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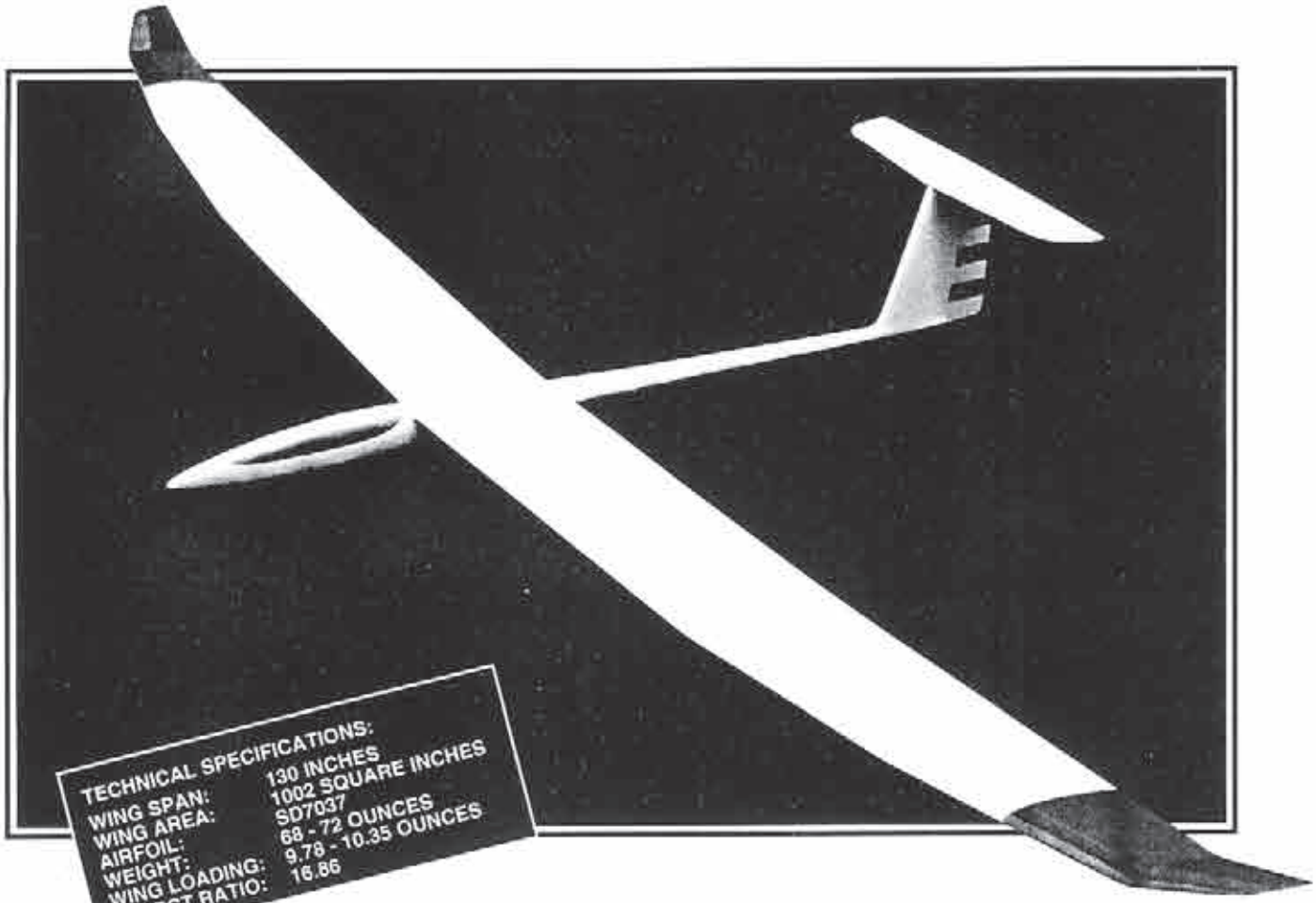
R/C *Radio controlled* SOARING DIGEST

THE JOURNAL FOR R/C SOARING ENTHUSIASTS

PREDATOR XL

A WORLD CLASS ORIGINAL DESIGNED BY DAVE HILL



TECHNICAL SPECIFICATIONS:

WING SPAN:	130 INCHES
WING AREA:	1002 SQUARE INCHES
AIRFOIL:	SD7037
WEIGHT:	68 - 72 OUNCES
WING LOADING:	9.78 - 10.35 OUNCES
ASPECT RATIO:	16.86

This fine kit features include:

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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>.

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RCSD On-Line Event Coverage

We've been busy. As some of you have already discovered, the *RCSD* web page now offers event coverage on-line, and the photographs are in color! As of this date, 5 new articles can be accessed, and there are 2 additional photos by Terry Edmonds on the F3J Championships included, as well. We hope to continue, and provide you with this sort of coverage on an on-going basis.

Our thanks to Bill & Bunny Kuhlman for all the coding work they went through in order to set up the pages, upload all the articles, and putting up with us amateurs. We were not aware of the "smart quote" nix, for example, so if any of you see glaring errors where numbers come up in unexpected places, we hope you'll forgive us for these small mistakes!

Thanks also go to authors Phil Landray & Gerry Knight (Canada), Scott Marshall (Utah), Dave Lear (Texas), Edwin Wilson (Kentucky), and Gordy Stahl (Kentucky) who wrote the reports for your soaring enjoyment.

As Dave Register said, "Sounds like a good mix of electronic and print forms." We hope that all of you agree. Dave has also come up with a list of suggestions of specific things he'd like to see in this sort of report; we hope to make that available on-line, soon, as well.

In the meantime, this frees us to concentrate on news, information and diagrams through the pages of *RCSD*. And, it's important to note that **NOT all** event information will be exclusively on-line; there will be times when we feel it's appropriate for the printed form. Please continue to keep us posted on future events, as well! And, we're **still** looking for a volunteer to coordinate the event schedule, too.

Next month, we'll announce the Volz servo winners, and we hope to have something new to report, as well. As always, if any of you have any comments or suggestions, we'd like to hear from you!

Happy Flying!
Judy & Jerry Slates

Dave Reese (Santa Cruz, California) flies a CR High Performance Products Contender at Sunset Beach State Park near Watsonville, California.

Photo by Dave Garwood, Scotia, New York.

Jer's Workbench

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Decisions, Decisions, Decisions

Now that the weather has cooled down to a more acceptable mid-90 degree level, I found myself wanting to start a new winter project.

I blew the dust off a box of drawings that have been collected over the years, carefully sorting through all my hidden treasures, many of which I had completely forgotten about. Over the next couple of days, I considered first one, and then another, gradually eliminating each in turn for one reason or another. And, then, Eureka!! I found a perfect subject for my next project, a 1/5 scale Pilatus B-4!

I had ordered this particular set of drawings, Plan #637, several years back from Verlag fur Technik und Handwerk GmbH, Postfach 1128, 7570 Baden-Baden Germany. I remember when they arrived; I realized immediately that this model was going to be a real bear to build; they've been collecting dust in the box ever since... Ah, yes. And, they're written in German, of course...

I don't read German well, hardly at all in fact, so the first task was to settle into a comfortable chair and begin an analysis of the drawings. Once done, I converted the measurements from metric, and proceeded to lay out the work.

I was not expecting any surprises, as everything appeared straight forward. The first task now is to prepare a list of the building materials required for the construction of the model; then, I'll see what supplies and scraps are on hand, and what supplies will have to be purchased from the local hobby shops, and home builder supply stores.

Once done, I plan to construct the fuselage first, as I expect it to be the most time consuming; the fuselage will be built on a keel and then strip planked. Later on, I'll share exactly how to accomplish this task.

The keel must be layed out properly; the assorted fuselage bits must be assembled perfectly. If I do not get everything just right, I fear nothing will fit properly later on, as all the parts come together. Hopefully next month, we'll be well underway!

■

News Flash

The 11th Annual Southwest Classic (formerly the Southwest Winter Soaring Contest) will be held this coming year on February 6th and 7th, 1999. This is the first stop on the Southwest Triad circuit, which includes the Pasadena Rosebowl contest and the Visalia Fall-Fest. The location this year has changed to a bigger, better venue. It will be held at Schnepf Farms in Queen Creek, AZ, about 20 minutes southeast of the old contest site. The club field at Rodeo Park is still actively used, but more room was needed for the 175 pilots expected back this year. The site offers a limited number of RV sites with electric and water, public restrooms with showers, and lots of grass nearly everywhere with unlimited camping and parking areas. The contest will be a precision/duration and add'em up event, with awards for Grand Champion, 1-5 P.D., 1-5 Add'em up, 1-3 Two meter, 1-3 R.E.S., 1st Team and 1st Gray Cup. For more information, call CD Dave Wenzlick, (602) 345-9232, E-mail azdw@uswest.net or visit CASL at http://www.public.asu.edu/~vansanfo/casl/

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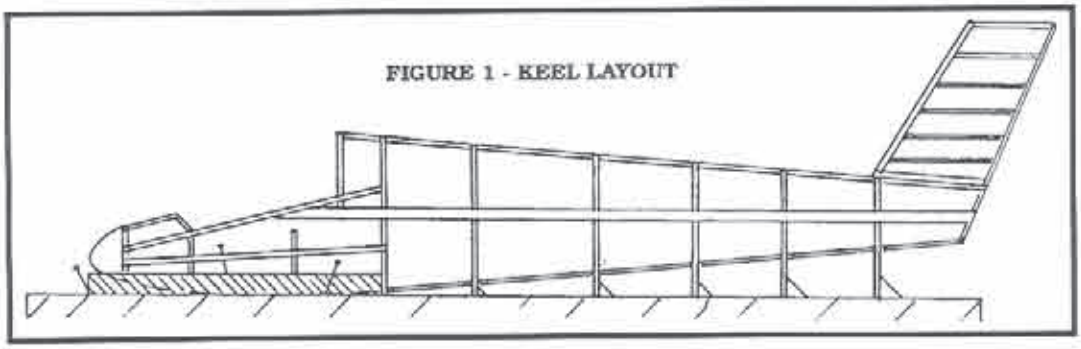

FIGURE 1 - KEEL LAYOUT

Midnight Mongo

By William G. Swingle II
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Recently, two local pilots, Mike and Roy, decided to build a large foamie. Specifically, they built an 8 foot span flying wing foamie that they named Mongo. (*RCSD* July, 98) It flew very well and was deemed a complete success. In fact, it was successful enough that they decided to try kitting the airplane and formed their own company, BASH enterprises.

I was fortunate to be present when the first prototype was launched. I got lots of stick time on that plane and had to have my own. One problem though did emerge. How would I transport a plane that large in my car? With its 8 foot wing span, there was no way Mongo would fit in my vehicle. It wouldn't even be close. Then an idea occurred to me. I could build it in two pieces.

Some trial and error experimenting showed that a two piece construction would be a tight squeeze. But, at least it would fit. My transportation problem was solved! I could own a Mongo after all.

I got my hands on a second generation prototype. It's close to the original prototype with only some minor changes, so my hopes were high as I began assembling it. Its construction is quite similar to most other foamies. The only real differences are due to Mongo's large size. Because this plane has lots of wing area (12 sq. feet!), those old obstacles, size and weight, are far less concerning. I used a large battery pack and standard servos. It was great! I felt liberated, and built with no concern for what radio gear to use or where to put it.

The instructions call for two servos per elevon. This along with the large wing span means you'll have to do some minor wiring, but a Y harness and a few extensions could eliminate that. Because I was building it in two pieces I couldn't easily put the receiver and battery right on the center joint as I typically do. So they were offset several inches to the side. I grouped the receiver, battery and switch on the same wing half. This makes one wing a bit heavier than the other and shifts the lateral CG to one side. However, Mongo's large size makes the difference trivial. Grouping these three on one side simplifies daily assembly and disassembly because only one connection has to be made between the wing halves.

A covering material that's become popular lately is colored packing tape. So, in the interest of cost and simplicity, I decided to try it. After applying a few strips I was convinced. The tape is very simple to apply and looks good. It even responds favorably to heat. Though it doesn't shrink nearly as tightly as the typical iron-on films, it does tighten up with a heat gun. The only difficulty I had was the amount of covering that Mongo needs. I didn't have enough and had to get more to finish. I forgot that the wing has a top and bottom; thus I had two times 12 or 24 square feet to cover! Egad!

