clouds will form and in the clouds, cooling now at the saturated adiabatic rate, the upcurrent will become even stronger. The clouds are likely to be large, fast growing and, if the instability continues aloft, thunderstorms are almost certain.

If the temperature measurements show that the lapse rate is greater than the dry adiabatic, the atmosphere is stable. Any thermal that begins to rise will find the air around it warmer than itself and will rise no further. This will be bad for soaring.

As a rule, any real temperature sounding does not show a wholly simple picture, either unstable or stable. The air nearly always had layers where the lapse rate changes.

As a rule, after a night when the ground has cooled and hence has cooled the air just above it, there will be low level temperature inversion. That is, as the weather balloon or aircraft ascends the air temperature rises. This is because of the night-time cooling of the land. The air is stable below this early inversion. At some height, usually, the measured temperatures will begin to fall and there may be a zone of instability. At some greater height again, there is often a high level inversion, so convection will not go above this level.

As the ground warms up during the morning, if there is the usual morning low level inversion, thermals will begin but they will rise only a few feet at first.

In these early conditions, the small thermals below inversion level are often quite large enough to be used by model sailplanes. They tend to be small and they rise only until they run into the warmer air above, perhaps a few hundred feet. But they often provide several hours of excellent model flying conditions before the full scale sailplane is even wheeled out of the hangar. The concept of 'trigger' temperature does not arise. A warm patch on the ground will produce a thermal, which will probably form into a plume, rise some way and then disperse against the 'roof' of warmer air above.

As the ground temperature increases in the sun, the thermals will rise further before they find the air warmer than themselves. If the ground warms up sufficiently, at some time of the day thermals will get through the inversion and rise into the air above. The ground temperature at which they do this is commonly termed the 'trigger' temperature. When the thermometer reaches this figure, the full scale sailplane will be able to reach high altitudes and perhaps venture across country.

By watching the rate of temperature rise on the ground, it is possible to predict with a fair degree of accuracy, when the trigger temperature will be reached. While waiting, the sailplane may be rigged, inspected, ballast may be loaded in, maps may be prepared and the pilot made ready for take off at a time very soon after the expected 'trigger' time.

On the other hand, it may be, on an overcast day for example, with a strong low level inversion, that the trigger temperature will never be reached and the glider will not leave the hangar. Also, if some change in the weather is expected, such as the arrival of a front, or an incursion of cool sea breezes, the full scale sailplane pilot may be frustrated. However, model soaring may continue below the inversion.

An illustration from last Friday

The best way to illustrate all these features is to describe briefly what happened last Friday, 20th November, at Gawler. Apart from routine training flights for beginners, a group of six experienced pilots were hoping to fly in sailplanes including a Hornet, two Discus, DG 200, LS 3 and Ventus B. (I was in the Ventus.)

The early temp. trace, obtained by fax from Adelaide airport, was as shown on the accompanying chart. There was a very pronounced low inversion up to 1000 feet. We had a fairly cool night. As we wandered around gossiping at about 10.30 a.m., the training two seaters doing circuits found no lift at all. None of us had a small model glider but if we had, it is almost sure that there would have been small thermals to use but they would not rise very far.

Above 1,000 ft. the lapse rate was slightly stable, that is, the line sloped slightly more steeply than the dry adiabatics. So even if a thermal reached 1000 ft., it would soon run into air warmer than itself and stop. At about 8000 feet the lapse rate became even more stable, and higher still there was another strong inversion, heralding the arrival from the west of a high pressure ridge, expected for Sunday.

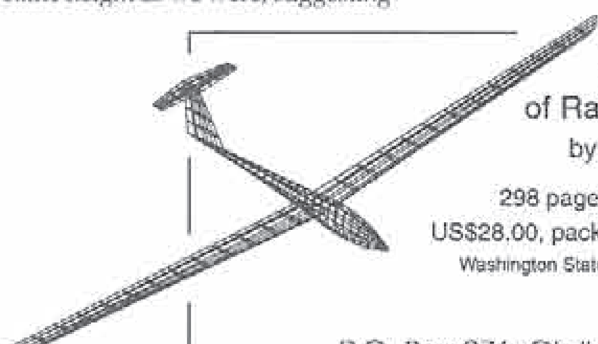
Fortunately, there was no sign of any cloud early in the day. Checking the dewpoint temperature, we found that clouds would not form at all unless a thermal reached something like 9,000 feet and that did not seem likely, at least in our neighbourhood.

In the unobstructed sunlight the temperature on the ground was rising steadily. We reckoned it would reach about 26 degrees by mid-day, and (tracing the dry adiabatic from this temperature) this would allow thermals to get through the 1,000 foot inversion from about 12.30 onwards. This, then, was the 'trigger', and we prepared to get ourselves launched at about 12.30. I myself thought another twenty minutes later would be better so took third position in the line.

However, a thermal starting at only 26 degrees would not get very high because the air above the inversion was stable. At 27 degrees it would probably get to 4000 feet - if the ground temperature reached thirty degrees, we ought to be able to follow the dry adiabatics up to 8,000 feet. I doubted if the airfield would ever get to 30. It is very common at this site for a sea breeze to come in early in the afternoon, dropping ground temperatures rapidly and, so to speak, cutting off the thermals at the bottom for several hours. However, I thought if we could get away inland, the ground far from the sea would have longer to heat up and we would get better lift. The idea was to scratch away from the home base as soon as we could and fly inland some distance in the hope that temperatures further from the coast would be higher. There would be a 'window of opportunity' for an hour or so, after reaching trigger temperature and before the sea air arrived.

The first pilot to take off was a little too early and, as I was struggling at 2,000 ft. in my first weak thermal at 12.50, he was landing again, having failed to find anything. (His second try was successful.) A second thermal to 3000 ft. was marked for me by another sailplane climbing rapidly about 2 km away, and we headed off north eastwards. 6000 ft. was reached in a strong thermal over a small town about 20 km out. I heard on the radio that the sea breeze had already come in and the runway in use was changed. We had got away in time. From there, still believing ground temperatures would be rising further inland, I pushed on to find a series of better and better thermals until after about forty minutes flying time I was 50 km from base and finding thermals to 8,200 ft. Something like fifty kilometres further inland there were small cumulus forming just about the same height as we were, suggesting that conditions in that direction would be even better. A couple of other sailplanes joined me and one of them pushed out further. I did not see him again but he probably went to those clouds and flew home from there later in the day. I wandered around for a while between 7 and 8,000 ft. and then 'final glided' back to land into the sea breeze after about 2.5 hours. ■

Gordy's Travels - Optima Battery - Dual terminals - handy for hooking up fast chargers or retrievers.



GORDY'S TRAVELS

"Spiraling Up Into the Air"

Yep, a New Winch Battery Technology!

by Gordy Stahl
Louisville, Kentucky
GordySoar@aol.com

As usual, you never know where I will go with this column and this time it is not a destination but a thing that I visit: a new winch battery design, the Optima, Spiral Cell Technology lead acid battery, that acts more like a SCR Ni-Cad!

I had followed the bread crumbs and threads of information about winch batteries over the years, so I guess my curiosity was already piqued when I first noticed an unusual battery at various automotive supply locations around the country. It sort of looked like a six pack of really big flashlight batteries stuck together in a plastic case. While most auto batteries are flat on the sides, this one clearly has separate segments. I had glanced at the brochure, which called it an Optima Battery. The cutaway picture depicted a rolled or spiral element design, instead of the usual flat element segments. The claims were pretty amazing; I even saw a picture where the battery had been shot with a bullet to prove its toughness! Plus, whenever I saw one at the store, it was mounted on its edge, side or upside down! (Don't confuse the Optima with gel cells!)

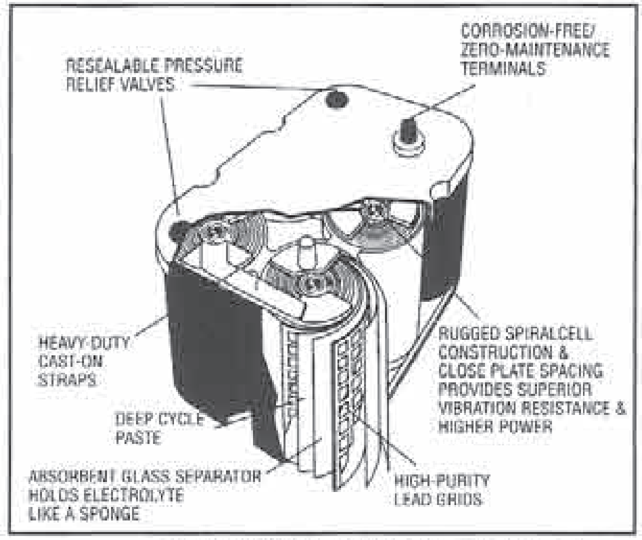
The price was two and a half that of the conventional discount-house, deep cycle batteries we usually use. So, I figured there had to be something special about these cells. Of course, the clerks I met were no experts and the best they could come up with was, "They're better."

So, I got a brochure and contacted the company to find out more. According to the contact, the idea is that typical lead acid batteries are somewhat fragile as the vertical plates take a lot of abuse. They all were made for right-side-up installations. While some were 'sealed', their internal construction still relied on being 'upright'. The sealed 'gel cell' types didn't provide the kind of energy we needed. Some of those batteries are constructed to handle vibration shock loads and some were suited to high current loads versus continuous loads. Mostly, they are variations on the same theme.

The Optima seems to be a whole new theme, but has to fit into categories of the 'norm'.

The 'spiraled' element is thinner, longer and more secure. So it is suited to dropping and bumping, like when we drop it on the field, or throw it in the trunk of the car or on the garage floor. It also spreads out heat and allows for more reactive surface area. That should mean that a bad spot on an element is less likely to affect performance, (as indicated by the bullet wounded advertisement).

Like conventional batteries, there are six individual cells; but unlike conventional batteries the cells are round with far more exterior 'jacket' area exposed for a more consistent temperature in each cell during use or sitting on the shelf.



Those attributes seem like they would be real benefits to our application since our batteries are usually sitting in the sun with little or no wind for cooling. Also, and unfortunately, our winch batteries spend a lot more time sitting in the garage than at the field. That is another place where the Optima excels.

The Optima Battery ads claim that it has a phenomenal standby life, which includes retaining its charge for extremely long periods of dormancy (no need to keep a trickle charger going). That spiraled element's ability for improved dissipation of heat allows, and actually enjoys, high amperage charges; in fact, they thrive on 10 to 30 amp charges. (If I read the information correctly, they can be charged in 35 minutes, from dead, up to 100 amps!) That comes in handy for quick recharging. Those rates tend to cook the plate type batteries. A peak charged Optima can be detected by feeling its side; warm is done! Hot is still not good!

They come in an assortment of sizes, storage capacities and connection configurations, as well as in 'starter' and 'deep cycle' designs. Starter cells provide more <u>one</u> time power bursts (not to be confused with our use).

Deep Cycle Batteries are for continuous draw applications, but that is another place where Spiral Cell Technology seems to provide an advantage. The longer, thinner surface of the elements, as well as the higher cooling surface area, both add to their value for use in sailplane winch applications.

Our winches pull huge currents, but not for very long, so it would make sense to have a 'starter' designed battery. EXCEPT that we don't just do it <u>once</u> every hour or so. We do it repetitively, all day long. So, it would seem that a 'deep cycle' design would be the right choice. NOT! Why not? Well, they are made to provide a continuous flow of energy, right? Yes, but we aren't using them to power golf carts or wheel chairs that use relatively small current loads.

We see the same type of demands on our ni-cads. High powered electric ships pulling 60+ amps, for short periods of time, generate huge amounts of internal heat. Their cadmium is 'glued' together with a low resistance, heat stable material. On the other hand, our radios call for consistent long term demands of relatively low current draws. A less resilient 'glue' is used, because heat isn't a factor; more cadmium is present, so more energy can be stored; but, output amperage is also reduced. Those cells offer long life output, but no 'punch' and slow charges. The motor type, or high output, fast charge means fast discharge, less capacity and the ability to live under high generated heat.

