R/C Soaring Digest

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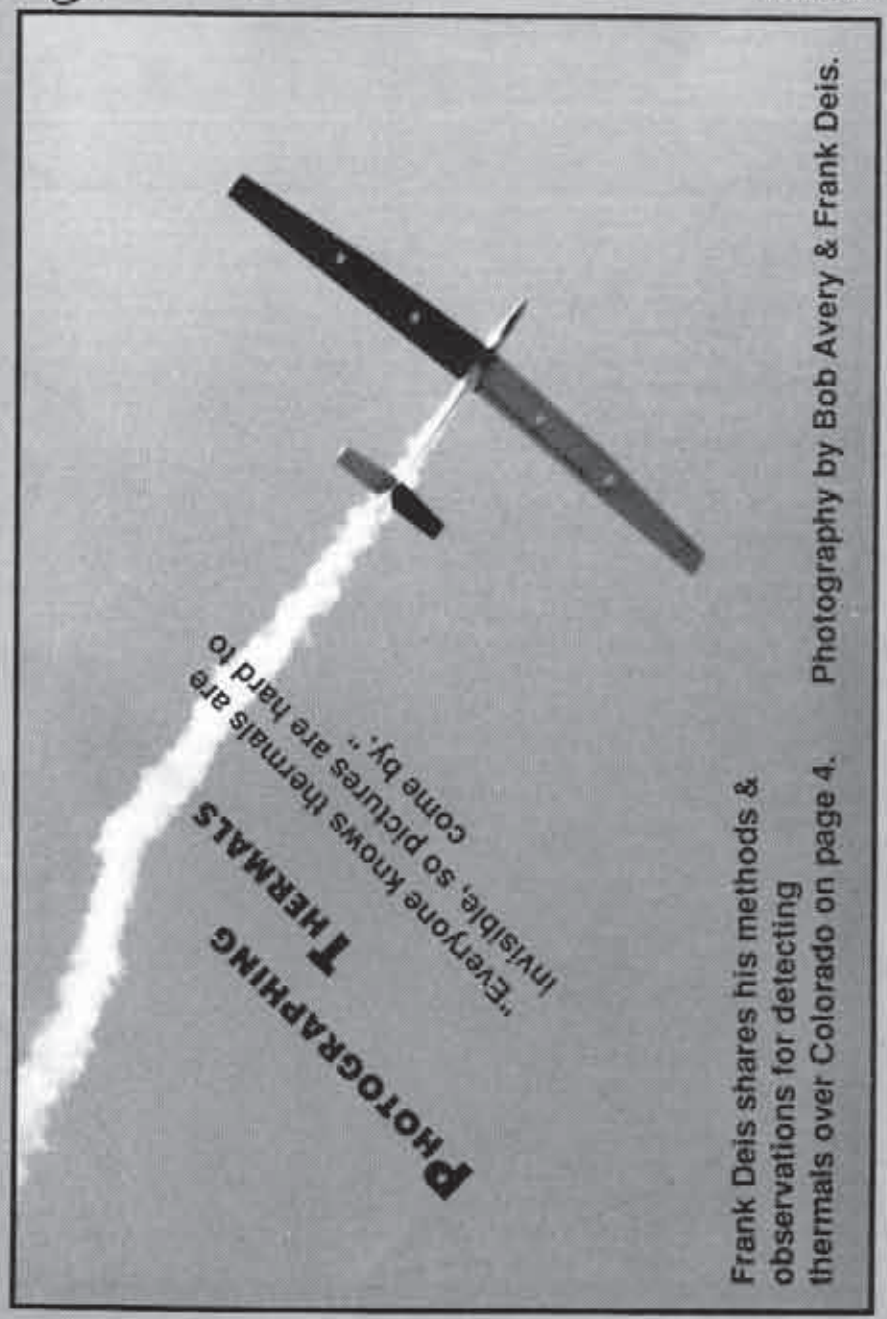
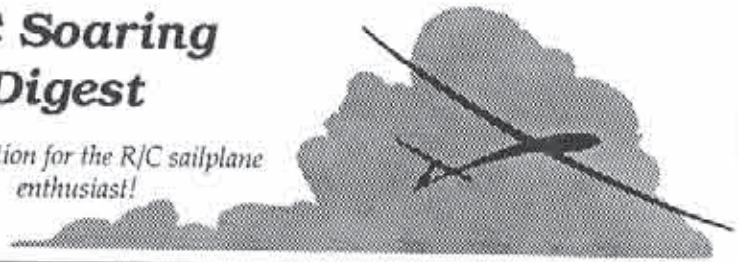