The supplied elevons are 3 inch wide balsa. But, I decided to try coroplast for the elevons. Mike and Roy humored me, but thought balsa would be a better choice. To be honest everyone I asked felt balsa would be better, but I didn't listen. I really wanted to try the coroplast. I've used it on other flying wings with good results, so I decided to try it again. I also wanted to maximize the roll rate, so I used wider elevons that were 4 inches at the tip and 2 inches at the root. As I was examining the freshly cut surfaces, the first thing I noticed is that a 4 inch wide control surface is GARGANTUAN! It seemed way too big but, realizing I'm not accustomed to planes this large, I assumed myself ignorant and continued with the coroplast.

I would have liked to install the servos flat, sunk below the wing surface. But, as is often the case, I was in too much of a hurry and decided to stick to a simple vertical installation. This speeds installation and leaves the pushrod and servo horn easily accessible.

Though it's usually not a major portion of the construction process, I really enjoyed installing the pushrods and setting the throws. Two servos operating in tandem make a great sound. In the same way that a twin engine aircraft will sound much better than a single, the blending of the similar tones makes the sound beautiful.

At 2:30 in the morning I finished Mongo. This, along with my chosen coloring of solid black, led me to christen my plane the Midnight Mongo. I think it sounds much better than the Two Thirty Mongo.

The first flights were disappointing. The inverted performance and any high G maneuvers were terrible. My Mongo was nothing like the others which were zipping about the slope while I was standing there scratching my head. Why? I was stumped. Luckily both Mike and Roy (along with several others) were present to remind me of my choice to use the coroplast elevons. The consensus was clear. Toss the coroplast! I replaced my coroplast elevons with the supplied balsa and my problems went away. The Midnight Mongo flew great. It was like a new plane. I'm still amazed at the difference. Now the inverted performance is terrific and loops are super tight. Though I'm not sure, I suspect the problem with the coroplast was that it doesn't have sufficient stiffness for the wide control surfaces.

I've found the recommended CG to be fairly conservative. I've been able to move mine back quite a bit. However, this is somewhat misleading. With an average size sloper a tip stall can be quite sudden and exciting. This can make an aft CG something worthy of much caution. But Mongo's tip stalls are very gentle and forgiving. This makes an aft CG less concerning. Currently, I think I'm a bit too far aft, but I'm still experimenting to find the location that works best. I may just leave it where it is because the aft position makes loops very tight and pitch response immediate.

Dori Swingle holds the finished Midnight Mongo.

I frequently catapult launch my other foamies with a short length of hi-start tubing. It can be quite exciting and is great for those days when the wind doesn't cooperate. I was leery of catapult launching an 8 foot airplane, but the idea was too tempting to resist. I had to try it. I taped a crude tow hook just forward of the mid-point between the CG and the nose, and walked to the ball field next door. I tried a conservative launch and used only my conventional method. I tried just one strand of Hobby Lobby Orange tubing with a medium stretch. The launch was smooth as silk and the plane flew straight and true into the sky. But, the launch wasn't nearly high enough. I threw caution to the wind. I used two strands of the rubber and stretched the tubing hard. The plane flew just as smooth as before and seemed to like the extra stretch.

On subsequent launches, I noticed a large variation in launch height for what were fairly small changes in stretch. This tells me there is still some extra launch height which could easily be gained. The bungee length typically used for combat foamies is 20 feet. Mongo seems to need a longer length in order to have sufficient acceleration time on boost.

I really like my Midnight Mongo. Because of its size, it's rock steady which makes formation flying much more fun. In fact, I've been flying it more than any other plane. Plus, it's a guaranteed eye catcher at the slope.

■

on the Wing

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Mike Carris' Swallow

Mike Carris of Albuquerque, New Mexico has built a beautiful swept wing glider for thermal flying. Named Swallow, Mike's sailplane is a high aspect ratio 'wing with winglets.

Swallow, as shown in the included 2-view, has a 122 inch wing span of approximately 1020 in^2. Two inches of the span is due to the fuselage width. The wing has a double taper, with the main taper extending out to within 9.5 inches of the tip; the second taper extends all the way out to the tip. The root chord is ten inches, and the wing main taper gives a theoretical tip chord of 7.5 inches. The second taper removes 1.5 inches from leading edge of the wing tip, giving a true tip chord of five inches. There is no dihedral.

Mike used the EH 2.0/10.0 airfoil across the entire span. Wing twist was computed using a $C_{Lcruise}$ of 0.45 and a quarter chord sweep angle of 21 degrees. The outer half of each wing is twisted 1.5 degrees. The CG is 12.5 inches behind the leading edge of the wing root.

The center sections have 28 inch flaps of 25% chord. To keep the flaps off the ground, Mike added a two inch skeg to the bottom of the fuselage aft of the CG. The ailerons, also with 25% chord, cover the outer panel up to the beginning of the second taper, 9.5 inches from the wing tip. The winglets have a five inch root and use the same taper as the last 9.5 inches of the wing. They have a nine inch height and a tip chord of three inches.

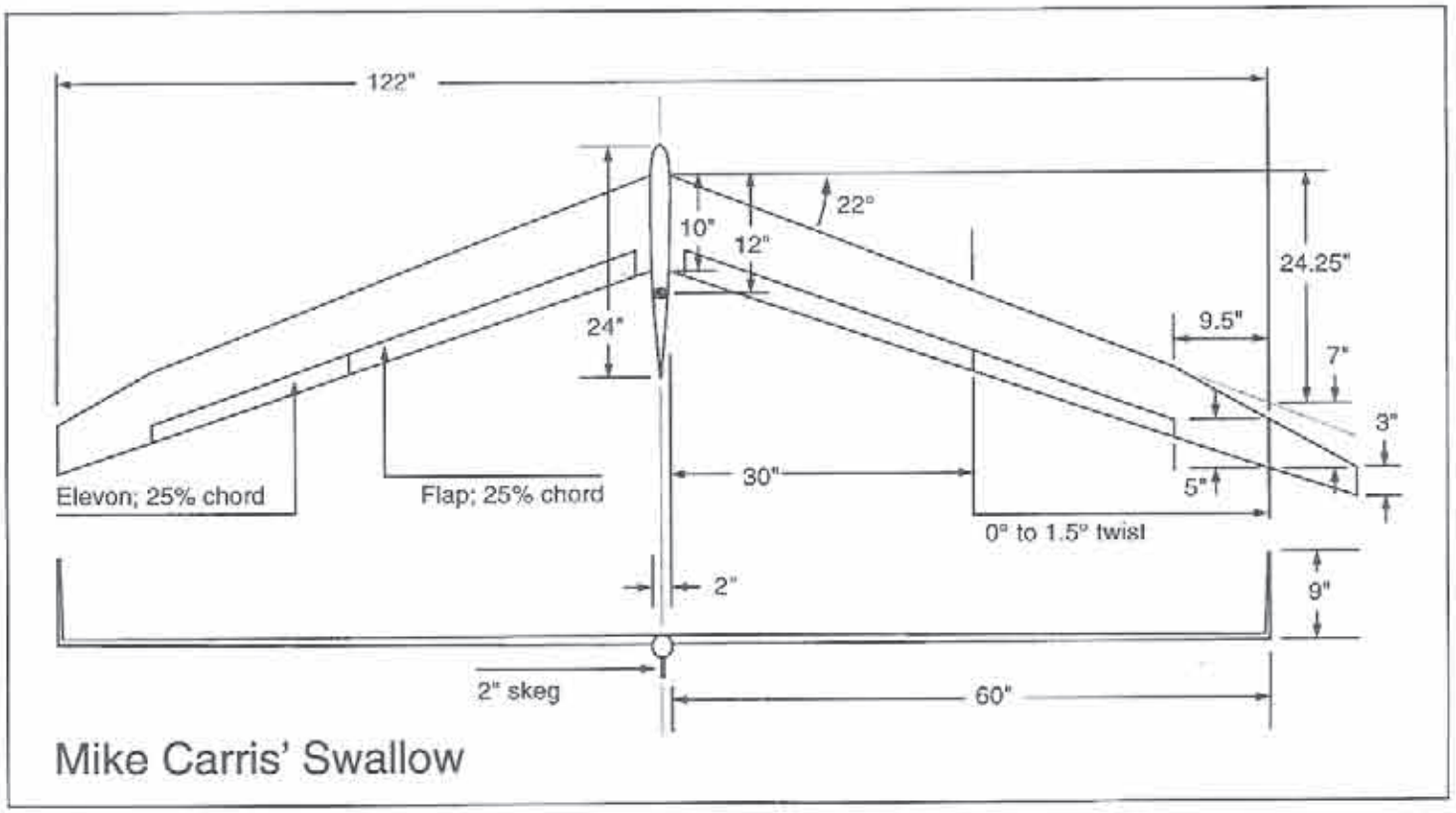
The fuse is 24 inches long and about 1.5 inches deep. There is a single tow hook which is mounted one quarter inch in front of the CG.

Mike used Joe Wurts' spreadsheet for determining the carbon-glass ratios. Construction consists of one layer of 3.5 oz. unidirectional carbon and 3.2 oz. E-glass on a bias over all surfaces. There is also an extra layer of 3.5 oz. unidirectional carbon on the top of the wing root which extends out 12 inches. This fabric is cut to an oval shape. A half inch carbon rod passes through the spar about five inches from the root. The wing is very stiff, and resists bending and torsional loads very well.

Flight behavior borders on exceptional. Swallow is very easy to control once off the line, and performance potential is definitely there. Launching, however, has been quite problematic, as the 'wing consistently veers and tries to roll off to one side. The difficulty during launch is most likely due to two conditions:

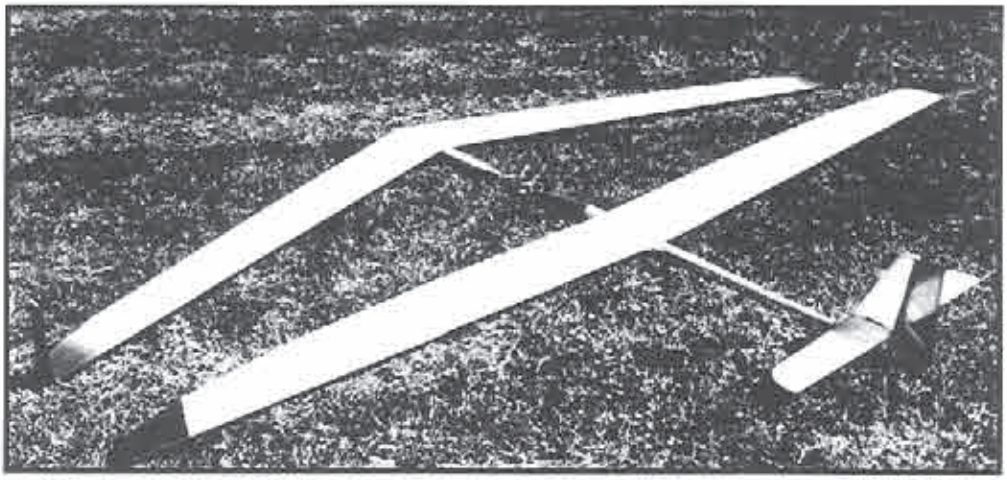
- First, the tow hook is mounted to the bottom of the fuselage, a location well below the vertical CG. This creates a lever arm which tends to over-rotate the wing at the most critical time. Moving the tow hook forward can reduce this effect, but only with an accompanying loss of launch altitude. Common methods of solving this problem

Mike & his Swallow.



Mike Carris' Swallow

Mike's Swallow and a friend's laser.



involve either recessing the single tow hook or mounting two tow hooks to the underside of the wing. The latter solution dictates use of a bridle, but has proven to be extremely effective.

- A lack of anhedral is a second factor in the poor launch dynamics. Yaw-roll coupling in swept wings becomes more intense as C_L gets higher, as during launch. Anhedral (negative dihedral) would both reduce yaw-roll coupling and lower the CG on the vertical axis.

Mike's Swallow is currently unflyable due to damage received during launch. While the damage is fixable, Mike has instead moved on to a swept wing tailless RC-HLG. He does, however, have plans for another, somewhat smaller, Swallow.

If you have a project you'd like to share with *RCSD* readers, or would like to see a particular subject discussed in a future column, please contact us at P.O. Box 975, Olalla WA 98359-0975, or by e-mail at <bsquared@halcyon.com>.

■

TECH TOPICS

Dave Register
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Harley Michaelis, LSF023, is well known for many years as a designer of numerous sailplanes, the latest of which is his open-class GENIE. Harley has used many clever concepts in these ships and his latest idea may have very widespread application for all classes of sailplanes and powered planes. I've made a bench mock-up of the system he's going to describe for us this month. It really works and will wind up in my Psyko if I can ever get down to the basement workshop for a couple of days!