Our winch battery application actually falls in between the 'starter' and 'deep cycle' typical design applications. Optima says they shine in this area, with their Spiral Cell Technology. It allows a lead acid battery to provide higher voltage (that's winch drum speed) all the way down its discharge curve. It allows for better cooling of the element surfaces and more surface for the electrolytic reaction. Since the actual construction is more physically stable than plate style batteries, the Optima can take more banging. Another handy feature is that the Optima doesn't care how it sits; mount it upside down, edgewise, or on its side.

They use a high grade lead, which adds to the lifespan of the battery; it can actually sit for up to one year, unused, and still start your car! The advertisement states that the Optima battery has been proven to exceed 350 complete discharges and recharges - up to 50% more than plate style batteries.

My explanation may not be all that scientifically accurate, but the analogies are close enough for us to understand the general value of the Optima Battery:

- Long shelf life.
- More winch power all the way down the discharge curve.
- Not fragile.
- Spill and corrosion FREE.
- Loves to be charged at high currents. (Can be charged in an hour at 30 amps.)
- Doesn't need trickle charging; holds its charge while stored.
- Heat dissipating.
- Cool looking.
- Up to 50% more complete discharge cycles than conventional batteries.
- Unlike Gel Cells, does not require special chargers.
- Warranty is full replacement during the first year and pro-rated on second year.

I divided the benefits into the cost, and I think you will see why I got one. I really like not worrying about acid on my clothes, car or terminals.

You can find out a little more from their website at <http://WWW.Optimabatteries.COM>. The batteries are available in your area at Battery Plus and many of the automotive parts houses. Optima's phone number is (303) 340-7440.

See you next trip! ■

LANDINGS

This is the year before the millennium two thousand. That number, 2000, has a satisfying roundness to it and just because our mathematics is largely based on the decimal system, many events of all types will be held in the name of the brave new century. The same will hold true for the scale sailplane scene. We will see new airtow, slope and winch fun flys, and perhaps someone will even host an aerobatic event or two!

It seems that every year new frontiers are explored and the year 2000 will no doubt be a special year for this! Last year saw state-of-the-art, bent wing birds take to the air in great numbers: the Discus II and many others. I expect that we will see most of the newer full-sized sailplanes fly polyhedral wings while the upgrades for older types will still be in the form of the winglet.

I visited friends at the Dansville Municipal airport last fall just in time to see two twin ASW 15s come in for landings after a couple of hours of flying. Just as soon as they came to a stop, both pilots sprinted for the men's room.

They *HAD* to land....

All advances in sailplane performance enhancement seem to be in the area of flying. Anyone want to invent something to help out these guys?

Speaking of landings, here's a well-known (and sometimes unfortunate) law of aeromodeling: "whatever goes up comes down". It occurs to me that we haven't covered the most important maneuver of all – the landing. Although we still have a few more things to cover, let's talk about landings this time.

The LANDING
(moderately difficult for everyone)

So. What's a "Landing"?

For our purposes, let's agree that a landing is a controlled and well-placed descent with a gentle flair, touchdown and rollout to a stop on your landing spot. What we're striving for here is a nice, smooth touchdown, a landing rather like the ones I saw at the Dansville Municipal Airport the other day. Pretend you're in the cockpit when you touch down. Was it painless? Was it a great landing? If so, that's the way to do it!

Most sailplanes have one excellent tool to help make good landings: the spoilers. In some respects, the towplanes have a similar landing aid: the throttle. Both of these very handy devices help control the aircraft's descent. To a lesser degree, the flaps and ailerons come into play (more on these later).

The Tools of the Trade

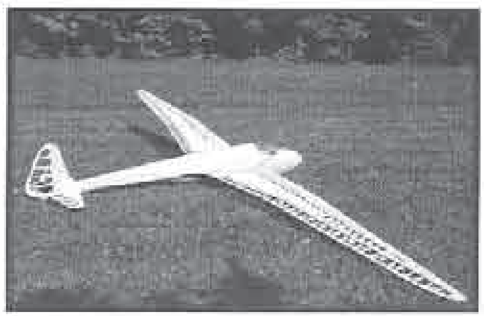
It's harder to make consistent good landings if you have fewer controls – rudder only, for example. The more control you have, the easier it is to land. In general, gliders with rudder, ailerons, elevator and spoilers are the easiest of all to get gently back down to Mother Earth.

Most powered aircraft don't glide as well as sailplanes (although a "dead stick" landing presents no problems). This can be an advantage when landing. That's why powered aircraft don't need spoilers. Another great advantage is that (with throttle) they can come around for another approach if necessary. By the way, there's no better way to learn how to land than practicing approaches and touch-and-goes with a powered aircraft (a powered sailplane will also do the trick nicely). You can get in 20 or 30 approaches in just a few minutes! *Practice makes perfect!*

The Ground Effect

One landing problem unique to sailplanes (because they glide so well) is the "ground effect". When flying a foot or so off the ground, the air can no longer be compressed downwards and this makes the sailplane wings fly, fly and fly – just when you want them to *stop* flying and get back onto the ground!

The ground effect won't present much of a problem for your towplane (because the chances are it won't float so well), but it's quite another story with your high performance sailplane. This is where spoilers are worth many times their weight in gold.



Photos from Tom Schmidt – scratch built Fafnir II, an interesting scale project.

The Spoilers

Because of the ground effect and the fact that they fly so well, gliders need some way to kill the lift to make landings easier. This is where the spoilers come in.

Sailplanes have wonderful glide ratios - meaning that for every foot of sink, the glider can fly forward for quite a long distance. The best full-sized sailplanes claim glide ratios in excess of 60 to one. That's 60 feet forward distance for every foot of sink. Think of it! From 5,000 feet up, some sailplanes can fly 60 miles or more with no lift!

As you might expect, some of our better scale models (especially the larger ones) emulate their full-sized counterparts and also have superb glide ratios. This is great for thermalling and flying in very light slope lift, but when the time comes for landing, this super ability to fly can sometimes make it difficult to get back down to Mother Earth. The spoilers help solve that problem.

When deployed, the spoilers stick out of the wing disrupting the airflow on the wing, making it easier to land. Appropriately also named "airbrakes", these very handy dandy landing tools kill the lift and help you park your sailplane where you want it.

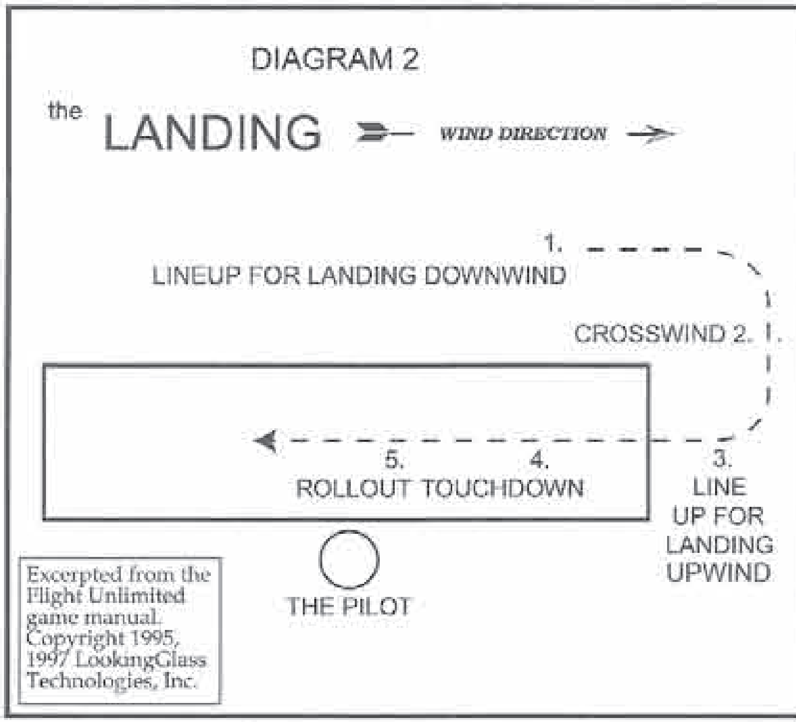
Other Ways to Kill the Lift

Some (model airplane) pilots use both flaps and ailerons when landing. The ailerons, when deployed in the up position on both wings at the same time, help to kill the lift. Mostly you will see this done on competition gliders, not the scale birds.

Very few full-sized sailplanes have flaps and almost none use the "crow" position with flaps down and ailerons. I am not entirely sure why this is, but I suspect that when you're in the cockpit and your life is on the line, you don't want to mess with the aerodynamics too much. You certainly don't want to tip stall and crash! It might interest you to know that most full-sized sailplane crashes are caused by unwanted spins. These unwanted stalls near the ground are usually caused by pilot error. The low altitude spin injures more pilots than any other maneuver.

However you kill the lift on your glider (and not kill yourself), a controlled descent sure is a BIG help with landings! The more help you get the

ASW-15



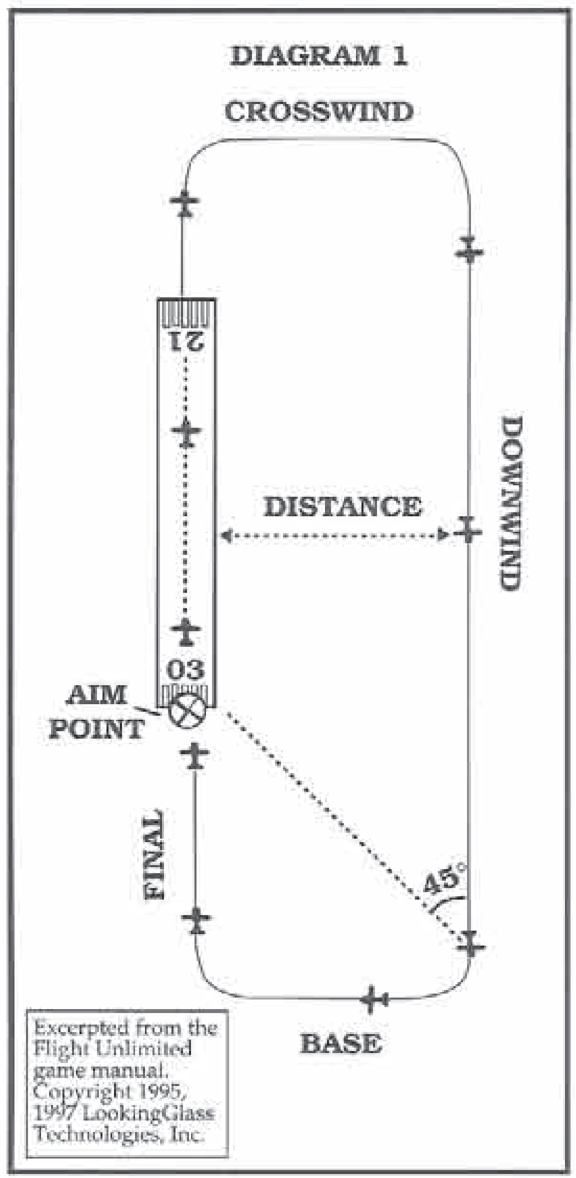
Gernod with transmitter.

Robin Lehman
63 East 82nd St.
NYC, NY 10028
(212) 879-1634

better! Sailplanes only have one chance to land so it had better be good the first time 'round. That's why the landing pattern is such a big help.

The Landing Pattern

Different sailplanes require different control inputs. Some require more piloting skills than others to land properly. But no matter what you fly, the basic landing



pattern for every airplane should be the same.

Whether trying to land on the top of your favorite slope or coming into a flying field, the quality and ease of your landing will be determined long before you touch down. The trick is to end up nicely lined up on your final approach.

If you ever visit a small airport, you will notice that most airplanes and almost all sailplanes fly a pattern just before they land. They do this for two reasons. Firstly, if everyone flies the same pattern when landing, there's less of a chance of a mid-air collision. But at least as important, this pattern makes it much easier to achieve a good, well-placed touchdown.