R/C Soaring Digest

A publication for the R/C sailplane enthusiast!



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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; (602) 474-5015.

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The Soaring Site

Mid-South Championships

The event section of this issue contains a status report on the Mid-South Soaring Championships by Bob Sowder of Memphis, Tennessee. In conversation with Bob, we understand that generators can be used on site for demonstrations (computer, etc.) in either the exhibition tent area or the Modeler's Mall. (Please double check with Bob, however.) The Mall provides an excellent opportunity for those that sell sailplanes or related accessories to show off their products. Nothing formal is planned. This year, advertising literature, brochures and/or flyers will be included in the registration packages which will be provided to all entrants on-site. 150 registration packages are planned, so if any of you would like to have literature about your products included, please contact Bob Sowder at (901) 757-5536.

WSJ

Wil Byers received a letter from Dr. Eppler in which he outlines his preliminary plans: to arrive in Richland on May 29, with a departure on June 5. He hopes this gives him enough time to see the RC models and fly some gliders, as well. Dr. Eppler also says, "As a supplement to my presentation on induced drag, I would suggest that some aeromodellers would take two identical RC models with a not too high aspect ratio, with zero dihedral, with the only difference of one model having vertical winglets up, the other one with the same winglets down. It would be very interesting for me to learn which of the two models is better. I think the modellers can estimate the difference between two models very precisely. Perhaps some flights can be made with the two models flying side by side in the same conditions. This is, of course, only a suggestion. I intend to present also my own experiments. I am really looking

forward to the week in your area. I hope that no "act of God" will prevent me from this visit."

A Question from Australia

Staurt Smith, Tasmania, Australia, has asked, "Can you offer some advise on the plotting of a fully elliptical wing planform? I have a wing rib plotting program, so individual ribs are not a problem. It's the actual shape of the leading edge that I can not find in any of my references. I'm intending to design something along the line of the Genesis, but with a span of 144 inches." *Does anyone have any suggestions?*

Ivinghoe Soaring Association

Graham Woods, England, is now the newsletter editor for *The Beacon*, the newsletter of the Ivinghoe Soaring Association. He sent us a copy of their newsletter, and all we can say is WOW! Nice job, Graham!

Graham also wrote the following letter regarding their flying sites.

"At the moment, anyone can fly on our public slopes that are owned/controlled by the National Trust (a body that looks after large estates, gardens, stately homes, etc.). For a small annual donation, as a gesture of goodwill (≈$150) from our association, we can fly there. Electric, IC power, Hang Gliders and Parascenders forbidden. Our relationship with the N.T. has always been a relaxed arrangement, but this is due to change sometime this year with flying restricted to ISA members, only. This will cause us some problems since any accidents will be deemed to be our fault. The site will have to be 'policed' by us somehow - but what happens when awkward strangers turn up? What can we do? What fee will we have to pay in the future, etc.? It's not sorted out yet, but I'm sure that some sort of accommodation will be made for guest fliers if accompanied by a member or invited to fly.

"We more or less have all directions to fly - some better than others but west is best.

David Cutter sent in this photo with the following caption on the back:
"ASW22, B 270 Graupner, Big Creek Lumber Co., 3 miles north of Davenport, California"
"I really enjoy your R/C Digest! Keep up the good work."
Thanks! (signed) Dave

North, northwest, and northeast are quite good, south is OK, southwest is flyable and so is southeast; east is our poorest slope. The slopes are all at the same location on the Bedfordshire/Buckinghamshire border, near the village of Ivinghoe. It is about 40 miles north of central London. Our association had nearly 300 members last year and our site gets quite busy at weekends with members and non-members, typically 20 - 30 on a good day with 5 - 10 models airborne.