Harley has been using a socketless (non-coupler) version for many years on his JOUSTER and GENIE sailplane designs. This was published in the Sept., 1993 issue of *Model Aviation* under the title "Direct Aileron Drive System (DADS)". That system involved a bent rod going into a slot in the aileron, but had a wire pushrod and some intermediate linkage to the servo. Using a direct drive from the output gear was always a consideration, but a simple way to do that wasn't readily apparent. While sorting through his junk box one day, he came across a tire valve cap and, with some experimentation, found it could be splined with epoxy to snugly couple to the servo output gear. This led to the no-slop, all-internal Rotary Aileron Drive System (RADS) and the Rotary Flap Drive System (RFDS) that is the subject of this column. Using these, totally clean wings, uncluttered by any external hardware, are readily achievable.

Harley's web site provides additional details for this type of installation. These include suggestions for three piece wings (plug in tip panels - click on the thumbnail sketch for more information) as well as a method for rudder control with all internal linkage. Information on his GENIE design is also available so if you have web access, check it out.

Well, I've said enough. Let's let Harley carry on from here.

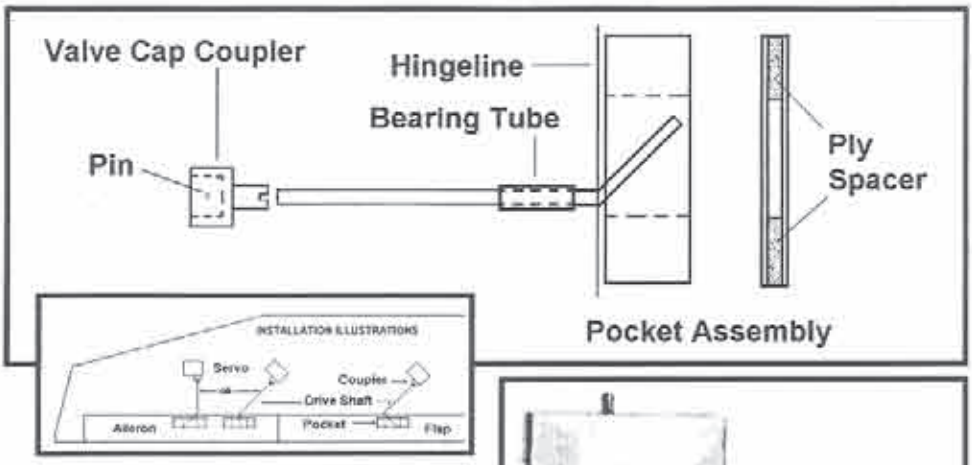
The Rotary Driver System

by Harley Michaelis, LSF023
http://www.rc-aero.com/lsf023/
(Click on RADS/RFDS link)

System Discussion

This system is all-internal and contributes no slop. There are only 3 elements in it, namely: (1) A Coupler on the output gear, (2) A Pocket in the moving surface, and (3) A Drive Shaft between. None of the usual hardware is used. The shaft slips into the pocket and works within it during deflection. Fore-aft movement of the bent end in the pocket during deflection avoids any binding from misalignment between the hingeline and pocket.

There is no hard point of attachment, such as a clevis on a horn, so there is nothing to catch weeds or get ripped off. Since nothing hangs out, wings can be cleaner to reduce noise and parasitic drag. One F3B study concluded that the drag caused by 4 external linkages was equal to 5 to 10% of the total, and similar to that caused by a horizontal stab. This would lead to the conclusion that elimination of external linkages would have a positive effect on performance as well as enhancing appearance of the airframe.

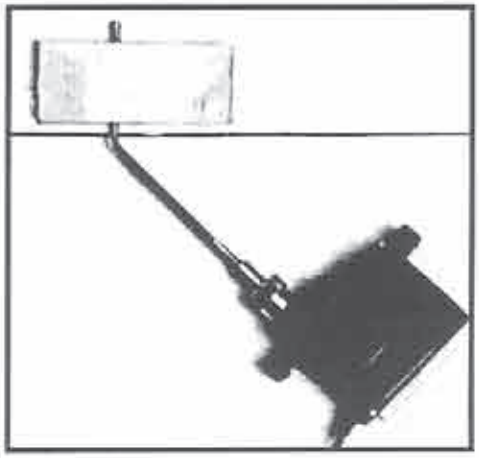


The sketch illustrates typical servo positioning in a plug-in wing panel. The flap servo goes in at 45 degrees relative to the hingeline and the shaft end has a 90 degree bend in it. The bent end of the flap drive shaft will operate in a fan pattern, so its opening needs to be wide enough to avoid jamming. Where possible, the aileron servo, with a 45 degree bend, may be similarly angled. The bent end of the aileron drive shaft then works virtually vertically, so the opening for it, side to side, can be quite narrow, such as 1/4". Full expected deflections, namely 90 degrees of down flap and 45 degrees of up aileron, are possible if hinges or structure do not restrict motion.

Coupler - Standard and Mini Servos: For standard and mini servos, the coupler is made from a screwdriver type tire valve cap (Tru-Flate Part No. 47-103, for example. Available at most auto supply stores.). Remove the washer and any loose parts from plated brass valve cap. Drill a 3/32" hole through the cap. For smaller shaft diameters, shim later by CA'ing in bits of tubing. Coat the servo case top & gear with PVA, Pic Slicker, paste wax, chapstick, etc. Fill the screw hole with wax. As needed, round the end of a piece of 4-40 rod, etc., to just seat in the hole. Wax the rod. Run the cap onto it to center around the output gear. With the cap against the case, temporarily bond the rod with a tiny bit of CA. Fill the cap about 2/3 full with quick epoxy being sure to avoid bubbles. Press to the case and hold a few minutes until it starts to set. Put the assembly aside and allow it to cure well. Then pull the coupler off the output gear, take out the rod and clean the parts.

Coupler - Micro Servos: Lightweight couplers can be fashioned out of 1/4" x 20, all-thread, socket-head nylon bolts, which typically have a 3/8" diameter round head. The opening in the head will be enlarged with a drill bit and splined as done in the valve cap.

You will need: The bolts, cut to 3/4" or so overall length, access to a drill press, 15/64" and 9/32" drill bits, preferably about the same length, a 1/4" x 20 tap and a flat 3/4" thick board to clamp to the drill press unless it comes with centering attachments.



To guarantee centering, square up the board and clamp it to precisely align to the front and one side of the drill press table. Position the table on the column so either bit can be placed in the chuck without moving the table on the column and lose centering. You want about 1" clearance between the end of the longer bit and the board. Insert the 15/64" bit and drill through the board. Remove that bit and tap the hole. If necessary to remove the board to tap, clamp back in the exact position. Remove the tap, seat a bolt to the board and put the 9/32" bit in the chuck. Lower to be even with the top of the bolt head. Then attach a wheel collar, tape, or adjust the depth-setting nuts for a 3/16" deep cut. Slowly drill to avoid melting the nylon. Remove bolt with pliers.

Properly done, there will be a clean opening with 3/64" thick walls. A dimple will have been made in the bottom to help in centering a small bit to make a pilot hole down the shank. Decide what size drive shaft you want to use and drill out accordingly so thin CA can get between the rod and the bolt. Trim shank to 1/4" or so. Optionally smooth off the threads. Be sure to heavily score the rod for a good bond.

Use a paper punch to make a round hole in masking tape, etc. Concentrically scribe a 3/8" or 7/16" circle around that hole. Position this over the output gear, as a guide to centering the head over the gear when forming the splines. Plug the pilot hole to prevent the epoxy from escaping.

Pocket: Make the pocket from the thinner, non-textured laminate (Formica, Nevamar, Wilsonite, etc.) used to face kitchen cabinets. (Free samples at building supply.) Spacers are ordinary aircraft ply, uniformly sanded for a snug fit to the shaft. Thin CA

bonds all the parts. Put the smooth side of the laminate inside. Make pockets 1/2" x 2" or so, with spacers 1/2" square. (Miniaturize as needed for HLG's.) Locate the servos as close to the hingeline as practical to keep the shafts short to minimize flex. Then locate the pockets laterally, setting the front edge back 1/16" from the hinge pivot line. Where possible, place the pocket near the top surface if top-hinged or near the bottom if bottom-hinged. Be sure the shaft bent end (5/8" to 3/4" long) is laterally centered in the slot. For sheeted frame surfaces, mount the pocket inside the sheeting on a broad base of thin (1/64", etc.) ply.

Installation Considerations

Shaft Bend Positioning: It is important that the elbow of the bend not pry between the top and bottom of the pockets during deflection. This is avoided by placing the pocket 1/16" or so behind the hingeline and placing the elbow slightly ahead of the hingeline. The sketch is meant to illustrate this positioning. The pocket is imbedded in the surface. In operation, the bent end of the shaft is either pushing a pocket down or lifting it up. The surface just goes along for the ride.

Hinge Locations: Hinges are best placed on or near the top of the wing for ailerons and on or near the bottom for flaps. Tape hinges work very well with the system. The front edge of the flap or aileron would be beveled as usual to allow down aileron or flap reflex.

Servo Location: Servos are located as near the inboard ends of a surface and as close to the hingeline as practical. This helps keep mass inboard and shaft length minimal to avoid flex. Pockets can be placed near the inboard end of the surface.

First establish the servo location, then the shaft's path to the hingeline and then the pocket's lateral location, relative to the bend. The servo would be mounted by whatever method is appropriate to it and the structure. Where a foam core is involved, follow this procedure:

Pre-Bagging/Skinning Steps and Servo Mounting: Before skinning or bagging, mark the path of the servo leads, hingeline, servo outline and pocket outline on the core underside. Router or hot wire the paths for the leads as usual. Servos should be mounted firmly, such as on a 1/16" ply base with rails against the case and a bracket screwed over the case. Certain brands have cases with side flanges for screw-mounting. Decide how the servo will be mounted and outline the well perimeters for such mounting. The servo will be mounted with the Coupler attached to the output gear. Important! Wax up the output gear before attaching the Coupler. The well should allow clearance for the Coupler and also 1/4" or so clearance so it can be slipped off the gear and repositioned for neutral. Once the well is outlined, then mark 1/8" or so beyond its perimeter to establish where the skin should later be cut to peel off. Removed skin can be taped back as a cover, bearing on the 1/8" of foam.

After outlining where the skin is to be cut, make a template from thin plastic sheet (.014" bagging mylar will do nicely) placing a squared-up edge relative to an endcap and the wing rod, etc. Outline the well perimeter on the template, too. Drill small reference holes at key corners of the outer perimeter.

Pocket Installation: Make a snug rectangular opening in the core in which to press the pocket flush with the appropriate surface, namely with the top for ailerons and the bottom for flaps. If bagging, fill the slot in the pocket with waxed soft balsa. Epoxy the pocket flush with one side of the core. Fill in the other side with soft balsa. Seal around the pocket so bagging epoxy can't get in it under vacuum. Have reference marks to denote precisely where hingelines are to be cut after skinning.

Post-Skinning Steps: After skinning, cut ailerons and flaps away. Clear out the pockets. Position the template, make pinholes at the key perimeter points. Mark outline to cut. Use razor saw, rotary saw blade or fine dental burr in a Dremel tool to just cut through the skin. Work from a corner to peel it away.

Tunneling: The axis of the shaft should be aligned with the axis of the coupler. This may require slight tilting of the servo base. Router out the well accordingly. Put the coupler on the waxed output gear. With long drill bit, make a tunnel from the hingeline toward the coupler, keeping the tunnel aligned with the pocket involved. To assist in aligning axes, cut a length of 3/32" or 4-40 rod and temporarily run it through the tunnel toward the servo. Make it long enough to reach into the pocket. Deepen the well and angle its bottom to align axes and recess the servo. Epoxy the servo base in place. Mount the servo.

Hingeline Bearing: The rear end of shaft needs to be supported just ahead of the bend to avoid excess wobble within a pocket. A 3/4" length of plastic tube, such as pushrod material, will do fine. Open the tunnel as needed to get it in along the shaft axis. Wax up the temporary rod and epoxy the tube in place with the rod running through it. A little play between rod and tube is okay, but can be reduced by slipping a piece of 3/32" I.D. tube on the real shafts, next to be sized and attached to the coupler.