The landing pattern is best flown in the form of a rectangle starting with the upwind leg (see diagram 1). After you are comfortable with that, you can fly a three-sided rectangle (diagram 2) starting with the downwind leg (#1), then crosswind (#2) and upwind (#3) for touchdown. Once you know how to land, you can abbreviate this pattern still further and fly only the crosswind (#2) and upwind segments of the landing pattern.

Why the Square Landing Pattern?

If you fly a square landing pattern, you can easily control the descent of the model on every leg. For example, if you are coming in too high or too fast, you can enlarge the downwind legs to help you line up properly on final. If on the other hand, you find yourself too low on the downwind leg, you can cut the landing pattern short, fly crosswind and land much sooner than originally planned.

The square landing pattern gives you a lot of flexibility. The airspeed, height and rate of descent are easily controlled, making it easy to line the glider up on the runway and land exactly where you want. That's not a bad thing when you only have one crack at it!

LANDING MISTAKES

You can often tell well in advance that you're about to witness a bad landing. As mentioned before, a good landing happens long before the touchdown. If your downwind leg is started too close to your landing spot, you won't have enough room for your crosswind leg (#2 in the illustration) with the result that your last turn onto final is very likely to be quite abrupt, leading to gyrations back and forth. You'll be turning right, left, right, left, trying to straighten out before touchdown. Had you made a gentle turn onto final, your airplane would be easy to straighten out and your landing would be much easier to control. If you run into a problem like this, try to remember that your mistake probably occurred many seconds earlier when you didn't give yourself room to make a nice gentle, *controlled* turn onto final (#3 in the illustration).

The Abbreviated Pattern

Once you are having success with the three-legged landing pattern, you can now cut off the downwind leg and come in from crosswind onto final. This cross wind part of the pattern is extremely useful for all the reasons mentioned above – it helps give you a way of easily controlling your glider and getting it to gently land exactly where you want it to.

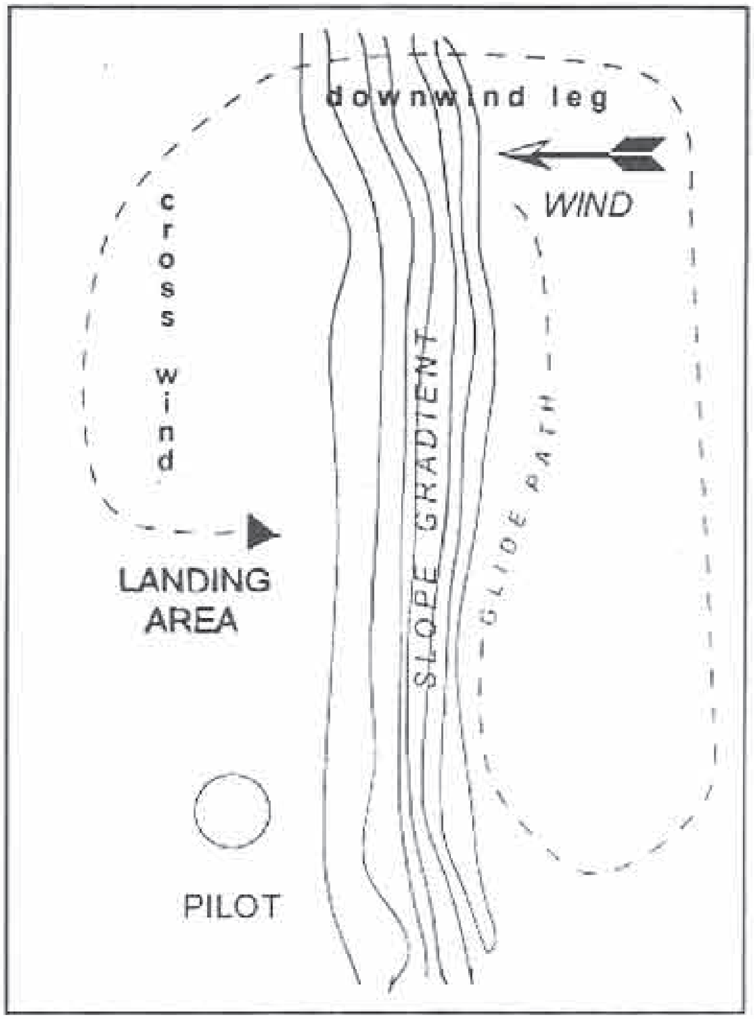
Powered Aircraft

Many of you are learning to fly power because you want to airtow. May I suggest that the first time you fly an unfamiliar aircraft, practice landing patterns and touch-and-gos until you are quite used to your new bird? Do this practice with a full tank of fuel so that you won't go dead stick at just the wrong time! A couple of flights of touch-and-gos will stand you in good stead when you start your airtowing.

Slope Landings

If you have a nice big landing strip on the top of your slope, a landing pattern will make it much easier for you place your airplane where you want to. The same holds especially true when landing a sailplane on a small spot on top of a slope.

SLOPE LANDING



The Tight Spot

Gain enough height to come in downwind, then turn crosswind and "crab" the glider along the hill so that when you turn into the wind, you are perfectly placed for touch down. If you're a bit too high or coming in too hot, don't panic, simply fly out over your hill, gain some height and try this same landing pattern again.

Touch-and-Gos with a Sailplane?

Whether your slope has a tiny place to land, or whether you have a wonderful flat area to land on, it's a good idea to practice the "touch and go" technique to get the feel of how to best land. On a decent hill you can make a bunch of landing "passes" until you have mastered the art of placing your glider where you want it.

Perfect Landings?

Rarely do we make many perfect landings in a row. Generally speaking, good pilots make good landings almost all the time, while the rest of us have varying degrees of success. Watch your fellow pilots to see what they do right and watch the rest of us to learn what went wrong. The chances are you'll be able to tell it's going to be a lousy landing long before touchdown. Either way it will be a learning experience!

The Wind

You probably already know this, but I will mention it anyway: the wind dictates how *high* and/or short you should make your final approach. If you have a strong headwind, your final approach should be relatively high and much steeper than what you might think. How many times have you seen a glider land way downwind when it's blowing hard?

The reason for this is that on a windy day, the relative ground speed is quite slow. If you make the same pattern and approach as on a calm, windless day, you won't make the field because the glider has to fly further *through the air* to cover the same distance on the *ground* because it's flying into a *headwind*.

The wind is really your friend (assuming you can land into the wind). The more wind, the slower your ground speed will be.

The only hitch is, you must compensate for the wind and either make your final approach much shorter, or much higher (than on a windless day).

Why Land into the Wind?

Flaps can help you land because they slow the aircraft down. That's the same reason why you always land into the wind. It's best to have the lowest possible ground speed when your wheels kiss the earth.

If you have a 15 MPH wind, and your glider flies at 25 MPH, when you land into the wind your ground speed will be only 10 MPH (25-15 =10). If you land down-wind on the other hand, your ground speed will be a very fast 40 MPH (25+15=40). Quite a difference!

Practice makes Perfect

When visiting the Akro-Cup event in Germany (last September), I saw Gernod Bruckmann practicing nice square landing patterns with his electric powered sail-plane. He learned to fly a couple of months before and just loved to hone his new-found piloting skills! He'd take off, fly a pattern and make an approach. Before touchdown, he'd gun the throttle, make another nice square pattern and another approach. He did this time and time again until his batteries ran out. Then he would land for real.

If you learn to make a proper square approach, then most of your landing problems will go away.

Gernod also showed us that practice can be a lot of fun! He was having an absolute a ball doing touch-and-gos! No doubt next year he will be towing up his dad!

Every airplane lands a bit differently. One thing is certain, if you fly yours, you will have to land. Try the rectangular approach - it will help you get back down easily and in one piece.

May you all have a great flying season this year! And may all your landings be excellent!

Good Flying! And Happy Landings!

■

"SHORT CUTS"

Steve Savoie
926 Gage St., Bennington, Vermont 05201
(802) 442-6959

U-2 Building Project, Part 2

Well, a month has gone by with not much physical progress, but a lot of planning has taken place, as well as pinning down some of the design and construction details. Our first task was to get the layout of the flying surfaces and fuselage on paper. This was done by scanning the 1/100 scale three views into a graphical format, which was imported into a CAD program where the outlines and details were electronically overlaid. It was just a matter of a few keystrokes to manipulate the scale to 1/12. The final outcome of this task provided full size plans, which were plotted out using a laser drafting printer.

The fuselage diagram was printed out in several side and top views, while the stabs were printed out in simple planform. We did, however, print several variants of the wings. One was to proper scale; the second set was stretched ever so slightly as to have each wing panel match the overall length of the fuselage. This allows us to reduce the wing loading without sacrificing portability since the 60" fuse is the longest part and dictates transportation requirements. The third set of planforms stretched the wing to approximately 120" for better visibility and improved hang time.

Dealing with the fuselage is going to be our biggest task. I planned to make the plug out of glass over blue foam, but Jerry Slates convinced me to go with wood, preferably clear redwood. This was good, sound advice and Dave Garwood agreed that it would be a good investment. Well, my original estimate of $45 for the wood was shattered; I had the wood selected and the price shot up to $110; there is a big difference between board feet and linear feet. Remember, this thing will be 60" long, up to 8.5" wide, and 5" high. We found an alternative to wood and that was Rohacell™ R-51. Rohacell™ is a high cost, structural foam used in the composites industry; its designation stands for 51 kilograms of weight per cubic meter, about 5#/cubic foot.

Fortunately, my place of employment (Vermont Composites) is the largest East Coast consumer of this foam; what we consider scrap pieces was more than adequate to bond together under vacuum to form the raw plug. This foam sands like very dense balsa and does not finger dent (125# compressive strength), it shapes well and is compatible with epoxy and CA type glues. Jerry recommended that when I bond up my planks I use an even number, so that the center bondline can be used as a reference for the plug lay out, a great idea.

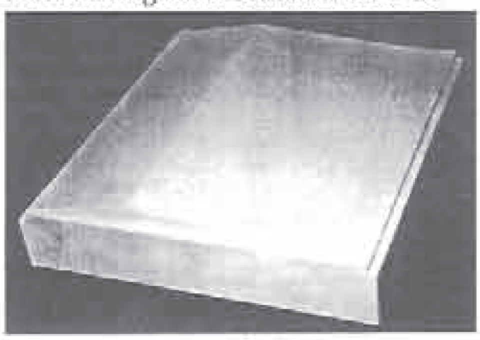
The raw plug was shot with 3M 77 spray, and the scale outline printout was applied to the foam. The side profile was then cut with a scroll saw, ever so slightly oversized. The top view was attached to the bottom side of the plug (a fairly flat face) in the same manner. The procedure was repeated, producing a rather square plug. I did fail to note that the vertical fin detail was not included on the side profile cuts. Once the plug is near completion, we'll cut a core for the vertical fin, skin it with plywood and bond it to the plug at the tailplane fairing.

This brings up a good point; if we plan to make the fuselage scale, we'll have a slight problem with the jet intake details. This area has what is called a negative draft and will cause the plug to be locked into the female mold once it is cured. Jerry suggested possibly making the fuselage in two section, one forward of the intake and the other aft. I wanted to keep things as simple for us as possible, so I decided that once the fuse plug is shaped we'll skim coat it with epoxy, fair it in, and then cut out the negative draft portions of the intakes, lightly bonding them back into position. This allows the plug to be removed from the mold; once that is done, the remaining intake sections can be slid back and then out of the mold. This method may make a small parting line on the mold that we'll dress up prior to laying up the fuse.

The negative draft will still exist on the final mold, but I believe that the flexible glass fuselage halves will have enough give to make the extraction possible. While work is proceeding with the plug, we are also working on the templates for the cores. We are planing to use the SD8020 for the vertical fin, as well as the stabs. This airfoil performs well and is reasonably thick for strength purposes. Dave plans to skin his stabs with 1/64 plywood and I'll probably use 1/16 balsa; we'll cut the cores for a skin thickness mid-point between the balsa and ply.