"We also have the use of a flat field for thermal soaring some ten miles away. In the U.K. we use 35MHz PPM & PCM (Futaba, JR, Sanwa, Multiplex, Graupner, etc.) and some folks still use the old, unreliable (CB!) 27MHz Fm. (Cars and boats only use 40MHz.) We nearly always use a peg board for frequency control. 72MHz is illegal. (There might be some leeway here; let's not talk about it.)

"All fliers should have 3rd party insurance of at least £1,000,000. They should abide by our rules and recommendations on flying, be polite to members of the public and fly safely. (I.E., speed runs away from the slope when the air is clear, no low flying over people, pathways or the model pound, etc.) Our monthly meetings are held at the nearby London Gliding Club, Dunstable on the 3rd Wednesday of the month. Membership of the ISA is £12 per year inclusive of insurance for the slope.

"Anyone coming to fly is welcome to get in touch with me, or Antony or Mike for information. I may be able to give them some numbers to call for other parts of the country or tell them of other UK slopes to visit in the south of England."

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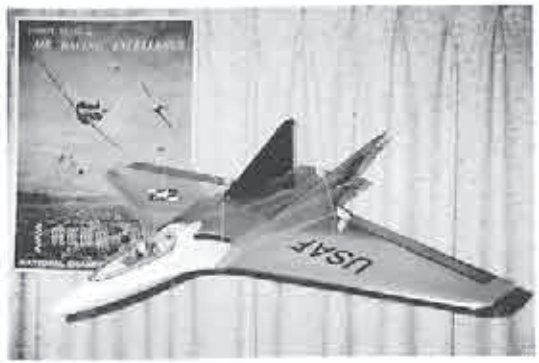
Included in the newsletter was a loose note about stolen property written by Peter Stevens, Safety Officer. It says, "The premises of Ian Tunstall, who runs 'M.B. Leisurecraft', has been burgled and a lot of items taken including his stock of M.B.L. NiCad cyclers, lost model alarms, a Dremel fretsaw, pillar drill and much more. His well known 1/4 scale 'Steinadler' has also gone. If you are offered one of these items by anyone other than Ian, grab the b....r and inform the police."

If any of you think you know something that may be of help, please contact one of the folks above.

Happy Flying!
Jerry & Judy



Paul Clark, Japan, says, "I just finished my DCU Wind Weasel and am in touch with Mark to get his new Toucan (MAN Aug '93)/(RCSD/B² May '93). Haven't had the weather to fly W/W yet - just test tosses. Enough to take the right stab off, but you'd never know. Had to be amused by the back cover of the Dec. issue and the comment inside. Jonathan's Shogun has 5 crash launches and no flights, to date? Takes more lift than we had at the time. The last launch looked good, but the trees looked close, and after two tree retrieves on the same trip, he aborted instead of chancing it. The enclosed picture is afterward. You now have further confirmation of Jarel's kits."

(L-R) Jonathan Clark, Eric Verme and Paul Clark
Happy gliders folks at the end of the day. Eric soloed his Gnome at Tottori, and just finished an hour flight on Gentle Lady. Jonathan is holding Super Ridge Runt, Slope Skeeter, and Impulse. Eric is holding Gentle Lady. Paul has Sparrow (has Bob Parks BPT8 tail feathers), Gnome (converted), Graupner UHU (elec.) salvaged from a friend's crash.

Photographing Thermals

...by Frank Deis
Photos by Bob Avery & Frank Deis
Pikes Peak Soaring Society
2680 Fairway Dr.
Colorado Springs, Colorado 80909

Figure 1 - Smoke-ritter on Legionair.