Real Shafts: Using stainless steel "filler rod" found at welding supply, make low radius 45 and 90 degree bends about 3/4" long in the end of rod pieces. Do this by inserting ends in a vise and pounding with a hammer close to the vise. Round the ends smooth. Size the rods so that with the forward ends inserted 3/8" into a coupler, the elbow of the bend will be located slightly ahead of the hingeline. If the fit is too tight to wick CA in, open the coupler with #41 drill bit. Heavily score the rods where they enter the coupler. Mark depth on the rod. Turn on the radio, put servo in neutral and position the coupler on the output gear so the notch in the coupler is accessible. Insert the rod so it is in neutral and drip fresh, thin CA glue into the assembly at the notch to wick-join the rod and coupler. **LET IT CURE SEVERAL HOURS, EVEN OVERNIGHT!** Properly done, the bond is so strong, the rod will actually twist before the bond will break. Trim skin away adjacent to the flap shaft to prevent it jamming against the skin edge during deflection.

Hinging: Slip the rod ends into the pockets. Tape masking or black tape at the ends to temporarily align, space and support the aileron or flap. Apply hinging tape as usual.

Pinning: With all finalized, drill a small hole through the coupler and output gear. Run a pin through the hole to retain the coupler on the gear.

Misc: Occasionally shoot a little graphite powder into the pockets. Occasionally blow out dust.

****

Harley has designed a compact Coupler that could be injection-molded and which would attach to any servo output wheel. The Drive Shaft assembly involved would be firmly secured to it with a set screw. The Coupler can be made with a tiny "universal joint" which would eliminate the need to align the axes of the servo output and the Drive Shaft. Harley is seeking a manufacturer to work with him to exclusively produce and market the system. Anyone who has such capability may e-mail him at hmlsf023@bmi.net and get pertinent information by asking for his "OVERVIEW" file. Dave.

■

GORDY'S TRAVELS

Winch is it?

Or, Tension on the Road!

Gordy Stahl
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GordySoar@aol.com

Over the years, the "sport" winch has come and gone, the basic design parameters staying pretty much the same. That holds true for the Little Big Winch (LBW). Of course, improvements have been added!

Walt Dimick designed the LBW as a premium device, not down to a price but up to a quality. With neatly machined anodized aluminum components, this winch is tiny and lightweight, yet extremely powerful.

Everything included is first class: foot pedal, battery quick disconnects, stakes for holding the winch in place and the turnaround..., Wow! That turnaround is awesome! Aluminum and anodized to keep it resistant to oxidizing, it features a low mass, 3.5" phenolic pulley with a lifetime lubed military spec bearing, and comes mounted on a steel stake. The good news is that the turnaround is also available by itself.

So, what's a sport/practice winch all about? Convenience and Control. Yep, that's right. The LBWinch is small and light and nearly as easy to set up as a bungy. Bungies are cheaper, but a winch allows you to apply gradual and consistent force all during the launch phase. It allows you to have huge launches without applying a lot of force in windy conditions since you can hold tension, kiting your ship to altitude, hardly taking any line in. In light wind conditions, you can use more line speed, again without the heavy initial load, gaining great altitude because you aren't carrying that dead piece of rubber up with your plane.

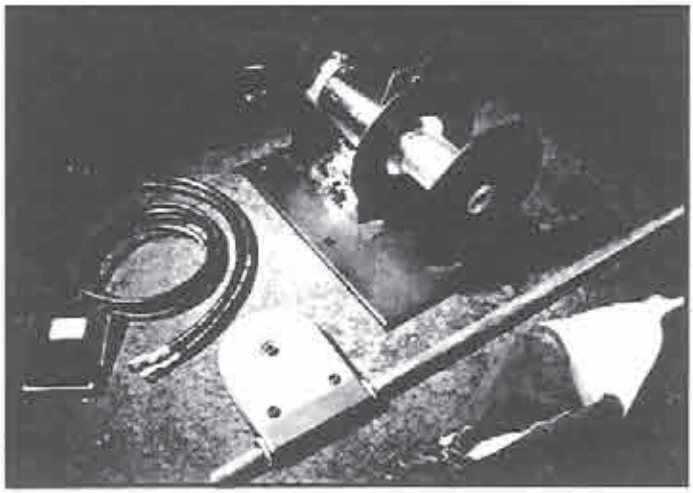
High-starts are elastic, they are powerful the first few times, and slowly but surely they die. They don't teach you anything about winching, the launch system used at virtually every contest. The LBW is a winch. Is it as powerful as a contest winch? No, but it can rip the wings off lots of planes if you really try, and it will safely launch any open class ship that I know of. Walt tells me that, as of August, all new orders will be outfitted with motors that are of an improved design. I am told that while this new motor is the same size as the original, it develops 40% more torque and runs cooler than the one I demo'd at the Mid-South, and we launched our contest ships on that one at the practice field most of the night.

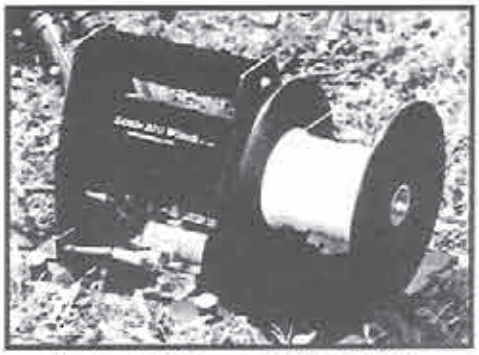
Size does matter, I mean, take a look at the specs. It is a package easily carried in one hand. Even the recommended battery, lawn tractor size, is compact. That means one guy can go to the field, set up and launch all day, without straining his back stretching a high start time after time, or lugging a 30+ pound package of battery and winch.

Oh yeah, it even has a brake system to help protect against the drum over feeding the line. The motor is a permanent magnet motor, unlike the big longshaft motors, which have field coils. So what? Well, a permanent magnet motor converts the magnet's energy into electrical energy, you know as in a generator. I know, what does that have to do with braking the drum?

Well, by shunting the output leads of a generator, the electrical energy comes to a dead end, and sort of like blocking off a water line, the magnetic energy causes the armature to kind of bind up, and the drum is connected to the shaft of the armature. Now if the output leads of the motor were dead shorted the brushes would be taking the entire load, causing lots of heat and destruction. So on the LBW, as on the past sport winches, an adjustable resistor is used to collect that output energy and dissipate it slowly in the form of heat, while braking the drum's centrifugal energy.

The bottom line is this; we have a small amount of time out of our lives to spend soaring. Each launch is important, cuz they eat up time. Being in control of the launch tension is important to your plane. Having one bungee doesn't really work for launching everything. The LBW lets you





(Bottom) LBW in use 10/97 at P.A.S.S. site, Blue Lake Park. (Top) Winch Package "A" (line excluded for clarity).

Little BIG Winch

wdimick@aol.com

Manufactured by Signatures, Portland, Oregon

Specifications:

Winch:

Motor: 12 volt DC, rare earth magnet type.
Solenoid: Continuous duty, designed for winch applications.
Brake: Dynamic, ballast resistor.
Frame and Spool: All aluminum, anodized.
Spool capacity: 2200 feet of #15 braided nylon winch line.
Hub size: 2.00 inches.
Battery quick connectors: 200amp capacity
Total weight: 14.75 pounds.

Turnaround:

Pulley: 3.5 inch diameter, phenolic pulley with sealed, lifetime lubed, military spec. ball bearing.
Frame: The pulley is recessed into 6061 anodized aluminum side plates.
Stake: 30 inch, 5/8 inch diameter galvanized steel. Pulley is free to swivel 360 degrees on the stake.
Total weight: 3.75 pounds.

safely launch HLG's, 2m's, and open class ships up to and including a Sailaire.

Years ago, when the other sport winches were available, some of us put off getting one. We all knew we probably needed and wanted one, but put off getting one, and we all regretted it. Thanks to Walt for not only bringing it back, but for bringing it back with style. True, you could buy lots of new high starts for the money spent on the LBW, but not one of them will give you the consistent tension control, that only a winch can produce.

Word has it that there is a quite a waiting list, so contact Walt ASAP if you have been thinking about making that step up to a winch.

You can reach him at Wdimick@aol.com, or at 503-659-7883. He has a website at www.sigfilms.com/LBWinch.

You always hear that it's the little things in life that count; this winch is little! But with plenty of power.

Thanks as usual for taking this trip with me; next scheduled stops are a review of the new NSP Psycho 3 open class composite ship, a trip to the USA's largest electric event in Pennsylvania, and a report on our largest TD event is Visalia, California.

See you on the road!

■

HAVE SAILPLANE, WILL TRAVEL!

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This column is dedicated to soaring vacations. This month, Dave Garwood takes us to Petersburg Pass on the New York/Massachusetts border.

Petersburg Pass Slope Site

by Dave Garwood
Scotia, New York

You say you're spending the weekend on a fall foliage tour of upstate New York? Or maybe it's time to emerge from the cave after a long winter's hibernation and see the leaves return to the trees in the western New England mountains?

Good. But pack a sailplane, because you'll wish you had one if your journey takes you through the Taconic Mountains that run along the Massachusetts/New York border.

Pull into the parking lot at the top of the saddle back mountain on Route 2 between Petersburg, NY and Williamstown, MA, climb the gravel trail towards the south, and drink in two stunning vistas. You find yourself on a ridge between two valleys. To the west is Petersburg, in a bowl shaped valley 900 feet deep. To the east is Williamstown with Mount Greylock, the tallest peak in the Berkshire mountains of western Massachusetts in the distance.

Both sides are flyable, and dynamic soaring is possible, if you're really on top of your game. *RCSD* columnist Steve Savoie discovered the magnificent flyability of this site, by tossing off his Dump Chicken in wind so light that "the grass was moving, but the trees were not." Now living in Bennington, VT, about 18 miles away, Steve has flown Petersburg Pass as many as four times in one week.

This is Big Sky slope soaring — at least it seems like Big Sky to those of us who live where glaciers once covered the landscape. The bowl to the west creates a wide lift band when it's working - you simply cannot fly out of lift and still see your plane.

"This is the best inland slope site I've ever flown," said my 20-year old son, Lou, on our second trip there when we had 10-12 MPH wind. Lou's been flying slope for about six years, and on that day flew a DAW 1-26, his trusty Sig Ninja, and a Slope Scale lead sled Mitsubishi Zero.

In 20 MPH, vertical development becomes impressive, supporting 250-foot loops. On his first visit there, Bob Powers quickly put away his NSP Sparrow and pulled out his ballasted-up carbon Renegade. "I don't think we've ever flown this fast at Cape Cod," Bob said after a few whistling fast passes.

The east side is flyable in SE wind, but so is Mount Greylock, only about 20 miles away, and in rare SE wind Greylock is the place to go.

Petersburg Pass is not a beginner flying site nor a spot for the faint of heart. It has the absolute trickiest launch point that I've seen in ten years of flying slope in eight states. You must launch through some intense turbulence and shoot through a break in a tree line until you get out into the lift, holding the nose down all the while to keep the speed up. It is an adrenaline-pumping moment, because there are trees below. Many trees.

The landing zone is surprisingly docile. It's a grassy area about 100 by 125 feet containing only a few bushes and one surveyor's stake on our last visit. It is amazingly free of turbulence and if you set up a reasonable landing approach you can grease it in on grass. If your downwind leg is too long, though, you'll be in the tree line at the east end of the LZ.

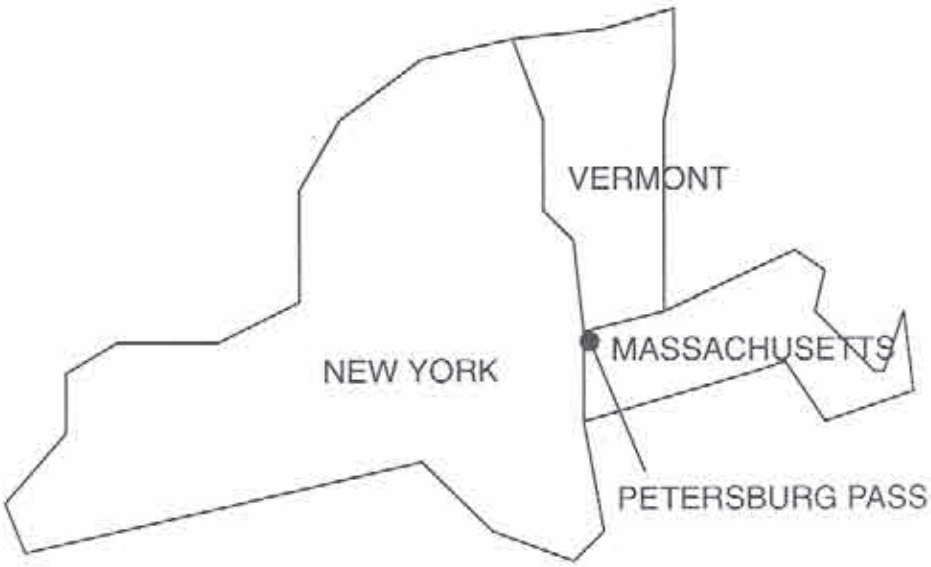
CAUTION 1: Do not fly an untested or untrimmed plane at this site, at least not in wind higher than 5-8 MPH. Do not launch a plane with shaky batteries here.