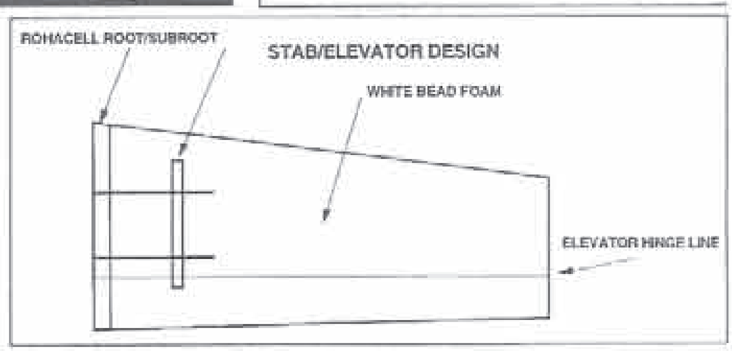
We are planning to use regular white foam for the cores, but will insert 1/4 wide Rohacell™ R-51 roots and subroots. Once the cores are cut and shaped, the Rohacell™ will be bonded in and then contoured to the airfoil shape using sanding guards, hand palm sanded. Rohacell™ **can't be safety hot wired, because it gives off extremely hazardous gases.** The stabs will be drilled and fitted with brass tubing to accept suitably sized music rods, 2 per stab to hold the incidence angle.

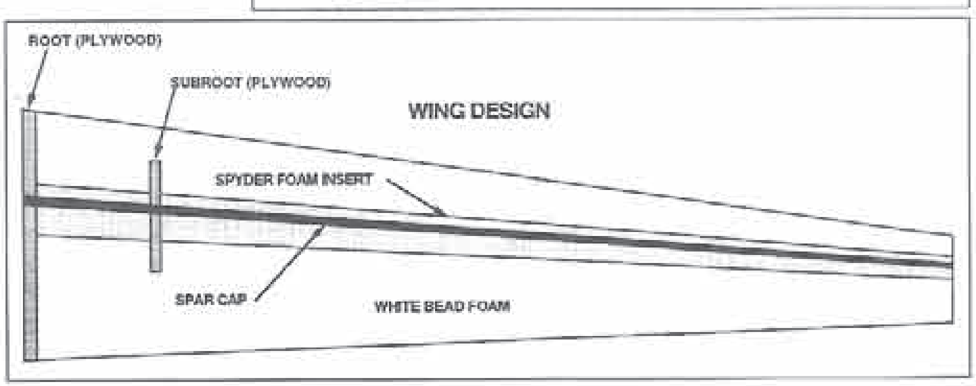
The stabs will have the elevator sections cut out and capped. I'm hoping to use offset control horns and one clevis to tie the two elevators together inside the tail cove

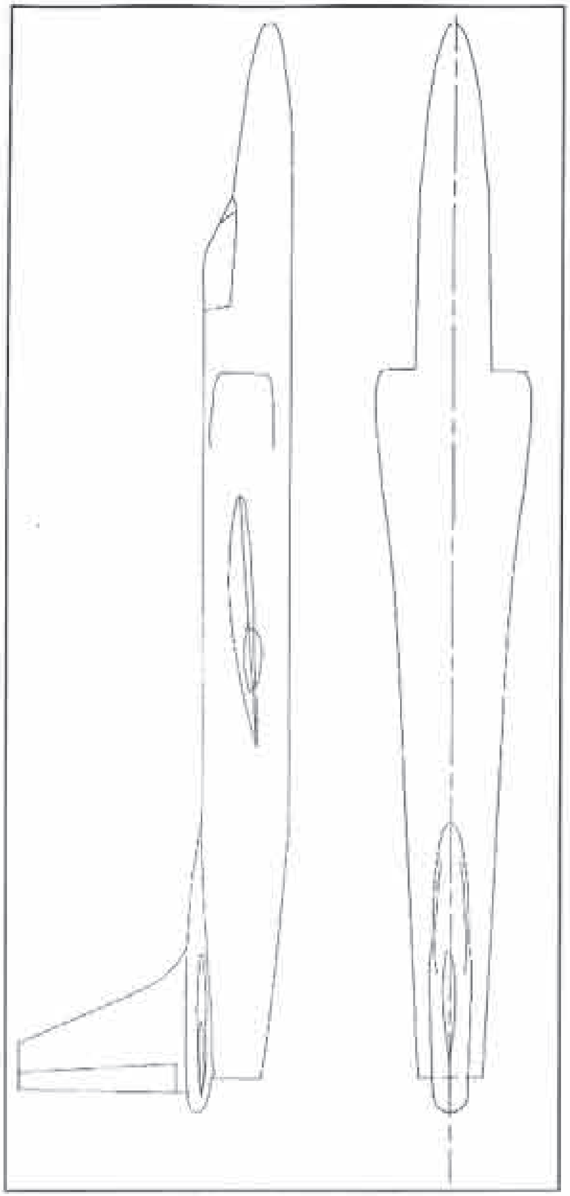


(Photo left) Rayite™ 100 mold tool - CNC machined for composite tool, 100 psi @ 250°.

(Photo right) Tool in process of being covered with PTFE release film. Allows multiple part pulls w/o release agent.







The planforms will be cut out of white foam and a full height strip will be cut out of the spar area about 1.5" wide at the root and 1" wide at the tip which will be full depth. We'll insert a piece of Spyder foam into place, bond the sections together with kicker alone, and then cut out the airfoils. I'm hoping this will reduce weight and provide good compressive strength over the spar area. We'll insert a root and subroot, out of plywood, and then route out a recess for a short spar cap using 1/8" x 3/8" spruce. Some light glass will reinforce the trailing edge of the flap/ailerons, when the skins are bonded on using West Epoxy. The root/subroots will then be drilled out for a wing rod(s), although this is still in the planning stage, and we may find it necessary to make a few changes as we construct the U-2.

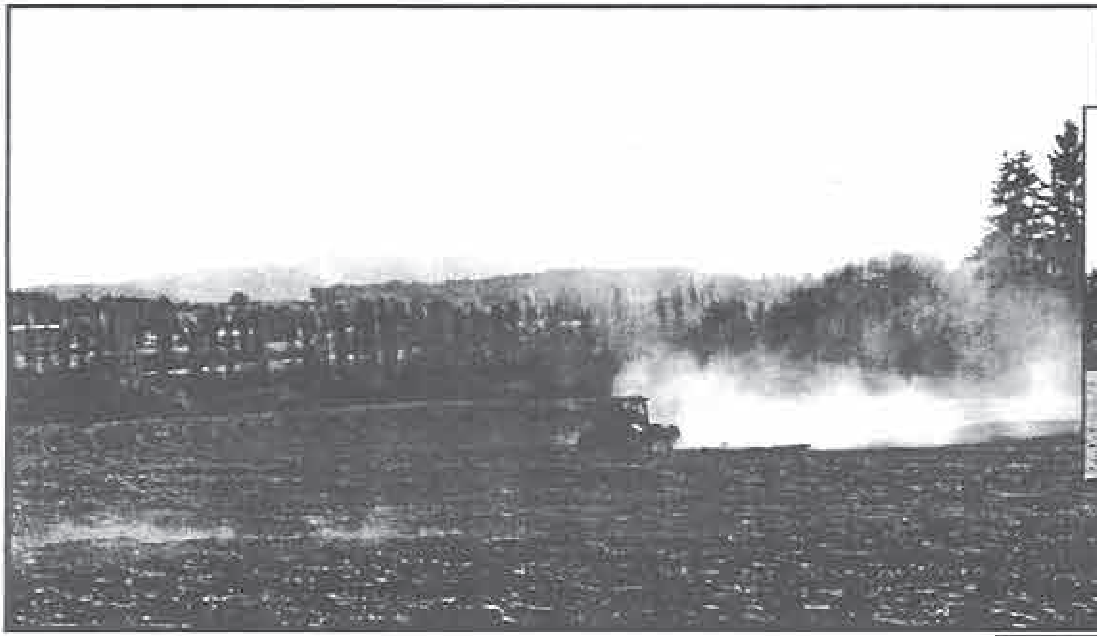
Well, that's enough for now! We've got a lot to do before the next installment of this series.

■

of the fuselage. This should keep the stabs against the fuse, be aerodynamically clean, and reduce the possibility of servo failure due to control horns snagging on brush. This design will also make it easy to change stab sizes should the original area be insufficient (approximately 15% of the wing area).

The wing airfoils have been selected and work is proceeding on the templates. Dave wants to go with the SD6060, which has worked well on my Salto and is a good, general, all around slope airfoil for this region. We'll probably kick up the camber on the tips about 2% and put in a bit of washout. My airfoil selection was recommended by Jerry and I think it will meet my needs. I'll be using HQ 10/2 on the root and HQ12/2.5 on the tips with 2 degrees of washout. I hope to take advantage of the HQ's ability to reflex for slope and good general performance for aerotow/thermal. We both agree on using 1/64 ply for the skins with flaps and aileron control surfaces both at 25% of the cord. The TR1 has 25% cord flaps and 20% cord ailerons which would be a pain to build into the models. Dave may move the flap/aileron break point inboard to improve roll rate; I'll keep mine scale.

The plan for the wing construction is as follows.



Raking down clods to level the field. Only heavy equipment could save this flying site!

Waid Reynolds 'spikes' a landing in soft dirt! The dirt provides a great cushion, without damaging the plane.

HAVE SAILPLANE, WILL TRAVEL!

Tom H. Nagel
904 Neil Ave.
Columbus, OH 43215
tomnagel@iwaynet.net

This column is dedicated to soaring vacations. This month, our column is written by Les Grammer of Pullman, Washington (that's the state of, not the district). Les is a member of the NorthWest Soaring Society (NWSS), which has approximately 100 members scattered throughout the Pacific Northwest (Oregon, Idaho, Washington, Canada). He is the president of NWSS, and flies handlaunch, slope, and thermal ships (with an occasional power or electric kicked in for a change of pace.) He currently flies a modified Pelican and a 2-meter Super V in competition, and has been the NWSS 2-meter season champion for the last two years (though he doubts that will ever happen again!). You may have read some other articles of his, as he's been a fairly regular contributor of stories to the *RCSE*.

That Dust ... It's a Devil!

NWSS Tournament

By Les Grammer
Pullman, Washington

During my 'formative' years, I wanted to learn how to fly *so* badly I could hardly contain myself. My problem was I was so scared of less than ideal conditions that the weather (or at least my perception of it) continually thwarted me. I would very patiently await those calm, warm days so I could get some practice in. On occasion, I would risk a windy day, usually to come home defeated (Read that "airplane in pieces".) I've since learned this is what you can expect if you're teaching yourself to fly.

Though I eventually worked my way through the 'defeated' stage, as I became embroiled in gliders this 'waiting for the perfect day' syndrome carried over. Windy day? Nope, can't go thermaling. Go do something else! Threat of rain? Better stay inside. Fog? Forget it!

It wasn't until I was forced to fly a contest or two in heavy winds that I learned I could fly (and learn a lot) on those windy days. A contest under scattered showers taught me that light sprinkles here and there could be accompanied by great lift. (However, an attempt to fly in the fog taught me those days are still best left to steelhead fishing.)

While I still prefer those ideal calm, sunny days for flying, one of my practice partners pointed out you can learn ***how to*** fly in ideal conditions, but you'll learn ***about*** flying under those less than ideal circumstances.

Boy, was he right! Most of my big lessons have come under conditions of adversity, such as the windy or rainy contests. That point was pounded home again at the NorthWest Soaring Society Tournament. This is always the last official competition of the season for the NWSS, which is usually held in early September. It's accompanied by a banquet at which the season champions are crowned, new board members and officers are elected, and special awards are presented. This is where all that hard work of the summer competitions finally pays off, both in recognition of flying accomplishments as well as humanitarian contributions to the NWSS. Though this is primarily an opportunity for NWSS members to showcase their skills against the region's best, any and all are welcome to compete. There are usually 50-70 fliers signed, giving their all.