Figure 2 - Smoke-ritter on Thermal Comet

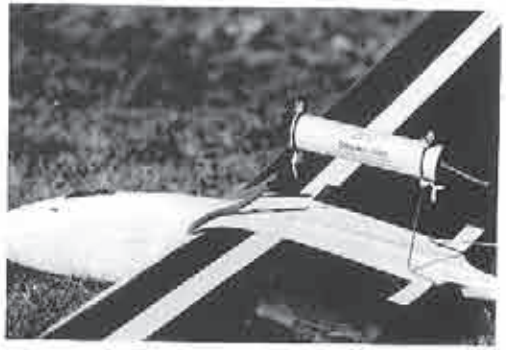


Figure 3 - Smoke-ritter installation using coat hanger wire supports.

It is hard to describe thermal phenomena (bubbles, bubble wakes, chimneys, rotors, inversions, etc.) in an article and there are many people who will argue about their very existence. I thought it would be nice if I just had pictures showing typical examples of each to go along with their descriptions. Since everyone knows thermals are invisible, pictures are hard to come by.

It dawned on me that wind tunnel operators faced a similar problem when asked to visualize the air flow over a model and that they solved it by introducing smoke streams to make the air flow visible. It seemed reasonable to try a similar approach to make thermals visible.

I found an advertisement in my Tower Hobbies catalog for "Smoke-riters" - a kind of smoke bomb made for model airplanes. Figures 1 & 2 show the installation on two different sailplanes (my old Legionair and Bob Avery's original design called a Thermal Comet). The Smoke-riter is six inches long, one and three eighths inches in diameter and it weighs about six ounces before burning. It burns in two phases for a total burn time of about three minutes including the short pause in the middle. When burned out it weighs about two and one half ounces. Although the weight is significant, the most noticeable impact is the added drag; therefore I think this installation should be reserved for fairly large sailplanes.

Figure 3 shows the design of the wire supports and their installation. The Smoke-riter cartridge is supported fore and aft with a wire structure made from a coat hanger. To protect the sailplane I covered the wire with some small diameter surgical tubing where it contacted the airframe. The cartridge burns pretty hot so protecting the sailplane from the heat was a major consideration. I located the centerline of the Smoke-riter about five inches above the fuselage which seemed to provide enough clearance that the heat was not a problem. The smoke itself emanates from holes in the cartridge located about one and one half inches from either end. The cartridge is marked with the notation "smoke issues here" in the vicinity of the ports. On my Smoke-riters this note is about forty five degrees around the cartridge from the true position of the smoke ports. By carefully examining the cartridge I located the actual ports through the cartridge wrapper and installed the cartridge with the ports pointing straight up. This worked so well that the airplanes didn't even get dusty! I adjusted the wire supports so that the C.G. of the cartridge was right above the original C.G. of the sailplane and it was ready to go.

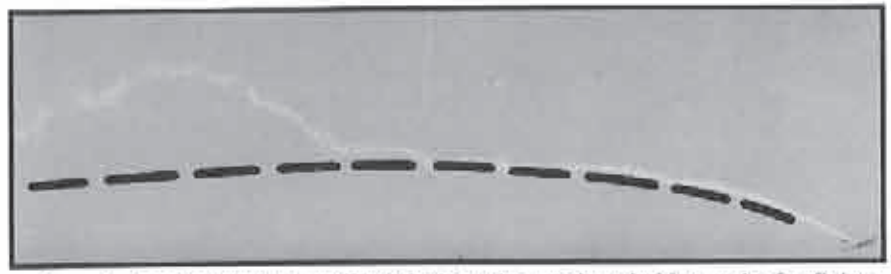


Figure 4 - Smoke path for a small bubble thermal approximately 20 seconds after flying through it. (Dashed line shows original flight path.)