CAUTION 2: If losing a plane will cause you permanent emotional damage, do not fly here. If a plane goes down over the forest below it will likely be impossible to recover. One local flyer has lost one due to battery failure, and three hours of hiking failed to turn up a sign of his plane. This scenario prompted Lou to utter the Jack Handy quote: "If you drop your car keys in a pool of molten lava, let them go, because, man, they're gone."

CAUTION 3: The Taconic Trail, a recreational hiking trail exits the woods smack into the center of the LZ. On landing, and for close-pass maneuvers you must post a spotter at that trail to watch for hikers. If we were to hit a hiker accidentally, it could easily get us kicked out of the site.

These cautions are less urgent in lighter wind conditions. You can fly HLGs and long wing floaters in 3-5 MPH with less risk. Flying light and medium aileron slope soarers in 5-15 requires some attention to maintain safety. Flying slope screamers in 20 MPH or higher commands serious attention to safety issues.

All in all, Petersburg Pass is one memorable slope site. If your thumbs are up to it, consider putting it on your New York/New England travel itinerary.



GENERAL INFORMATION

Location: Park in a gravel parking lot at the south side of State Route 2 in Petersburg, NY about 1/4 mile east of the NY/MA border. The flying site is 200 feet up a gravel trail to the south.

Land Management: New York State Department of Environmental Conservation. Formerly a ski area, primary land use now is a hiking/backpacking staging area. Parasailors also use the site, though they launch from a partially cleared area across Route 2.

Wind Conditions Needed: The west side is flyable in 5 MPH or more wind from the west or northwest. The big slope faces NNW, but is in the wind shadow of another peak to the north. The east side is flyable in SE 10 MPH or better.

Recommended Planes: In suitable wind conditions., anything you have trimmed well and can fly confidently. Steve Savoie expects to fly his 1/4 scale Salto there soon, and next for me is an Airtronics Swift 2M six servo ship, maybe a heavier Slope Scale iron horse. It looks like Bob Powers will stick with his CR Renegade for a while.

For More Information: Steve Savoie (home) (802) 442-6959.

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Thanks, Dave!

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@freenet.columbus.oh.us for gentle editing and suggestions. Tom ■

(Above) Dave Garwood launches a Slope Scale Zero in 12 mph NW wind.
(Left) Lou Garwood with Sig Ninja at Petersburg Pass slope site.

Seven Stages of Slope Evolution

by Dave Garwood, Scotia, New York
& Dave Sanders, Capistrano Beach, California

Photography by Dave Garwood except where noted.

About the authors

This article began as a dinner discussion on Eagle Butte among wilderness chefs Dave Reese and Ed Cypret, along with Joe Chovan and Dave Garwood. It was continued in a late night discussion with Sanders, Chovan, Garwood and Alden Shipp at the Lucas County Inn during the 1998 LASS Midwest Slope Challenge, and was finished in the Kansas City International airport by Dave Sanders and Dave Garwood.

Primordial Awareness. *SlopeKiller@AOL.COM, a "keyboard flyer," at his terminal contributes his opinion to an on-line discussion of the latest slope soaring airfoils. "I'm not an expert, but I play one on the internet."*

Secondary Selection. *A pair of Durable Aircraft Models P-51 Mustangs, flown by Wade Kloos and Dave Sanders during the El Cajon, California PSS event in May, 1998. Photo by Shelby Sanders.*

Total Immersion. *Type Specimen for Homo Slopiens - eastern branch, Steve Savoie (Bennington, VT) prepares to launch his own-design Dump Chicken to test improvements to the lift after cutting down 35 trees at a Hudson River, NY slope site. Note end of chain saw just behind left wing tip.*

Seven Stages of Slope Evolution

This article proposes a taxonomy of seven developmental stages that we have seen in slope soaring pilots as they progress through the hobby/sport. It is offered for the review and reflection of *RCSD* readers, and we hope that others will contribute to scholarly research and scientific knowledge in this area of study.

Early Emergence. *A pair of Bob Sliff Sensoars over the Hudson River Valley in upstate New York. This photo of Rudy Coletti (Troy, NY) and Dave Garwood taken in 1990 by Paula Garwood.*

1. Primordial Awareness

In this stage, the subject has a dim cognizance of slope soaring flight. He has heard of it, has seen photographs of it, and may have even read a book or an article on slope soaring, but hasn't actually built or flown a slope sailplane.

The most important equipment at this stage of slope development is a computer terminal and an AOL account. His most recent quote: "Honey, I can never log onto the service. It's always busy. Maybe we should get Web-TV."

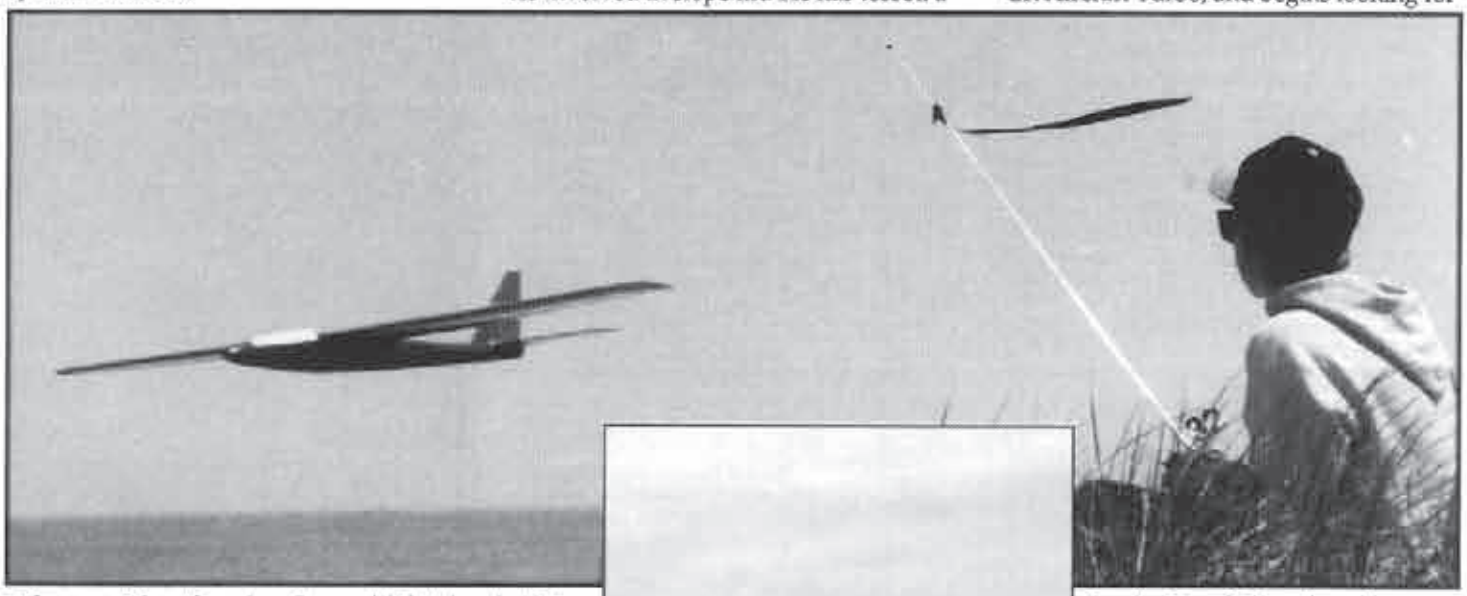
2. Early Emergence

Fully aware of slope flying, a representative of this stage has watched RC slope soaring or hang gliding, has studied gulls and pelicans and has developed an understanding of the atmospheric dynamics involved in slope lift. He has tossed a Carl Goldberg Gentle Lady or DynaFlite Skeeter off a hill, and amazed himself at the longest flight in his soaring career.

Development in this stage involves building stronger polyhedral sailplanes, maybe a Great Planes Spirit or Culpepper Chuperosa. His most important building tools are T-pins and X-acto knives. His field kit includes five minute epoxy and bits of balsa and plywood. He learns to turn only into the wind, to land shiny-side-up, and can be heard asking his wife on windy days, "Honey, do you think it's okay if I mow the lawn tomorrow?"

3. Primary Adaption

Exuberance increases and an exploratory urge develops. The seeker builds an aileron slope plane, perhaps a Sig Ninja or CR Aircraft Turbo, and begins looking for



Primary Adaption. *Lou Garwood (Plattsburgh, NY) flys a Sig Ninja at Cape Cod, Massachusetts. The Ninja is an excellent slope aileron trainer for those who prefer the balsa-and-lite-ply construction.*

Early Specialization. *Some guys won't be seen with an airplane that doesn't look like an airplane. Doug Buchanan (Seattle, WA) flies one of his own-design BAe Hawks at Eagle Butte, Washington in May, 1998. (Below)*

Secondary Selection. *Wade Kloos flies a Durable Aircraft Models P-51 Mustang, a large-span, close to scale EPP foam kit of his own design at the El Cajon, California PSS event in May, 1998. It's not a sin to fly an airplane that looks like an airplane. Photo by Shelby Sanders.*

Secondary Selection.

Now willing to travel a little, but in 1992 still mortified at the prospect of having a plane go down in an unrecoverable area, Dave Garwood launches a Sig Ninja from Mt. Greylock, Massachusetts - 1400 feet above the valley floor, and prays. Nature is a Mother.

slope flying sites. His shop now includes a moto-tool and a jig saw, and he is willing to travel up to 20 miles to fly slope.

He's not happy unless the wind is blowing 10-15 MPH and his most impressive maneuver is an inside loop. The most important items in his field kit are fiberglass cloth, CA glue, and kicker. He thinks to himself, "On our family trip to the beach (or mountains), maybe I'll take a slope plane and do a little flying."

4. Secondary Selection

The pre-addiction stage. Here the seeker accumulates several planes for several wind conditions, and may make a trip to the coast or the mountains with slope soaring as the primary focus of the trip. He can handle 20 MPH wind and flys aerobatics, including rolls and inverted passes. He may become interested in full-contact combat if he has discovered EPP-foam planes, and he's willing to travel 200 miles to fly at a good site.

At this stage the subject is not happy unless he has three planes ready to go with servos and receivers mounted. He has four long sanding blocks to save construction time. His newly discovered adhesives are hot-melt glue and Goop. Typical sailplanes are the Sig Samurai, Bob Martin Coyote, and Bowman Ruffneck. As he leaves the house he says, "I'll be back from the hill a little after dark."

5. Early Specialization

Now mildly addicted, our man is not content unless he has four new kits on the shelf, and four planes ready to fly in winds up to 30 MPH. His shop equipment includes an airbrush and Rapidograph pens because he's not destroying his planes on landing so much any more. He has begun to destroy planes during aerobatic practice. He may become interested in racing or in four meter scale planes, and now has a ModelTech P-51, Charlie Richardson Renegade, a Bob Martin SR-7, or a Brian McLean Vindicator. If aesthetically inclined and hooked on combat, he'll have a Lex Liberato Yak-3, a Merrill Farmer Saberjet, or DAW warbird.

He loves speed runs, stall turns, and low inverted passes. He can fly point rolls in both directions. Not afraid at this stage to leave his home valley to fly with other tribes, he'll travel up to 400 miles to participate in a weekend slope event, and says to his wife as he leaves, "It's only a two day event, my sweet baby."