The location changes every year to provide an opportunity for different branches of the NWSS membership to host the event, and this year's host was the Salem Area Soaring Society, out of Salem, Oregon. The site was to be a sod farm outside of Salem. The flying conditions? Two days with temperatures starting out in the low 70's during the morning, warming to the high 80's at the heat of the day, and winds starting out at zero for the first round, gradually increasing one to three mph with each round throughout the day; few to no clouds, visibility was "good".

Locals check out some of the planes as pilots "discuss" the field conditions.

"Ha!" You say, "Where's the adverse conditions? This looks like a perfect setup, particularly for gaining experience with winds." Yes, I agree. It was close to perfect flying *weather*. The adversity of this circumstance, the conditions, or more specifically the field!

Imagine the following. You're driving out of Salem, Oregon to the flying site. You know you're about to be flying against your area's best; all the hot-shots you've only read about in your newsletter will be present. There will be the banquet, the season champions and the special awards, along with a *very* nice set of trophies for the top finishers of this two day tournament.

As you drive along, you see fields of green, fields of golden brown, and a few dirt fields which have obviously been recently plowed or planted. Your site is a grass seed farm you've never seen before, so you carefully follow the newsletter directions and watch for *the sign*. Your anxiety is running a little high. There! Up ahead! You see it...."*NWSS Tournament*", and you turn onto a gravel road leading to a farm.

You note a busy tractor working the field next to the road, apparently plowing the land. It raises CLOUDS of dust (You have to live in a farming community to really appreciate the meaning of this.), and you easily spot three or four thermals carrying the dust away in different directions. In fact, you can clearly see the funnel formation of the thermals as they're outlined in dust! What a great place for lift!

You follow the signs into the barn for final registration, complete your sign up, and ask where the field is. The registrar answers "Just go on out and take a good look!"

You step outside the barn and walk around back. It's the only place you haven't "seen" yet, thus the grass must be out that direction. When you arrive out back and look out over the land, however, you only see acres of plowed ground, with clods the size of footballs. This is *your flying site?* Can you feel your heart sinking?

OK, turn your imagination back off. To you, this is only a bad dream. For the 55 fliers that showed up, this was the real thing. In talking to the other fliers, I learned that there had been a slight 'miscommunication' with the owner of the land, and somehow the order had come down to plow it under only two days before the contest. That tractor I described was actually out raking and smoothing the land in hopes of creating a suitable site for flying!

I actually contemplated leaving, but had just driven eight hours to get here. Besides, I was sharing a room with another flier, and I saw he was also here. So, instead I picked up and headed for the motel to see what the next day would bring.

As I arrived the next morning, I anticipated this thing might just be canceled, or at least moved to a new location. Instead I found winches set up, 30+ cars parked, with people setting up planes and shade; more cars arrived each minute. As I drove across the field to the parking location, I had to roll the windows up to avoid the choking cloud of dust.

Now, all things considered, the farmer did a great job of getting the land leveled and ready (as ready as something like this could be). Where before there had been nothing but plowed dirt and huge clods, there was now a smooth, even surface (albeit still soft dirt). The winch lines ran way the he(ck) up a slight rise, extending out of sight beyond the top of a hill. As retrievers were tested, the chute would raise a small cloud of dust as it was retrieved back to the launch point, all the way back to the winch. After walking around for five minutes it became obvious my legs wouldn't need any sun block, as no sun could penetrate the layer of dirt that had already coated my legs!

A few planes went up for practice and it was easy to see there was terrific lift, but the landings... When a plane hit, you had to wait two minutes for the dust to clear before you could measure. (OK, OK, that's a bit of an exaggeration. It only took 20 seconds for the dust to clear!)

If you've never flown at a dirt field like this before, believe me, you have entered the land of adversity. Dirt will get in your eyes. Somehow the sun will manage to burn through that layer of dirt in case you DIDN'T apply sun block. Your plane will collect dirt. Your electronics will collect dirt. If you're not careful, that spring-loaded rudder-elevator stick on your radio, which supposedly returns to center position when released, won't. Every time someone drives in or out, another cloud of dust will settle on everything/everyone around.

So, what's the big lesson to learn? Well, let me tell you, with a field like this you can see every little bit of air movement, from slight wisp to churning dust devil. You almost have a road map to the low-level lift.

My lesson started on my third flight. I had flown straight out into nothing but sink, turned right and still found nothing but sink. Eventually, I had to face coming home or losing the plane. The ride home was again full of sink (Yea, yea, I know.. One of those cardinal sin flight plans!). The plane finally made it over the field, but was still well short of my downwind 'window', with only about 10 feet of height, two minutes into a seven-minute task.

I couldn't just bring the plane diagonally across for a cross-wind landing (against the rules). All I could see was that 'walk of shame' rising up to smack me, and my first zero landing. That's when my timer told me, "There's a little twister just to your right. See it?"

Yes... There it was, directly ahead of my plane about 50 yards, one of those real small little twisters which would scatter the leaves (if any existed). This one was just kicking off a slight bit of dust. I've always avoided these little demons, thinking they don't really signify much and would just be potentially violent air at a low level. I actually thought the timer was giving me a warning so it wouldn't impact my impending zero landing. I thanked him and tensed up as the flight path carried the plane directly into the twister. Well, the plane did get kicked into a left turn, which I was able to counter. The end result was my flight path having been diverted a bit *away* from the lines, but also about four feet higher. I continued the left turn to come around to get back on some resemblance of a reasonable approach, which just happened to be into the direction of the twister again. My timer commented, "That's it!"

It then dawned on me. He thinks I'm coming around to try to work this thing! Strictly by happenstance, I was coming directly back into the twister. This time, as my plane crossed, I was kicked up another five feet. My mind went, "What the hell?" I banked around hard to try to stay with it. Initially, I couldn't turn tight enough to stay in, but each time I touched it, I would gain another six to eight feet. As the plane rose higher, I could turn tight enough to stay with it longer, and gain more altitude, yet.

It was difficult, as the twister would make drastic changes in direction. I would find myself kicked out, having to come around to enter again; eventually, the plane reached a high enough altitude that I was able to stay 'cored' in a tight turn, and really started climbing out.

That's when my timer announced, "Six minutes!" What? I had been at this almost four minutes already? I was almost disappointed, as I was going back up very nicely now and was excited to have worked into this nice column of lift. But I bailed, made my approach and landed. My landing was only about 80%, but my time was right on!

From that point on, I started watching the ground, and the planes above it. A lot of pilots were able to tag these devils, and you could easily trace a building thermal all the way back down to its smallest footprint on the dirt. I ended up utilizing those devils on four more rounds, two of them successfully, one where it seemed to just blow up and disappear, and one where I just lost track of it.

It was really impressive to watch Arend Borst. He was fresh back from his third place finish at the F3J World's, and watching him work this low level lift was like watching poetry in motion. Any number of times I would have sworn he was dead meat, only to watch his plane slowly gain again on these low-level pockets. I watched him pull at least four flights out from virtually nothing. (Of course, he didn't *need* the benefit of the dust acting as an indicator, but I'm sure that made it just that much easier.) He did, in fact, go on to win the tournament.

Of course, not *all* the twisters were beneficial. One came through which had a base of about 50 feet, with dust/dirt so thick you couldn't see through the other side. As it approached, no one happened to be in the air. However, a lot of guys went scampering to grab their planes and move them out of harm's way. If *this* puppy had touched your plane, you would not have needed the benefit of a winch to get airborne!

In retrospect, I can't say I would *want* to fly under those conditions again. (Just last night I got the last of the dirt out of my plane... I hope!) However, I might be tempted to haul a hand launch out and throw it around, particularly after I've watched what's happening at the ground level.

At the banquet, the biggest laugh was someone suggesting the NWSS logo should be changed from "NorthWest Soaring Society" to "Not Worth Seeking Sod". It will be a long remembered tournament, with a lot of stories told. (I'm sure the size of the dirt clods and twisters will grow with each telling.) We'll also work very hard to ensure that next year's tournament is over sod.

For me, I'm glad I stuck around to fly it, as it was yet another of those opportunities for a big lesson *about* flying. However, as I turn my attention to cleaning the dirt out of my transmitter, I hope I learned my lesson well, and that it need only have been a *once* in a lifetime opportunity.

(For those who might be interested in attending, this contest moves its site every year, from sites such as the sod farms of Mission, B.C., to the grass fields of the Tri-Cities Area and Seattle, Washington, to the coastlands of Portland, Oregon, etc. If you're interested in attending and would like some more information, please contact Les Grammer, NWSS-President, SE 1220 Sunnymead, Pullman, WA 99163, or drop e-mail to <grammer@pullman.com>.)

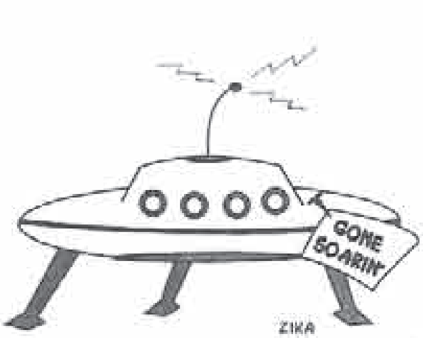
****

Thanks, Les!

If you have a favorite sailplane saga, consider writing it down for *RCSD*. If you are planning a vacation that includes your plane and transmitter, consider making notes as you go, and working up an article later. Take photos. Collect maps. And send your story to Tom Nagel at tomnagel@iwaynet.net for gentle editing and suggestions. *Tom* ■

Disclaimer: The information published about site access is believed to be accurate as of the date of publication; neither the author nor the publisher assume any liability or responsibility to any person or entity with respect to any loss or damage caused, or alleged to be caused, either directly or indirectly by the information included in this column. Flying site ownership, management and rules often change without notice. Fliers using this information are advised to proceed with good sense and politeness. Respect the owners and other users of the site. Fly safely.

■



SCHEDULE OF SPECIAL EVENTS

1999

February 6-7
11th Annual Southwest Classic — Queen Creek, AZ
Dave Wenzlick, (602) 345-9232
azdw@uswest.net

February 19-21
Pensacola 1999 — Pensacola, FL
Asher Carmichael, (334) 626-9141
ACarmic985@aol.com
Rusty Rood, (850) 432-3743

April 24-25
SKSS Unlimited — Newark, DE
John Kirchstein, kirchste@voicenet.com
(302) 731-2831

May 7-9
Fayetteville Airtow Fly-In — Fayetteville, NC
Wayne Parrish, (919) 362-7150 (after 9 pm)
Bernie Coleman, (704) 846-5219

May 8-9
TMSS Unlimited — Southern VA
Josh Glaab, ljglaab@pinn.net
(757) 850-3971

May 15-16
BASS HL — Frederick, MD
Jack Cash, jcashjr@cyberun.net
(301) 898-3297

May 15-17
Midwest Slope Challenge — Lake Wilson, KS
Paul Wright, (402) 796-2175
paulw@isco.com

May 22-23
ESL Fun Fly — Newark, DE
John Hauff, tankman58@aol.com
(718) 767-1369

June 5-6
CASA-2M — Near D.C.
Chris Bovais, bovais@kahuna.nrl.navy.mil
(703) 643-5513

June 10-13
Elmira Aerotow '99 — Elmira, NY
John Derstine, johnders@postoffice.ptd.net
(717) 596-2392

June 10-13
Montague Cross Country Challenge — Montague, CA
DG Airparts, Inc., dgair@cdsnet.net
(541) 899-8215

June 19-20
LISF Open — Long Island, NY
John Hauff, tankman58@aol.com
(718) 767-1369

June 24-27
MSSC '99 (Incl. XC) — Huntsville, AL
Ron Swinehart, (256) 722-4311
ron.swinehart@lmco.com

June 26-27
ESL-F3J — Long Island, NY
Tom Kiesling, kiesling@ctc.com
(814) 255-7418

July 10-11
LASS Open — Lancaster, PA
John Murr, jmurr@redrose.net
(717) 285-7025

July 24-31
AMA NATS — Muncie, IN
24th: Sport Scale Sailplnae, F3B, XC
25th: F3J
26th: HL
27th-28th: 2M
29th-30th: Unlimited
31st: NOS & RES

August 7-8
MVSF — Princeton, NJ
Bill Miller, jerseybill@worldnet.att.net
609-585-6779

August 13-15
GNATS Aerotow '99 — Ontario, Canada
Phil Landray, (905) 468-3923,
linden@niagara.com
Gerry Knight, (905) 934-7451
Lou Kleiman, (905) 688-4092,
mistral@niagara.com

August 14-15
CRRC Open — Boston, MA
Fritz Bien, fritz@spectral.com
(508) 369-1720

August 21-22
BASS Open — Frederick, MD
Jack Cash, jcashjr@cyberun.net
(301) 898-3297

August 28-29
SKSS Open — Newark, DE
John Kirchstein, kirchste@voicenet.com
(302) 731-2831

September 11-12
CASA Open — D.C.
Steve Lorentz, lorentz@fred.net

September 18-19
LISF-2M — Long Island, NY
Gordon Stratton, (718) 847-8299

September 25-26
ESL End of Season — Reading, PA
T. Kiesling/J. Glaab, kiesling@ctc.com
(814) 255-7418

Please send in your scheduled events as they become available!