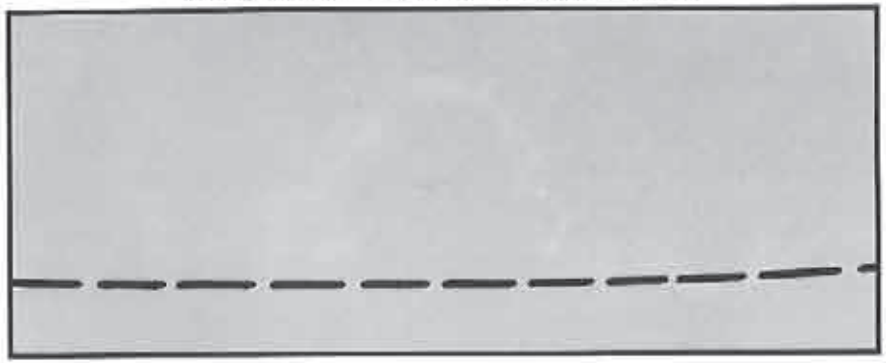


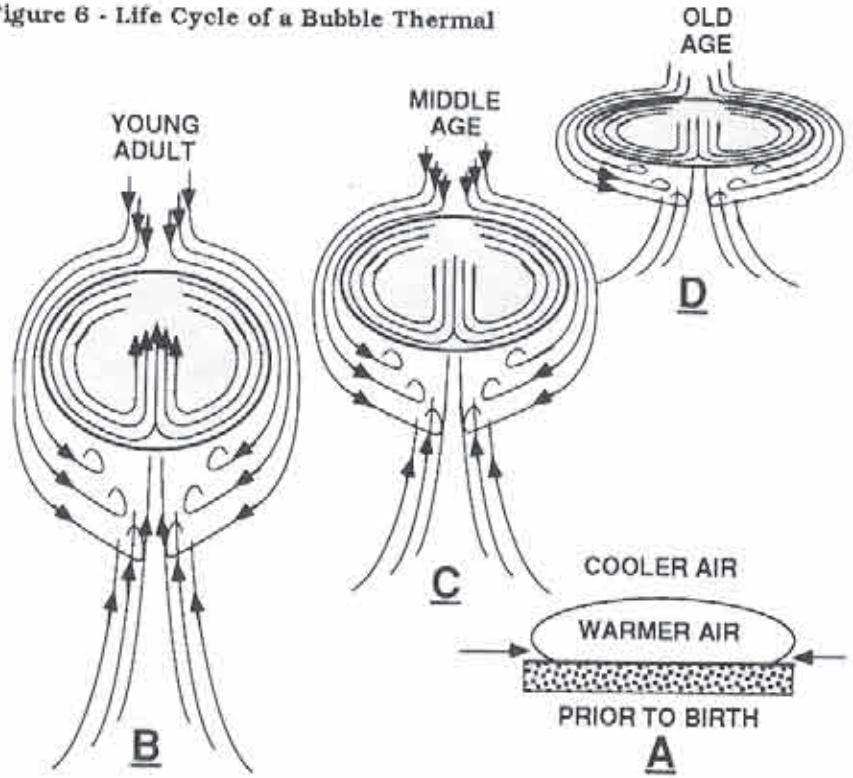
Figure 5 - Smoke path for a small bubble thermal after flying through it.

There are many ways to make the wire supports themselves. My approach was to make two wire frames - one for the leading and one for the trailing edges. See Figure 3. The leading edge support started on the lower side of the wing about one and one half back from the leading edge. I bent the wire to follow the airfoil shape as it went forward, wrapped around the leading edge and then followed the upper camber for a couple inches before bending it straight up to form a cradle for the cartridge. A similar approach was used on the trailing edge supports. Hooks were bent in the ends of the support wires beneath the wings so they could be held onto the wings on each side with rubber bands. The Cartridge was held in the wire cradle with rubber bands also. This allowed a quick installation on almost any airplane. (Make sure the rubber bands do not touch the cartridge.)

We test flew the configuration a couple of times to make sure everything was tight and to get used to the new feel. The glide ratio was noticeably reduced indicating that the Smoke-riter added a lot of drag. I considered adding a streamlined nose and tail to the cartridge to reduce the drag but decided they might result in a fire hazard and it would be safer to just live with the drag.