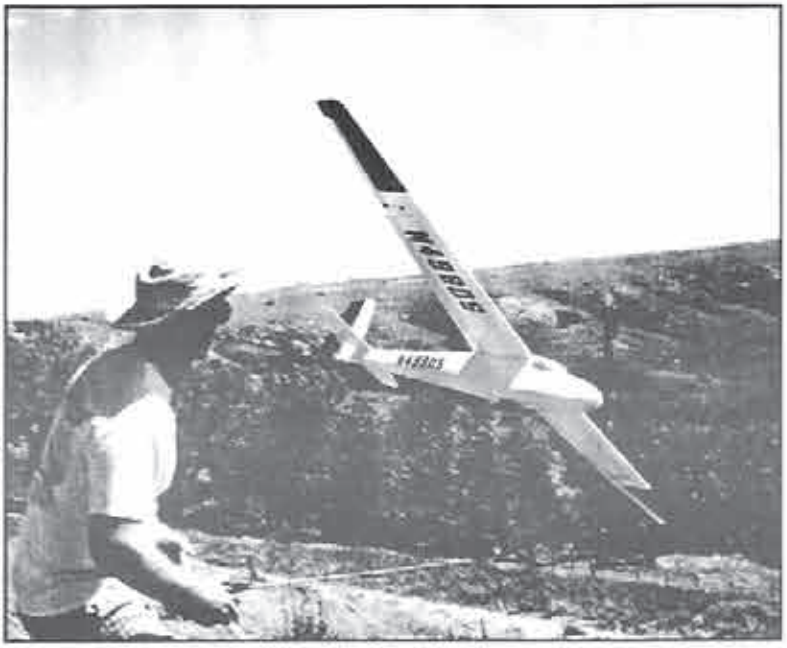
6. Progressive Homologation

Characterized by full addiction, our subject may spend a mortgage payment on a slope plane, either a five meter scale ship, or a fully molded unlimited racer with premium servos. He understands the use of ballast in sailplanes and he's got five ships ready to fly in five wind conditions. In addition to building planes, he now builds boxes to ship them to distant slope sites.

The slope pilot in Stage 6 has gotten over his fear of crashing his airplanes or putting them in salt water on those low beach runs. He understands the fighter pilot's credo "Death is a small price to pay for looking shit hot." He must have either two Brian Laird iron horses or a pair of John Higgins F-20s (one light and one heavy) ready to fly at all times, and can build another one and have it glassed and painted in a week if necessary.

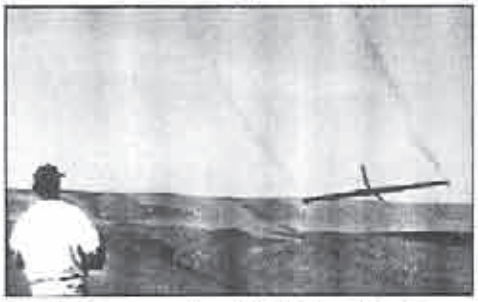
He can now fly clean pylon turns and outside loops. He flys close-formation stall turns and knows combat strategy and tactics. His most-used shop tool is a hot wire foam cutter and the most important item in his kit bag is a fast field charger.

He spends all his vacation time flying slope, and has flown by two oceans or inland seas. He is willing to cross the Sierra Nevada range, or the Mississippi River, or travel 1000 miles to join like-minded slope heads at Los Banos, El Cajon, Point of the Mountain, Wilson Lake, Sleeping Bear



Early Specialization. *The scale bug bites hard. Dave Sanders (Capistrano Beach, CA) flys a pre-production prototype KA-6 on a close pass. The windmill and stock watering tank give this site away as Wilson Lake, Kansas.*

Progressive Homologation. *Slope Scale Me-109 at Sour-Utah-95. It was Brian Laird (Moreno Valley, CA) who helped Garwood get over his fear of losing planes, saying, "If you lose one, you build another during the week." At last count Brian had lost four receivers in the Pacific Ocean, a part of getting really good at the game.*



Total Immersion. *Scott Hewett (Aptos, CA) pours on some speed with "Lurch," his 2x size Birdworks Zipper at Eagle Butte. The sailplane is producing vapor trails from the wing tips, something not often seen in the dry air of the central Washington desert.*

Total Immersion. *Type Specimen for Homo Slopiens - western branch, Dieter Mahlein (Portland, OR) at Eagle Butte, Washington for a week in May, 1998. Dieter brought ten planes and flew nearly every one of them nearly every day.*

Dunes, Jockey's Ridge, or Cape Cod. As he leaves, he promises his significant other, "I'll call you every night."

7. Total Immersion

This stage is characterized by hopeless addiction. He must have faster and heavier planes, and won't go to the slope in less than 25 MPH wind although he is not really happy unless the wind is blowing 40 MPH or better. The only thing he wants to do after a slope flight is grab another plane and launch again. He mindlessly performs complex aerobatics, flys diving rolls for relaxation, and can bring tears to your eyes with a big sky aerial ballet.

His shop now includes a production vacuum bagging setup and ventilated paint booth. He buys epoxy by the gallon and carbon fiber cloth by the yard. His most important field accessory is a selection of lead bars. By this point he's flown full-house HLGs, unlimited racers, scale sailplanes, PSS warbirds and slope jets, tailless planes, and a Pterodactyl or R/C Gull, but is unfulfilled unless he has a personal relationship with a slope plane designer and has something on his workbench that approaches a wing loading of 40 ounces per square foot.

This pathetic creature takes leave without pay to fly, if he has been able to keep a day job at all. Eastern region Stage 7 Homo Slopiens have been known to modify the landscape with a chain saw to improve slope sites. These guys travel thousands of miles to fly the legendary hills, can handle any winds from 5 - 75 MPH. They may say over their shoulder as they head out of the cave, "I'll call you from the airport when my flight gets in."

The End Game

Ultimately, this single-minded machine of a man will continue to drive himself to explore the limits of technology, biology, and wanderlust to satisfy needs for more exotic machines, more extreme thrills and more unusual sites.

Upon arrival to any given flying site he will calmly and deliberately move to the edge of the slope and hold out his arms palms down to feel the magical vapors of slope lift climbing the face, noting subtleties in the air, determining the strength of the lift and imagining how he will pick through its intricacies with all manner of pure-bred, wind-driven hardware.

To the casual observer this appears ritualistic, but his Stage Seven fellows know the wry smile and burning fire in the belly of another fully developed Homo Slopiens, and will confer not with speech, but rather with gestures and motions as an Indian shaman would communicate with another tribal elder.

The Stage Two or Three slope flyer will look at them and see a glimpse of their own fate, sealed in the crumpled remains of countless airframes, and the injuries acquired from long hikes to recover aircraft flown into lower slope faces at terminal velocity.

As the grizzled veterans walks back to his vehicle with a 50 MPH wind at his back to select an aircraft for his initial sortie, he may be heard to say, "If I say it's safe to surf this beach, it's safe to surf this beach. ■

"SHORT CUTS"

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Viking Models 1/6 Scale Salto, Revisited

A few years ago, I built a 1/6 scale Salto utilizing a Viking Models fuselage for the 1997 Elmira Aerotow Event. The plane was constructed with carbon fiber skins over Spyder foam for the wings; the V-Tail was carbon fiber on the bottom surfaces and glass on top for a live hinge. The *RCSD* article discussed the construction in detail and ended quite up beat. Since that time, I've had to deal with more than a few design and construction related issues that I would like to share.

The most significant issue was the skin covering. I only covered the top skin on the carbon wings and V tail. This was done to improve visibility, reduce cost, and reduce building time. I used Ultracote Plus. This covering has a peel and stick backing, which can also be heat shrunk and sealed like conventional covering. I only sealed the edges and did not shrink the material. It thought the rub down with 0000 steel wool to a satin finish would adequately set the covering. It looked great until it sat out in the hot August sun. The resulting blisters were so bad that lift was drastically affected. "Not a problem," I thought, "I'll just recover the wing with regular Ultracote."

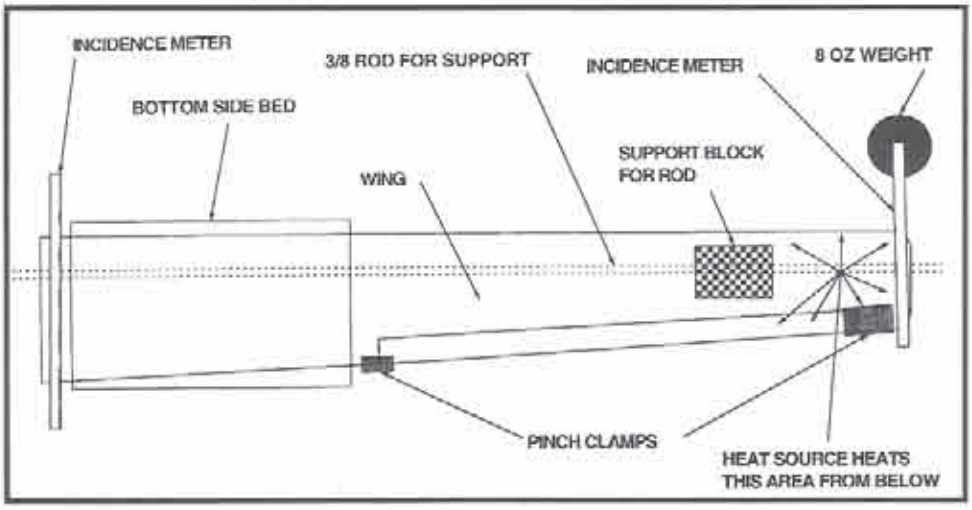
I removed the covering one night and was left with a sticky mess on the wing surface from the residual adhesive. I tried acetone, mineral spirits, paint remover, lighter fluid, etc., etc. Nothing would cut adhesive. I eventually brought the wing to my local hobby store and we just tried everything. Remember, not even acetone with a scotch bright pad would cut the stuff. Eventually, we found that dope thinner took off the mess with a scotch bright pad. It only took one hour per wing and a lot of scrubbing. Had the wing been a glass wing it would have been ruined from the hard scrubbing action, but the stiff carbon skins held their shape well.

What a mess! The wings were eventually recovered with regular Ultracote. The finish was fair and I found it hard to cover the carbon skins without entrapping a lot of air bubbles, which eventually blistered again, but were somewhat corrected with a pin and iron. Had I to do it all over again, I would have painted the wings and rubbed a satin finish into the paint. Any suggestions on how to cover carbon vacuum bagged wings with covering?

My other dilemma was tip stalling. I originally selected SD6060 for the wing section and may have put in about 1/32" of washout at the tips. I also increased the camber at the tips by .5%. My hope was to get the most out of the airfoil by using the least amount of washout. The plane had great performance going straight, but was terrible in thermal turns and low level landing approaches. What I did to correct this problem was to put washout (4 degrees) into the last 6" of the wing and ailerons. I first thought this would not be possible; but what did I have to lose?

To accomplish this, I used small pinch clamps on each side of the ailerons and clamped them aligned with the wing section. This would ensure the wing and aileron shared the washout. I then found the old foam beds and weighted the root section down to the workbench with heavy weights. Just an inch of the root was

Photography by Dave Garwood.



exposed to mount a Robart Incident Meter. The last 6 inches of the wing overhung the workbench, so I used a piece of 3/8" steel rod under the full length of the wing, at its point of greatest thickness, for support and reduce the chances of sagging. The lower bed supported the rod near the root and a V block positioned the other end of the rod.

A second Robart Incident Meter was attached to the overhung tip. As originally cut, there was just enough washout on the tip to read on the meter. I figured if I put 4 or 5 degrees into the tips I would be set. The incident meter was re-configured so that the aluminum tie bar overhung the leading edge by about 6". I then put 8 ounces of weight on the arm and measured the washout. The next step was to get the 150 watt halogen shop light and rig it up about 4 inches from the bottom of the wing tip. It did not take long before the wing began to twist, with the lamp on the black carbon bottom skin. Remember, the 3/8" steel rod was under the wing, so the tip would twist and not droop.

I watched the wing continue to twist until I was 5 degrees past my starting point; when that was reached, the light was turned off and the wing allowed to cool. Success! There was instant washout across both the wing and the aileron all the way to the tip! The other wing was done in the same manner. If you go too far, don't worry, because a little heat will allow you to reset it. I chose the light instead of a heat gun because it was more controlled and repeatable by keeping it the same distance from the surface.

The wing was then covered, top skin only, and taken for a test ride. I flew the Salto off the winch and both the launching and thermal turns were much better. It was not like a Gentle Lady, but rather similar to other scale ships I've flown. Later that day, I remeasured the washout and it had not changed. This would probably not have been true if the wing was laid carbon side up to the sun, but the same would be true for any other carbon wing laid up with a conventional resin system.

Since that time, the plane has been flown at a newly found slope site near the MA, NY, VT Tri-State corner with spectacular results. It also helps to fly off a 1200' ridge line. So far, no one has yet to find the lift boundary; even the 90" Salto, with black and white wings, presents orientation problems when looking for the outer edges of the lift boundary. I'm very pleased with the plane's performance since the tune-up. No more unintentional snap or tip stalling on landing approaches going through rotors.