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 15th day of the month. (Example: If you wish to place an ad in the March issue, it must be received by February 15.) *RCSD* has neither the facilities or the staff to investigate advertising claims. However, please notify *RCSD* if any misrepresentation occurs. Market Place Listings are $5 a month. Personal ads are run for one month and are then deleted automatically. However, if you have items that might be hard to sell, you may run the ad for two months consecutively.

For Sale - Business

PC-Soar Version 3.7 Sailplane Performance Evaluation Program with Airfoil and Sailplane Library expanded to 60 models including Chrysalis, Anthem, Genesis, Peregrine, Probe, Thermal Eagle, and Spectrum. Airfoil library includes 322 polars with 56 UIUC polars. PC-Soar with Libraries of Sailplanes and Airfoil Polars plus a new Excel utility for working with multi taper wing areas and aerodynamic centers. Reduced Cost: $50 + $3 P&H. PC-Soar library and software Upgrade to Ver. 3.7: $10 + $3 P&H. LJM Associates, 1300 Bay Ridge Rd., Appleton, WI 54915, ph: (920) 731-4848 after 5:30 p.m. weekdays or on weekends. E-mail: lmurray@athenet.net. PC-Soar Web Page: <http://www.athenet.net/~atkron95/pcsoar.htm>.

PRECISION AMAP WING CUTTER, replacement parts, and service. AMAP Model Products, 2943 Broadway, Oakland, CA 94611. Butch Hollidge, (510) 451-6129, or fax (510) 834-0349.

A.M.P. Aerial Model Products, sport, slope, race prototypes - all airfoils. 60" Del Valle Snake, 94" H&K Cobra, AMAP Flair, Kevin Cutler's full house Davenport Monitor. All race tested. Butch Hollidge, (510) 680-0589, eve, California.

PARACHUTES: $10. Dale King, 1111 Highridge Drive, Wylie, TX 75098; (972) 475-8093.

PLANS - R/C Sailplanes - Scale, Sport & Electric. Old Timer & Nostalgia - powered, rubber, and towline. Scale - rubber. All models illustrated. Catalog: $2.00. Cirrus Aviation, P.O. Box 7093 Depot 4, Victoria, BC V9B 4Z2, Canada.

Custom Cut FOAM WING CORES. White, pink, blue, and Spyder foam available; most airfoils available. Send copy of drawing for quote. Viking Models, U.S.A., 2 Broadmoor Way, Wylie, TX 75098; (972) 442-3910, fax (972) 442-5258.

For Sale - Personal

1/4 Roedel Super Cub (towplane), 2.687 meter span, wing profile Clark Y mod. (suitable motors are 160 T, 300 T, OS BGX-1, Brison 3.2 or similar), NIB... $385.00. Contact Robin Lehman, 63 E. 82nd St., New York, NY 10028, (212) 879-1634.

MARKET PLACE LISTINGS

VACUUM FORMED PRODUCTS, CANOPIES
Viking Models, U.S.A.
2 Broadmoor Way
Wylie, TX 75098
(972) 442-3910 • fax (972) 442-5258
RCSDigest@aol.com

Closet Scale Stuff
At Sailplanes Unlimited, Ltd.

1/3 Pribek ASW 27 - 5 meter span (196"), wing profile HQ 2.5/12, ca. 20 lbs.

1/4.2 FiberClassics Nimbus 4 - 6.28 meter span (246"), wing profile E 68-66, ca. 18 lbs.

1/3.6 Roedelmodell DG 800 - 4.15 meter span (163"), wing profile E 207, ca. 11 lbs.

1/3.75 Roedelmodell Fox MDM-1 - 3.8 meter span (149"), wing profile RG 12, ca. 15 lbs.

1/2.77 PriBek ASW 19 - 5.4 meter span (212"), wing profile Ritz 3 mod., ca. 20 lbs.

Please call for additional info: (212) 879-1634.

R/C Soaring Resources

These contacts have volunteered to answer questions on soaring sites or contests in their area.

Contacts & Soaring Groups - U.S.A.

Alabama - North Alabama Silent Flyers (NASF), Ron Swinehart, (256) 722-4311, <ron.swinehart @imco.com>, or Rob Glover at AMA3655@aol.com, http://sh1.ro.com/~samfara/

Alabama - Central Alabama Soaring Society, Ron Richardson (Tres.), 141 Broadmoor Ln., Alabaster, AL 35007, <ron_mail@bellsouth.net>.

Alabama - Southern Alabama & NW Florida Aerotow, Asher Carmichael, (334) 626-9141, or Rusty Rood, (904) 432-3743.

Arizona - Aerotowing, slope sites in AZ (rugged), Arizona Flying Eagles R/C Demo. Show Team, Dave Wenzlick, (602) 345-9232, <azdw@uswest.net, or visit CASL at <http://www.public.asu.edu/~vansanfo/casl>.

Arizona - Central Arizona Soaring League, Iain Glithero, (602) 839-1733.

Arizona - Southern Arizona Glider Enthusiasts, Bill Melcher (contact), 14260 N. Silwind Way, Tucson, AZ 85737; (520) 825-2729. SAGE welcomes all level of flyers!

Arkansas - Northwest Arkansas Soaring Society, Tom Tapp (President), RT 2 Box 306, Huntsville, AR 72740; (501) 665-2201, eve.

California - DUST, Buzz Waltz, 68-320 Concepcion, Cathedral City, CA 92234, (760) 327-1775.

California - High Desert Dust Devils, Stan Sadorf, 14483 Camrose Ct., Victorville, CA 92392; (760) 245-6630, <Soareyes@aol.com>.

California - Inland Soaring Society, Robert Cavazos, 12901 Forman Ave., Moreno Valley, CA 92553, RCAV@aol.com.

California - Northern California Soaring League, Mike Clancy, 2018 El Dorado Ct, Novato, CA 94947; (415) 897-2917.

California - Sacramento Valley Soaring Society, Dudley Dufort, 225 30th St., Suite 301, Sacramento, CA 95816, (916) 448-1266, <www.svss.org>.

California - South Bay Soaring Society, Mike Gervais, P.O. Box 2012, Sunnyvale, CA 94087; (408) 683-4140 (H), (650) 354-5469 (W).

California - Southern Calif. Electric Flyers, John Raley (President), 1375 Logan Ave., Costa Mesa, CA 92626; (714) 641-1776 (D), (714) 962-4961 (E), e-mail: E-Flyer@ix.netcom.com.

California - Torrey Pines Gulls, Ron Scharck, 7319 Olivetas Ave., La Jolla, CA 92037; (619) 454-4900.

Colorado - Rocky Mountain Soaring Assn., Phil Weigle, 1290 Salem St., Aurora, CO 80011; (303) 341-9256 eve.

Eastern Soaring League (VA, MD, DE, PA, NJ, NY, CT, RI, MA), Tom Keisling (Pres./Editor), (814) 255-7418, kiesling@ctc.com; Ben Lawless (Sec./Tres.), LawlessB@ang.af.mil; Anker Berg-Sonne (Scorekeeper), (508) 897-1750, anker@ultranet.com; Josh Glaab (Contest Coordinator), (757) 850-3971, ljglaab@pinn.net; <http://www.eclipse.net/~mikel/esl/esl.htm>.

Florida - Florida Soaring Society, Mark Atzel (President), 1810 SW Terrace, Ft. Lauderdale, FL 33312, (954) 792-4918.

Florida (Central) - Orlando Buzzards Soaring Society (www.specs-usa.com/~ingo/OrlandoBuzzards), Jerre K. Ferguson (Pres.), 4511 Pageant Way, Orlando, FL 32808, (407) 295-0956, <jerre@bellsouth.net>.

Georgia - North Atlanta Soaring Association, Tim Foster, (770) 446-5938 or Tom Long, (770) 449-1968 (anytime).

Hawaii - Maui Island Slope Soaring Operation (MISO), Duane A.K. Asami, 262 Kamila St., Kula, HI 96790, pgr. (888) 932-6247, <dasami@mauigateway.com>.

Illinois (Chicago Area) - Silent Order of Aeromodeling by Radio, Jim McIntyre, 23546 W. Fern St., Plainfield, IL 60544-2324; (815) 436-2744. Bill Christian, 1604 N. Chestnut Ave., Arlington Heights, IL 60004; (847) 259-4617.

Illinois (Northwest) - Valley Hawks R/C Soaring Club, Jeff Kennedy (President), 414 Webster St., Algonquin, IL 60102, (708) 658-0755, eve. or msg.

Iowa - Eastern Iowa Soaring Society (Iowa, Illinois, Wisconsin, Minnesota), Ed Harris (Editor), 2000 NW 84th Ave., Ankeny, IA 50021; (515) 965-5942, <harris.edwin@mcleodusa.net>.

Indiana - Bob Steele, 10173 ST Joe Rd., Fort Wayne, IN 46835; (219) 485-1145.

Kansas - Kansas Soaring Society, Pat McCleave (Contact), 11621 Nantucket, Wichita, KS 67212; (316) 721-5647.

Kansas - Aerotowing, Jim Frickey, (913) 585-3714.

Kentucky - Bluegrass Soaring Society, Frank Foster (President), 4939 Hartland Pkwy., Lexington, KY 40515; (606) 273-1817.

Kentucky - Louisville Area Soaring Society, Ed Wilson (Contact), 5308 Sprucewood Dr., Louisville, KY 40291; (502) 239-3150 (eve), e-mail <ewilson1@bellsouth.net>.

Louisiana - Capitol of Louisiana Soaring Society (CLASS), Leonard Guthrie (contact), 12464 Fair Hope Way, Baton Rouge, LA 70816, (504) 275-2122.

Maine - DownEast Soaring Club (New England area), <Jim.Armstrong@juno.com>.

Maryland - Baltimore Area Soaring Society, Erich Schlitzkus (President), 52 North Main St., Stewartstown, PA 17363; (717) 993-3950.

Maryland & Northern Virginia - Capital Area Soaring Association (MD, DC, & Northern VA), Chris Bovais (Coordinator), 12504 Circle Drive, Rockville, MD 20850; (703) 643-5513.

Michigan - Greater Detroit Soaring & Hiking Society, Greg Nilsen (Sec.), 260 Rosario Ln., White Lake, MI 48386-3464; (248) 698-9714, GNilsen624@aol.com.

Michigan - Great Lakes 1.5m R/C Soaring League & "Wings" Flight Achievement Program & Instruction. Ray Hayes, 58030 Cyrenus Lane, Washington, MI 48094; (810) 781-7018.

Minnesota - Minnesota R/C Soaring Society, Tom Rent (Contact), 17540 Kodiak Ave., Lakeville, MN 55044; (612) 435-2792.

Missouri - Independence Soaring Club (Kansas City area, Western Missouri), Edwin Ley (Contact), 12904 E 36 Terrace, Independence, MO 64055, (816) 833-1553, eve.

Missouri - Mississippi Valley Soaring Assoc. (St. Louis area), Peter George, 2127 Arsenal St., St. Louis, MO 63118, (314) 664-6613.

Nebraska - B.F.P.L. Slopers, Steve Loudon (contact), RR2 Box 149 E1, Lexington, NE 68850, (308) 324-3451/5139.

Nebraska - Lincoln Area Soaring Society (Wilson Slope Races), Jim Baker, 920 Eldon Dr., Lincoln, NE 68510-4014, (402) 483-7596, <http://www.geocities.com/CapeCanaveral/Hangar/1671/lass-2.html>.

Nebraska - SWIFT, Christopher Knowles (Contact), 12821 Jackson St., Omaha, NE 68154-2934, (402) 330-5335.

Nebraska - Ken Bergstrom, R.R. #1, Box 69 B, Merna, NE 68856; (308) 643-2524, <abergst@neb-sandhills.net>.

Nevada - Las Vegas Soaring Club, Jim Allen (President), 7117 Caprock Cir., Las Vegas, NV 89129; ph (702) 658-2363, fax (702) 658-1996.

New Jersey - Vintage Sailplane R/C Association, Richard C. Tanis (President/Founder), 391 Central Ave., Hawthorne, NJ 07506; (201) 427-4773.

New York, aerotowing Rochester area, Jim Blum and Robin Lehman, (716) 335-6515.

New York - Elmira - Harris Hill L/D R/C, aerotowing & slope, John Derstine, (717) 596-2392, e-mail johnders@postoffice.ptd.net.

New York, aerotowing Long Island Area, Robin Lehman, (212) 744-0405.

New York - (Buffalo/Niagara Falls area) - Clarence Sailplane Society, Lyn Perry (President), (716) 655-0775; e-mail perryl@sstaff.sunyerie.edu; Jim Roller (Competition Coordinator), (716) 937-6427.

New York - Long Island Silent Flyers, Stillwell Nature Preserve, Syosset, NY, Ze'ev Alabaster (President), (718) 224-0585, or Peter DeStefano (VP), (516) 586-1731.

New York - Syracuse area, Central NY Sailplane Group, Dave Zinteck, Minoa, NY, (315) 656-7103, e-mail Zinteck@aol.com.

North Carolina - Aerotowing, Wayne Parrish, (919) 362-7150.

Northwest Soaring Society (Oregon, Washington, Idaho, Montana, Alaska, British Columbia, Alberta), Sandie Pugh (Editor - NWSS Eagle), 1119 SW 333rd St., Federal Way, WA 98023, e-mail: parrot2luv@aol.com, (253) 874-2429 (H), (206) 655-1167 (W).

Ohio - Cincinnati Soaring Society, Ed Franz, 7362 Ironwood Way, Burlington, KY 41005; (606) 586-0177, <ejfranz@fuse.net>.

Ohio - Dayton Area Thermal Soarers (D.A.R.T.S.), Walt Schmoll, 3513 Pobst Dr., Kettering, OH 45420, (513) 299-1758.

Ohio - Mid Ohio Soaring Society (MOSS), Hugh Rogers, 888 Kennet Ct., Columbus, OH 43220; (614) 451-5189, e-mail <tomnagel@iwaynet.net>.

Oklahoma - Central Oklahoma Soaring, George Voss, (405) 692-1122.

Oklahoma - Tulsa R/C Soaring Club (TULSOAR), http://www.mccserv.com/tulsoar

Oregon - Portland Area Soaring Society (PASS), Pat Chewning (Secretary), 16766 NW Yorktown Dr., Beaverton, OR 97006, (503) 645-0323, e-mail: patch@sequent.com, www.europa.com/~patch/

Oregon - Salem Soaring Society, Al Szymanski, CD, (503) 585-0461, http://home.att.net/~aszy/sss/> for club's home page.

Oregon - Southern Oregon Soaring Society, Jerry Miller, 3431 S. Pacific Hwy. TRLR 64, Medford, OR 97501, e-mail Milljer@aol.com, ph/fax (541) 535-4410.

Tennessee - Memphis Area Soaring Society, Bob Sowder, 1610 Saddle Glen Cove, Cordova, TN 38018, (901) 751-7252, FAX (901) 758-1842.

Tennessee - Tullahoma (Southern Middle Area), Coffee Airfoilers, Herb Rindfleisch, 106 Inglewood Circle, Tullahoma, TN 37388, (931) 455-1836, <herb@cafes.net>.

Tennessee - Soaring Union of Nashville, Terry Silberman, PO Box 17946, Nashville, TN 37217-0946, (615) 399-0846.

Texas - aerotowing, Dallas area, Andrew Jamieson, 9426 Hillview, Dallas, TX 75231, (214) 349-9346, e-mail ajsleep@aol.com. Larry Sengbush, (972) 291-4840.

Utah - Intermountain Silent Flyers, Tom Hoopes, (801) 571-3702 (eve). "Come Fly With Us!"

Vermont - Steve Savoie, 926 Gage St., Bennington, VT 05201, (802) 442-6959.

Virginia - Blue Ridge Area Soaring Society (Central Virginia - Waynesboro), Tom Broeski, (540) 943-3356, <tjb@rica.net>.

Virginia - Tidewater Model Soaring Society, Herk Stokely, (757) 428-8064, herkstok@aol.com.

Virginia - Appalachian Soaring Association, Virginia's Southwest (Bristol area), Greg Finney, 106 Oakcrest Circle #5, Bristol, VA 24201; (540) 645-5772, e-mail <gfinney@naxs.com>.

West Virginia & Pennsylvania - Tri-State Soaring, Chip Vignolini, 2784 Mill St., Aliquippa, PA 15001; (724) 857-0186, Voicemail (412) 560-8922, <vdne30a@prodigy.com>.

Washington - Seattle Area Soaring Society, Waid Reynolds (Editor), 12448 83rd Avenue South, Seattle, WA 98178; (206) 772-0291.

Wisconsin - Valley Aero Modelers, Lee Murray, 1300 Bay Ridge Rd., Appleton, WI 54915; (920) 731-4848, <lmurray@athenet.net>.

Outside U.S.A.

Australia - Southern Soaring League, Inc., Mike O'Reilly, Model Flight, 42 Maple Ave., Keswick SA 5035, Australia. Phones: ISD+(08) 8 293-3674, ISD+(08) 8 297-7349, ISD+(018) 8 082-156 (Mobile). FAX: ISD+(08) 8 371-0659.

Canada - Montreal Area - C2VM Glider Club, Jacques Blain (President), days (514) 443-5335, eve. (514) 652-6167.

Canada - Greater Niagara Area Thermal Soarers (GNATS), Flat Field Soaring & Aerotowing, Gerry Knight, (905) 934-7451 or Don Smith, (905) 934-3815.

Canada - MAAC Men Gliding Club, Jim Holland, 168 Verona Dr., Winnipeg, Manitoba, Canada R2P 2R8, (204) 697-1297.

Canada - Southern Ontario Glider Group, "Wings" Programme, dedicated instructors, Fred Freeman, (905) 627-9090, or Bill Woodward, (516) 653-4251.

England (CIAM Flyer), Jack Sile (Editor), 21 Bures Close, Stowmarket, Suffolk, IP14 2PL, England; Tele. # 0449-675190.

England (southwest) - Sean Walbank, Woolcombe Hays, Melbury Bubb, Dorchester, Dorset, DT2 0NJ, phone 01935-83316.

Hong Kong - Robert Yan, 90 Robinson Road, 4th Floor, Hong Kong, (852) 25228083, fax (852) 28450497, yanr@asiaonline.net.

Japan - Dr. Paul "Sky Pilot" Clark, 2 - 35 Suikoen Cho, Hirakata Shi 573, Osaka Fu, Japan; IAC+(81) 720-41-2934, <pclark@osk3.3web.ne.jp> http://www3.osk.3web.ne.jp/~pclark/skypilot/

Scotland - Ron Russell, 25 Napier Place, South Parks, Glenrothes, Fife, Scotland KY6 1DX, ph. 01592 753689.

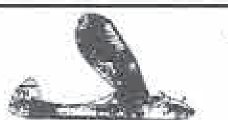
RCSD Index/Database

Available from: <http://www.athenet.net/~atkron95/pcsoar.htm>. Or, send 3.5" high density disks & SASE with stamps for 2 oz. Lee Murray, 1300 Bay Ridge Rd., Appleton, WI 54915; (920) 731-4848 after 5:30 pm weekdays or on weekends, <lmurray@athenet.net>.

Reference Material

Summary of Low-Speed Airfoil Data - Volume 3 is really two volumes in one book. Michael Selig and his students couldn't complete the book on series 3 before series 4 was well along, so decided to combine the two series in a single volume of 444 pages. This issue contains much that is new and interesting. The wind tunnel has been improved significantly and pitching moment measurement was added to its capability. 37 airfoils were tested. Many had multiple tests with flaps or turbulation of various configurations. All now have the tested pitching moment data included. Vol 3 is available for $35. Shipping in the USA add $6 for the postage and packaging costs. The international postal surcharge is $8 for surface mail to anywhere, air mail to Europe $20, Asia/Africa $25, and the Pacific Rim $27. Volumes 1 (1995) and 2 (1996) are also available, as are computer disks containing the tabulated data from each test series. For more information contact: SoarTech, Herk Stokely, 1504 N. Horseshoe Circle, Virginia Beach, VA 23451 U.S.A., phone (757) 428-8064, e-mail <herkstok@aol.com>.

"Aerotow '97' Elmira!" video taken at the Annual Northeast Aerotowing Fly-in, New York. 56 minutes of great flying, interviews, pristine scale models, demos, full-scale as well as models, and rare vintage film from Harris Hill in the 1930's. Check or money order, $24.95 plus $3.00 S&H (U.S.), payable to John Derstine, RD 3# Box 336, Gillett, PA 16925; (717) 596-2392, <johnders@postoffice.ptd.net>.
S&H foreign: $6 Canada/Mexico, $7 Europe, $8 Asia/Africa, $8.50 Pacific Rim. VHS format, NTSC standard. PAL format $40 + applicable shipping.



The Vintage Sailplane Association

Soaring from the past into the future! The VSA is dedicated to the preservation and flying of vintage and classic sailplanes. Members include modelers, historians, collectors, soaring veterans, and enthusiasts from around the world. Vintage sailplane meets are held each year. The VSA publishes the quarterly BUNGEE CORD newsletter. Sample issues are $2.00. Membership is $15 per year. For more information, write to the:

Vintage Sailplane Association
13312 Scotsmore Way
Herndon, VA 22071 USA

Hobby Shops that Carry RCSD

Finney's Hobbies
3455 Peachtree
Industrial Blvd. Ste. 980
Duluth, GA 30096
(770) 495-8512

Gunnings Hobbies
550 San Anselmo Ave.
San Anselmo, CA 94960
(415) 454-3087

Gyro Hobbies
23052 Lake Forrest Dr.
Unit C2
Laguna Hills, CA
(714) 583-1775

Gyro Hobbies 2
17431 Brookhurst Unit H
Fountain Valley, CA 92708
(714) 378-8924

Hobbies"N Stuff
9577-L Osuna Rd. NE
Albuquerque, NM 87111
(505) 293-1217

Hobby Town U.S.A.
8060 S. 84th St.
La Vista, NE 68128
(402) 597-1888

Hobby Warehouse
4105 South Street
Lakewood, CA 90712
(562) 531-8383

King R/C
Five Forks Village
King, NC 27021

Tim's Bike & Hobby
2507 Broadway
Everett, WA 98201
(206) 259-0912

BBS/Internet

Internet soaring mailing listserve linking hundreds of soaring pilots worldwide. Send msg. containing the word "subscribe" to soaring-request@airage.com. The "digestified" version that combines all msgs. each day into one msg. is recommended for dial-up users on the Internet, AOL, CIS, etc. Subscribe using soaring-digest-request@airage.com. Post msgs. to soaring@airage.com. For more info., contact Michael Lachowski at mikel@airage.com.