I wrote this little article just to let the readers know that not all scratch built designs (my airfoil selection/washout) work out well the first time around. I would also like to hear from others who have been able to cover over carbon vacuum bagged wings. I'm about ready to start a 1/5 scale Viking Models Nimbus II that will have carbon skins over Spyder foam, and I want to get it right the first time around.

■

Robin Lehman
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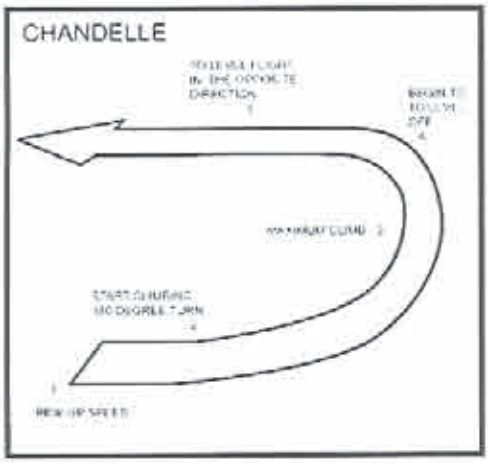
NYC, NY 10028
(212) 879-1634

There are some very interesting differences between flying a sailplane and a powered aircraft, especially when performing aerobatics. Each of these types has advantages and disadvantages. If I said this to one of my friends who flies a 40% Giles 202, he'd think I was out of my mind (but he wouldn't tell me that to my face). What possible advantage could a sailplane have over one of those wonderful powered aerobatic birds? Unless you've flown sailplane aerobatics, how could you possibly know?



Aerobatic Flight Plan

October 1997
- Uncouple your rudder & ailerons.
- Practice flying Straight & Level.
- Master airspeed.
- Practice the Inside Loop.
- Determine what rudder & aileron adjustments are required to fly a perfect loop.
- Tackle Inverted Flight.

November 1997
- Practice the Split-S or Wing-over.
- Practice gaining sufficient airspeed to be able to complete a 360° Roll.
- Practice The Roll.
- Combine maneuvers to develop your personal, custom, aerobatic sequence.

December 1997
- Practice 1/2 Cuban 8.
- Practice the Cuban 8.

January 1998
- Practice the Outside Loop.

February 1998
- Practice the Immelmann and Reverse Immelmann.

March 1998
- Practice the Hammerhead, Reverse Cuban 8, and Reverse Half Cuban 8.

April 1998
- Practice the Spin.

May 1998
- Practice the Tail Slide.

June 1998
- Practice the Humptybump. (Issue includes Sportsman & Advanced Routines.)

July 1998
- Practice the Chandelle & Procedural Turn.

August 1998
- Practice the Two Point & Four Point (Hesitation) Rolls.

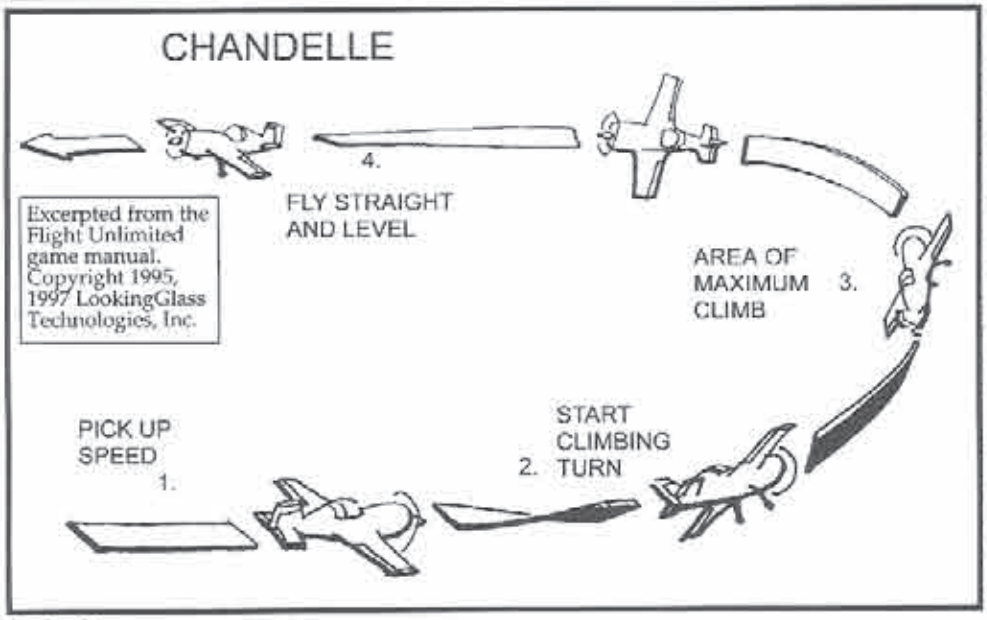
September 1998
- Practice the Sideslip.

October 1998
- Practice the Chandelle, revisited.

Notes:
- Establish and maintain a "Sailplane Diary" for each plane.
- Review monthly progress.
- Practice flying with a knowledgeable friend or expert, and remember that safety comes first.
- Practice with a flight simulator program such as Flight Unlimited (April, 1997 *RCSD*).
- Definition of "One Mistake High": Be darn sure you're high enough to complete the maneuver and make one mistake, before hitting the ground.

POWERED AEROBATICS

If you had a motor up front, you would have some considerable advantages. The most obvious edge is that (with some powered aircraft like Extras, etc.) you can perform virtually unlimited vertical maneuvers. You would also be able to practice your maneuvers without having to wait for your towpilot to show up. You wouldn't have to winch or wait for a thermal or for the wind to blow from the right direction.



Sailplane Advantages

But if the wind did blow from the right direction and you had a nice hill to fly from, you could practice at eye level until your batteries ran out! You see, sailplanes DO have certain advantages over the Extras and Caps!

Sailplanes have at least one other perhaps even more important advantage: unlike powered aircraft which have to contend with motor thrust and torque from the propeller, which tends to upset the aircraft, sailplanes are able to fly straight and true. Because of this, a sailplane should be able to perform some maneuvers better and cleaner than most powered aircraft. Maneuvers requiring a lot of vertical (such as a vertical roll) or power (such as a knife edge) are obviously much more difficult with a pure glider, but many maneuvers can be much easier to perform (the spin, Cuban-8s and loops, for example). A few other maneuvers are not really so difficult, but they require a completely different technique to achieve the same end (like the stall turn), and this brings us back to the Chandelle...

The Chandelle Revisited

The Chandelle we've already discussed is a sailplane variant of what might best be described as a climbing 180 degree turn. The Chandelle we previously discussed is easy for most sailplanes. What follows is a bit more difficult, because with this Chandelle you fly through a climbing turn, ending up higher than where you started – and that's the problem for sailplanes – the

climbing. Guess what? Once again the secret to success is airspeed, *airspeed* and still more AIRSPEED!

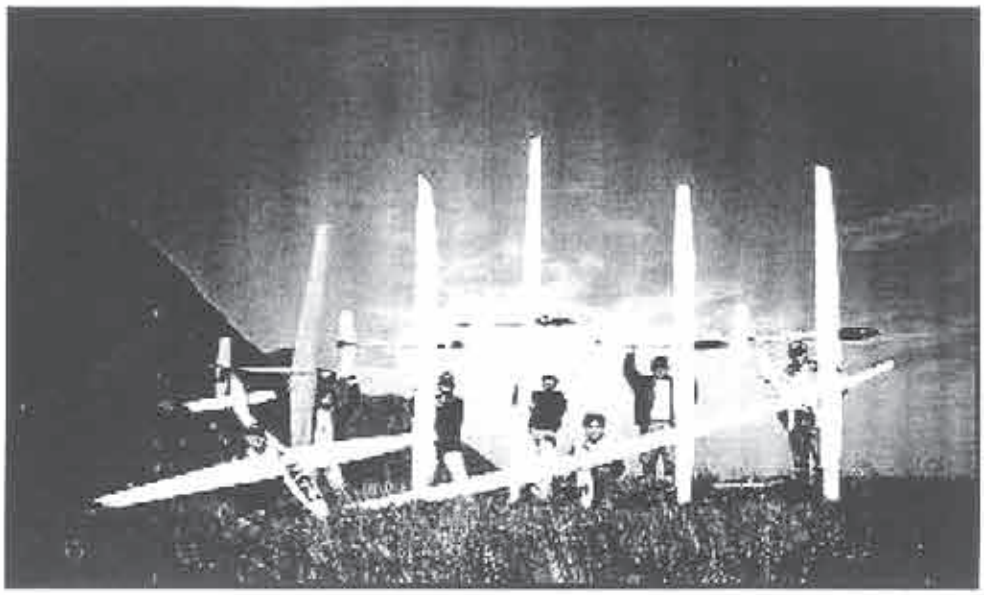
According to the AMA, "The Chandelle is an exaggerated climbing turn in which the airplane changes direction through 180 degrees. The model may begin with a shallow dive to pick up speed, the nose should then pull up and the model begins a climbing turn proceeding away from the flight line. The maximum climb and bank occur at approximately the midpoint during the change in direction. (The maximum bank angle may only be 45 to 60 degrees for non-aerobatic aircraft and up to 90 degrees for fully aerobatic aircraft.) The entry speed should be sufficient to prevent visible slipping or skidding and maintain the same turn rate throughout the maneuver. As the 180-degree point is reached in the turn where the aircraft is traveling in the opposite direction from which it entered, the wings are brought level for the maneuver completion. At this time, the aircraft would be flying at reduced speed compared to entry."

"Errors: the same turn rate is not maintained. The model slips or skids. The model does not provide a notable climb rate. The model does not finish with wings level on a heading opposite to that entered." (Used by permission.)

The Chandelle is a very gentle maneuver, and well within the reach of most sailplanes. The only difficulty is flying the symmetrical 180-degree climbing turn.

If you're flying a smallish and very docile sailplane, you will find this version of the Chandelle more difficult than with a relatively heavy glider, which will retain enough energy carry you through the entire climbing turn.

With a little practice, you'll quickly get the feel of how much airspeed your particular sailplane requires in order to easily perform this version of the Chandelle. ■



Soaring in Hong Kong.
Photography submitted by Job Chan, taken at Ma On Shan, Hong Kong. Gliders include 3.8m Fox, 3.8m B-4, 4.2m Condor, 4.5m DG-500, 3.8m DG-600, and 6m Nimbus 4 from Buchelle.

Flight of the Paragon, An Uplifting Story

By Gordon Cottrill
Lusby, Maryland
(410) 586-2254
furball@olg.com

I live in southern Maryland where August is a hot, humid, lazy, no fly kind of month, although lately the evenings have been so beautiful that we decided to go down to St. Mary's College and fly for a few hours after work. The "we" being, Ken Yunger, Chris Bruner and myself; 3 out of only 5 glider fliers in this area, we are a close knit group who fly together as often as possible.

The field at St. Mary's is rectangular and quite large; large enough to lay out a full hi-start in any direction and still have plenty of room to spare, with only an occasional soccer goal to avoid.

We have come to love flying there for several reasons, one of the most important being, thermals!

For some reason this field produces an abundance of big air that has yielded some very long flights in the past year, the longest being 61 minutes 37 seconds, with the Paragon; this is something I never thought possible for me to attain in my first year of flying gliders. Other flights of 30 to 45 minutes have been common and we enjoy knowing that any time we fly there we can be assured of some decent flight times.

We got to the field at 4 P.M. and, after a little deliberating on which way to lay out the hi-starts, I set it up for the first launch. I put the wing on my Paragon and Chris got his Alcyone ready to go, followed closely by Ken with his Spirit.

I usually take the first launch because, if there is any lift at all, the Paragon will show it. I have never seen another plane indicate lift (or sink) as well as the Paragon.

I quickly found a small thermal that netted me a 9 minute flight. Not bad for that time of day, within the next few flights we all realized that there was a lot of good lift out there; all we had to do was find it.

My second flight was really short until, while setting up for the landing, I caught a small thermal 30' up and right out in front of me.

The Paragon started going up ever so slowly at first, then a little faster as the thermal went up a small hill, and even faster as the thermal hit the tree line and seemed to break loose of the ground. Ken launched his Spirit and got in with me; we both started going up faster and faster as we ascended. Within a few minutes we were just specks in the clear blue evening sky; birds were coming up from everywhere just to join us in our pleasure.

There was so much lift that it didn't seem to make any difference where we flew. We could turn in circles, go back and forth, head straight into the wind or go down wind and come back.

If we got a little low, all we had to do was start circling and we would be specks again in no time.

Ken had to pull spoilers and spin down a few times to keep from going out of sight. I brought the Paragon back from outer space several times for fear of losing sight of her completely.

On the wing, the Paragon is slow and majestic; Overhead it is a thing of beauty.

As clear as it was, we estimated our altitude to be 2500-3000', but could have easily been higher.

After a while I asked Ken how long we had been up. He said, "45 minutes!"

Wow! It looked like we had a good chance of beating the field record and my personal best. As we passed the hour mark, we got very excited and started following each other around the sky, lest the other get better lift and stay up longer; this had become a TD contest. We thought maybe we would stay up until dark or at least 2 or 3 hours, the lift was that good. We were enjoying ourselves so much, we lost track of the time until, all of a sudden, the lift just quit, just like that, and we were coming down as quickly as we had gone up. We tried everything to stay up; we surfed the tree line, sloped the hill, used body English, grunted and groaned but, before we knew it, we were setting up for our landings. I landed first, followed a few minutes later by Ken.

All in all, Ken stay up for 1 hour 20 minutes, and I managed 1 hour 25 minutes. It was a new field record and our personal best, all in the same flight.

This may seem quite ordinary to some but, for us, it was a monumental event.

Ken and I were so thrilled, we hi-5'ed each other in celebration and looked like a couple of kids let loose in a candy store.

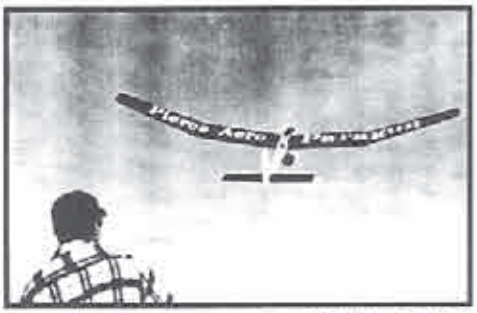
What a great flight on such a beautiful afternoon.

It could have only been better if Chris had been able joined us in our joy, but unfortunately the Alcyone had control problems and Chris was only able to manage one 26 minute and three 7 minute flights. He did have fun though, dancing with the buzzards. (But, that's another story.)

We left the field, hot, thirsty, and hungry, but with a feeling, that no food or drink could have given us.

I would like to thank Ed Slobod for designing this wonderful Paragon and Dave Garwood for building it back in 1977. I have had so much pleasure flying it this past year, that I would sincerely recommend the Paragon to anyone interested in learning what the air is for and how to use it.

I extend my personal invitation to any one who would like to join us at St. Mary's for a day of aeronautical pleasure. Bring a chair, lunch and a pair of binoculars; you may be up for quite a while.



Launching the Paragon is a sight to behold. It will go straight up with any wind. I regularly get 400 to 500 ft. launches with 20 lb. of tension on the line.

***

This story started out to be a testimonial about what a wonderful plane the Paragon is, but in retrospect it's a statement about how much fun and enjoyment can be had from flying big floaters. The much maligned "gas bags" have lost their popularity in the last few years, to the advent of the glass and carbon slippers.

Too slow you say? Too long to build? Too fragile?

Yes, they are slow and can't zoom or run from one side of the field to the other in search of the elusive thermal, but when you do find a thermal, you will have an easier time identifying it, for there is nothing that indicates lift like a big, slow floater. They do take more time to build and they do break easier, but as my 21 year old Paragon will testify, with care and consideration you can get a lot of flight hours from this relatively, inexpensive airplane.

If you're interested in the kit, Ed Slobod's telephone number is (818) 349-4758. Paragon Plans #626 can also be purchased from *RCM* Plans Service, P.O. Box 487, Sierra Madre, CA 91025.

■

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

June 25-27

MSSC '99 — Memphis, TN
Bob Sowder, (901) 751-7252

Please send in your scheduled events as they become available!

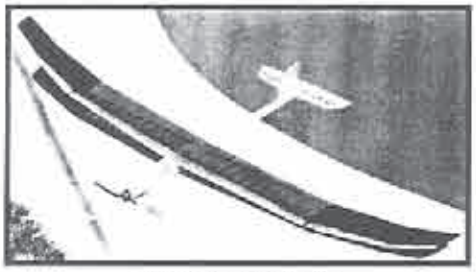
NEW PRODUCTS

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

Volz Servos Sales & Service

...from Volz Modellbau

For after sales service of Volz servos, please contact: R/C Direct, 7750 Convoy Court, San Diego, CA 92111, phone (619) 277-4531, fax (619) 560-9695, www.RC-DIRECT.COM. Volz distributors include R/C Direct, NSP, UPI, and Hobby Club. ■



Carbon D-Light E

...from ICARE Sailplanes

Carbon D-Light E, high performance, RTF, 71" wing span motor glider, features a light and strong white fiberglass fuse, almost 2 oz. with pushrod tubes and wing hold down installed and trimmed canopy. For the wing, a preshaped foam (D-form) is pressed with a layer of carbon into a female mold, providing a stiff and accurate leading edge with perfect airfoil respect. The rear of D box is faced with some light balsa shear webbing. The rear of the wing is traditional selected balsa build up. Root and transition ribs are made of balsa/carbon sandwich. Wing tip is made from a carbon/balsa sandwich, also pressed in a form to give an elliptic wing tip shape. Wing is covered with Oralight covering; leading edge is silver painted for better visibility.

The polyhedral is precut in the wing panel, as well as in the tail surfaces for easy assembly. It features a slightly modified S4083 airfoil. The empty airframe weighs 7.9 oz. Flying weight is 19 - 20 oz., 440 sq. in. wing area, 6.2 oz./sq. ft. wing loading.

Radio requirements are two sub-micro servos and a micro receiver. Recommended power set ups (one for Speed 400, 7 cells, LMR): use a Speed 400, 6V, 4:1 JAS gearbox, 12 x 8 light weight JAS fold prop. For long duration, like all up last down, use a speed 400 7.2V on 8-10 cells, 6:1 JAS gearbox and 12 x 8 light weight JAS fold prop.

Intro. price U$ 229.00 + 10.00 s&h. Combo specials: LMR combo or all up last down combo, includes Carbon D-light E, Speed 400 w/gearbox, motor controller, prop: U$ 329.00 + 10.00 s&h.

ICARE Sailplanes, 381 Joseph-Huet, Boucherville, Qc, J4B 2C5; <http://www.jonction.net/~icare/icare.htm>, <ICARE@telts.com>, (450) 449-9094, fax (450) 449-3497. ■

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Located in SW Arizona, 90x25 ft. concrete building. First third is retail space, middle half is beautiful living quarters, remaining third is work and storage area. Additional 12x12 ft. free standing shed and 6 sided fiberglass paint shed is located on a 125x25 ft. lot fronting Business I-10 hwy; 3 car parking in front. Hobby merchandise may be purchased at cost at inventory time; estimated at $24,500, plus two quarter scale Grob (109B & LS-77), 1 ASW22 sailplane, one 2.2m Foka sailplane, & 10 Automatic Altimeters for FAI F3I aerotowing. Foam wings & stabs for one hundred 54" scale Cessna OE-2 electric models, plus misc. model making drills & bench machines, accessories, & hand held tools accumulated over 55 years of model building.

Asking $80,000 for buildings with GE washer, dryer, refrigerator, Sharp Carousel microwave, Samsung SD700 computer & monitor, Okidata LED page printer, and misc. aviation publications & references. For info. packet of 10 photographs and copies of 1997 financial records, first year of operation at above location, send $5.00 money order. Going out of business primarily because tasks required to neatly and cleanly run a hobby shop is just too demanding at 82 years of age. Turnkey offer.

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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.

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 3.5 Sailplane Performance Evaluation Program Optional Sailplane Library now expanded to 54 models including: Alcyone, Anthem, Genesis, Mako, Probe, Thermal Eagle, and Synergy-91. Free Library Upgrades. PC-Soar Upgrade to Ver. 3.5 $10, PC-Soar New Purchase $40. New Libraries of Sailplanes and Airfoil Polars $30. Please include $3 P&H for all purchases & upgrades. Also available: Laser cut airfoil templates. LJM Associates, 1300 Bay Ridge Rd., Appleton, WI 54915; ph: (920) 731-4848 after 5:30 pm weekdays or on weekends; <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

End of the season clearance. If you want a beautiful sailplane, ready to fly or in kit form, check out these great deals! Schuller & Fleckstein 1/3 scale ASW 24, all glass, gleaming finish, completely scaled out, mint condition... $2250.00 w/servos, German bags, retract, pilot, etc. Grunau IV, 1/4 scale vintage beauty, unbelievable craftsmanship... $950.00 includes all servos, aero-tow, pilot, and custom mahogany case with foam cradles, brass hardware, and hand-rubbed lacquer finish. ASW 27, 3.5 scale, all glass Rippo kit, the finest molded ship of its size, brand new kit... $1595.00. E.M.S. type, 5.3 meter Duo-Discus, brand new kit... $1695.00 (compare at $2000.00). Roke 7 meter Grob Twin-Astir, all glass version; new, these kits cost $4600.00; I have 2 versions available; one needs paint and new canopies... $2250.00; one is in mint condition... $3295.00; both are completely ready to fly and include all servos, German wing and tail bags, retract, and (2) 1/2 scale pilots. Dan Troxell, (949) 831-8013, Southern California.

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

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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, (205) 722-4311, <ron.swinehart@lmco.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, slopesites 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 - California Slope Racers, John Dvorak, 1063 Glen Echo Ave., San Jose, CA 95125; (408) 287-0375.

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, Lee Cooper, 4856 Rockland Way, Fair Oaks, CA 95628, (916) 966-2672, <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), Jack Cash (Pres.), (301) 898-3297, e-mail BadIdeas@aol.com; Bill Miller (Sec./Tres.), (609) 989-7991, e-mail JerseyBill@aol.com; Michael Lachowski (Editor), 448 County Rt 579, Milford, NJ 08848, e-mail mikel@airage.com, <http://www.eclipse.net/~mikel/esl/officers.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.

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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.

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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 - 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 G. Tanis (President/Founder), 391 Central Ave., Hawthorne, NJ 07506; (201) 427-4773.

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New York - Elmira - Harris Hill L/D R/C, aerotowing & slope, John Derstine, (717) 596-2392, e-mail 2076482@mcimail.com.

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

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

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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.

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

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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, Voice mail (412) 560-8922, <ydne30a@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, <74724.65@compuserve.com>.

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.

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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>.

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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.

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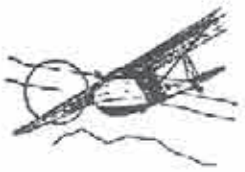

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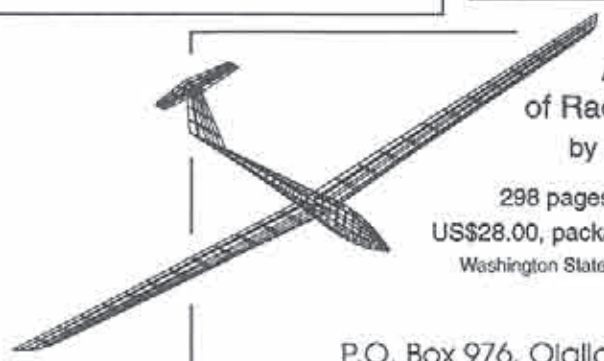

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The Condor is designed by Mark Allen, who is considered one of the best model sailplane designers in the United States, if not the world. Mark has taken all of his previous experience in competition thermal duration flying, plus all the knowledge he 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.

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1/3.8 all glass Kestrel T 19	HQ 3/15-10	196" (5m)

TOWPLANES

Frisch: 1/4 Wilga 109" (2,78m)
Brauer: all glass 1/4.5 Pilatus Porter Turbo 139" (3.52m)
Roedelmodell: 1/4 Jodel Robin 86" (2.18m)

SPECIAL ORDER

PriBek

1/3	ASW24	E203-201-193	196" (5m)
1/2	ASW27	HQ2.5/15	294" (7.5m)
1/3	Fox	E374	183" (4.66m)

Bruckmann

1/2.5	Fox	222" (5.65m)

Schueler & Fleckstein

1/3	all glass Fox	RG12	183" (4.66m)
1/3	all glass ASH 26	HQ3/14-10	235" (6m)
1/2.5	all glass ASW15B	HQ3/14	235" (6m)

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