International Scale Soaring Association

There is a growing interest in scale soaring in the U.S. We are dedicated to all aspects of scale soaring. Scale soaring festivals and competitions all year. Source for information on plans, kits, accessories and other people interested in scale. For more information, write to:

International Scale Soaring Association
37545 Oak Mesa Drive
Yucaipa, CA 92399-9507
e-mail: 70773.1160@Compuserve.com

T.W.I.T.T.

(The Wing Is The Thing)

T.W.I.T.T. is a non-profit organization whose membership seeks to promote the research and development of flying wings and other tailless aircraft by providing a forum for the exchange of ideas and experiences on an international basis. T.W.I.T.T. is affiliated with The Hunsaker Foundation which is dedicated to furthering education and research in a variety of disciplines. Full information package including one back issue of newsletter is $2.50 US ($3.00 foreign). Subscription rates are $18.00 (US) or $22.00 (Foreign) per year for 12 issues.

T.W.I.T.T., P.O. Box 20430
El Cajon, CA 92021

Seminars & Workshops

Free instruction for beginners on construction & flight techniques, week-ends (excl. contest days), "AJ" Angelo, South Bay Soaring Society (San Jose area), (415) 321-8583.

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.

Send for your aspirant form, today:

League of Silent Flight
c/o AMA
P.O. Box 3028
Muncie, IN 47302-1028 U.S.A.

Sailplane Homebuilders Association (SHA)

A Division of the Soaring Society of America

The purpose of the Sailplane Homebuilders Association is to stimulate interest in full-size sailplane design and construction by homebuilders. To establish classes, standards, categories, where applicable. To desiminate information relating to construction techniques, materials, theory and related topics. To give recognition for noteworthy designs and accomplishments.

SHA publishes the bi-monthly ***Sailplane Builder*** newsletter. Membership cost: $15 U.S. Student (3rd Class Mail), $21 U.S. Regular Membership (3rd Class Mail), $30 U.S. Regular Membership (1st Class Mail), $29 for All Other Countries (Surface Mail).

Sailplane Homebuilders Association
Dan Armstrong, Sec./Treas.
21100 Angel Street
Tehachapi, CA 93561 U.S.A.

ESL

The Eastern Soaring League (ESL) is a confederation of Soaring Clubs, spread across the Mid-Atlantic and New England areas, committed to high-quality R/C Soaring competition.

AMA Sanctioned soaring competitions provide the basis for ESL contests. Further guidelines are continuously developed and applied in a drive to achieve the highest quality competitions possible.

Typical ESL competition weekends feature 7, or more, rounds per day with separate contests on Saturday and Sunday. Year-end champions are crowned in a two-class pilot skill structure providing competition opportunities for a large spectrum of pilots. Additionally, the ESL offers a Rookie Of The Year program for introduction of new flyers to the joys of R/C Soaring competition.

Continuing with the 20+ year tradition of extremely enjoyable flying, the 1999 season will include 14 weekend competitions in HLG, 2-M, F3J, F3B, and Unlimited soaring events. Come on out and try the ESL, make some new friends and enjoy camaraderie that can only be found amongst R/C Soaring enthusiasts!

ESL Web Site: http://www.eclipse.net/~mikel/esl/esl.htm
ESL President (99-00): Tom Kiesling (814) 255-7418 or kiesling@ctc.com

Advertiser Index

Advertising Note

Please note that the cut-off date for classified & display ads is the 15th of the month.

Subscription Costs
USA: $30 First Class
(Texas res., please add $1.52 tax.)
Canada & Mexico: $30 Air
Europe/U.K.: $45 Air
Asia/Pacific/Middle East: $52 Air

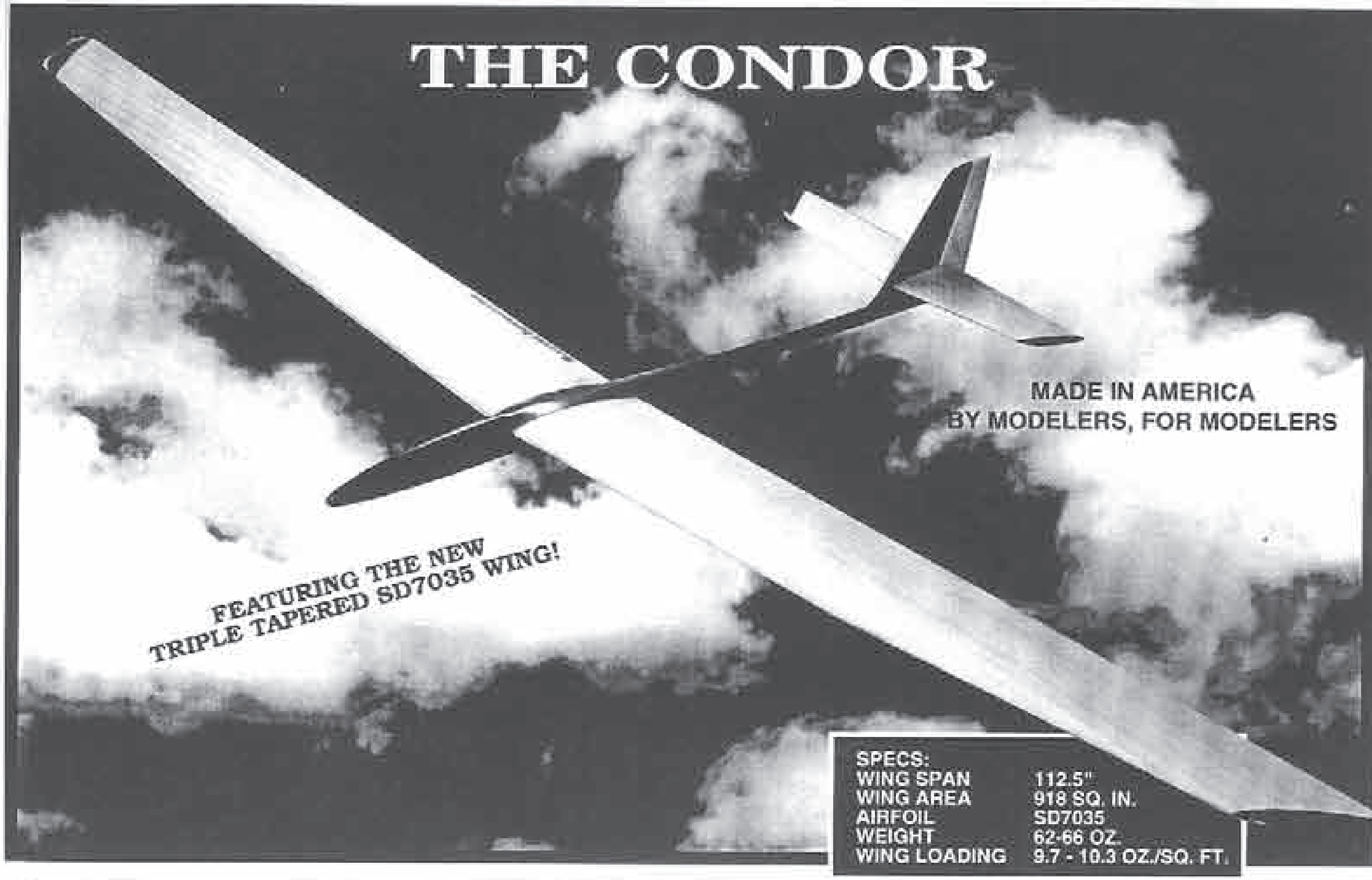
Back Issue Cost
Back issues are available for 1998. All are mailed via first class or airmail.
U.S.A., Canada, Mexico: $2.50 Per Issue + Tax (Texas Only: 7.25%)
United Kingdom/Europe: $3.75 Per Issue
Asia/Africa/Middle East: $4.35 Per Issue

- ☐ Please renew my current subscription.
- ☐ Please enter my new subscription to *RCSD*.
- ☐ Please send the back issues I have selected.

(Check or Money Order, only, please. U.S. funds.)

Name________________
Address________________

Please return to R/C Soaring Digest, P.O. Box 2108, Wylie, TX 75098-2108



The Condor is designed by Mark Allen, who is considered one of the best model sailplane designers in the United States, if not the world. Mark has taken all of his previous experience in competition thermal duration flying, plus all the knowledge he has gained from his earlier contest and sport designs, to design the Condor. Mark Allen's previous planes, to name only a few, are: Falcon 880 and 800, Falcon 600, Swift, Thermal Eagle, Vulcan, Night Hawk, Sky Hawk, Electric Hawk, Falcon 550E, Rocket, Pocket Rocket and, of course, the molded, world championship F3B Eagle. By taking the best of these designs and the new construction techniques available today, Mark has come up with, what we feel, is the absolute best open-class sailplane available.

The wings are made in America by Ron Vann, owner of Spectrum Enterprises. Ron is also an avid competition flier, and is considered to be one of the best wing manufacturers in the industry. Taking his years of experience in manufacturing wings, Ron has produced wings and stabs for the Condor that we feel are world class. Starting with the spar that Mark Allen designed, Ron uses only the best and most accurately cut foam cores available. He then uses hand-picked obechi from Kennedy Composites, which is applied with West Systems epoxy.

CONDOR

Tomorrow's Sailplane, Technology Today

This is after he has first reinforced the wing with carbon fiber and fiberglass. The servo wells are routed out, as are the flaps and ailerons. What this means for the sailplane enthusiast is a minimum amount of work before getting the sailplane into the air. The wing is light but strong enough to take "pedal to the metal" launches. Also available as an option is Ron's unique internal capped hingeline. This means even less work for the modeler.

The fuselage is made by Steve Hug, owner of the Fuse Works. Steve is another master at what he does. Fuse Works makes what we consider to be the best fuselage in the business. Steve uses only the best fiberglass and Kevlar™ available. All fuselages are manufactured using the West Systems epoxy. Steve's fuselages have the least amount of pinholes, if any, that we have seen. In fact, the fuselage is so pretty that many people do not paint it. The fuselage is extremely light, and yet strong enough for very aggressive flying and landing. For those with very little building time, and those who don't like to paint, there is an optional pre-painted, in the mold, fuselage which includes a unique carbon fiber canopy.

All kitting is done at Slegers International's new and larger manufacturing facilities. We have spared no time or expense with supplying the modeler with the best materials available. The kit contains pre-sheeted wings and stabs by Ron Vann, fiberglass and Kevlar™ reinforced fuselage by Steve Hug, 3/8" diameter titanium wing rod from Kennedy Composites, optional 3/8" diameter steel wing rod by Squires Model Products, control horns and tow hook by Ziegelmeyer Enterprises, pushrods by Sullivan, or optional one piece steel rods. All wood is custom cut. Specially cut basswood of 60" is supplied to eliminate splices in leading edge, flaps and aileron capping. All balsa is hand picked, light to medium, to ensure light weight wing tips, stab tips, and rudder. Aircraft ply is used for the pre-fit servo tray and towhook block. A comprehensive instruction manual is included.

The Condor, designed by Mark Allen, wings by Ron Vann, fuselage by Steve Hug, and kitted by Slegers International, we feel, is the best open-class, thermal duration sailplane available, at an affordable price of $395.00 plus S&H.

★ VISA ★ MASTERCARD ★ DISCOVER ★

SLEGERS INTERNATIONAL

P.O. Box 364, Long Valley, NJ 07853
Shipping: 35 Hacklebarney Rd., Long Valley, NJ 07853

(908) 879-9964 - FAX (908) 879-8177
http://www.slegers.com