The pictures were all taken on the same day late last fall near the end of our flying season. I flew my airplane while Bob

Figure 6 - Life Cycle of a Bubble Thermal



Avery took some pictures then we switched everything and he flew while I took the pictures. For scaling purposes, the Legionair (the one with polyhedral) has a 140 inch span and a 44 inch fuselage. The Thermal Comet has about a 120 inch span and a 55 inch fuselage. The dimensions allow one to estimate the size of the thermals marked by the smoke. For example, the Legionair flies at just over 2 wing spans per second or six fuselage lengths per second. The Thermal Comet is a little faster.

Figures 4 & 5 are the same thermal photographed about 20 seconds after pass through and again about 40 seconds after pass through. (The dashed line shows the approximate flight path of the sailplane.) Note that the upward velocity in its center is about one seventh of the sailplane's air speed - not real strong but nice. Note its shape; this is the classic bubble thermal as discussed below.

Figure 6 presents the life cycle of a bubble thermal. Before its birth as a thermal it is a bubble of warm air created above a warm patch of ground (figure 6 A). Soon after a bubble forms on the ground, a gentle circulation begins within it where the air flows upward at the center then out and down along the sides.

A bubble attached to the ground represents a very unstable situation. There are no rules for how long the bubble will stay attached to the ground, how large it will become or how warm it will become. For all practical purposes it simply spontaneously separates from the ground and begins to float upward.

When the bubble separates and "whooshes" upward (figure 6 B), air is drawn in behind it. This air is called the bubble's "wake". It is also referred to as "feeder air."

As strange as it sounds the newly formed bubble behaves like a self contained, separate and isolated object moving through the air surrounding it. Throughout most of its life time there is little or no mixing between the internal and external air. The most familiar phenomena similar to this is a smoke ring. Smoke rings also move as though they are solid objects. There is little if any mixing of the air on the inside with the air outside until the ring dissipates. In fact, thermal bubbles are closely related to smoke rings.

As the bubble rises, it interacts with the surrounding air at the bubble boundary. (See figure 6 B.) The air inside the bubble at the bubble interface tends to "stick" to the air outside the bubble at the bubble interface. As the bubble rises, this effect pulls on the surface of the bubble and draws the air at the top of the bubble down along the sides and toward the bottom. In response, the air in the center of the bubble moves toward the top to fill the vacancy. Once this donut like pattern is established there is a continuous circulation of air down along the surface of the bubble and up through the central core again as shown in the figure.

As shown in figure 7 a bubble type thermal has the same shape properties as any other bubble. It has a top, a bottom and sides and generally looks like a slightly squashed sphere. Therefore, it is easy to fly over, under or beside one and not know it is there.

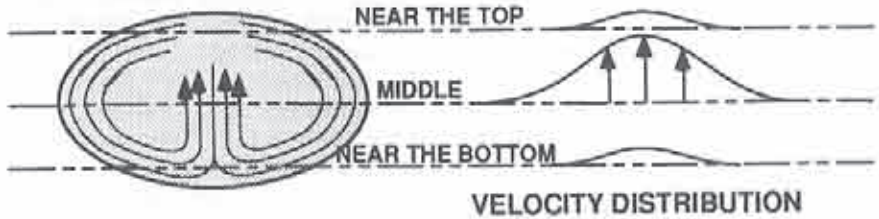
Figure 7 includes typical velocity distributions within the bubble at three different levels. Note how rapidly the air flows up through the central core in the middle of the bubble compared to the air at the surface of the bubble. All the air in the bubble is going up but some parts go up faster than others! Not just the rise rate of the bubble can carry a sailplane up. It can rise within the bubble if it is centered in the bubble's central core.

Figure 7 also shows the air flow direction and velocity at the top and bottom of the bubble. At the bottom, the flow direction is primarily inward toward the core. The only lift available is that due to the bubble's rise rate alone. Similarly, at the top the airflow is primarily outward and again the only lift available is due to the bubble's rise rate alone. Also notice how small the bubble's cross section is near the top and bottom compared to its size near the middle.

From figure 4 alone it is hard to tell where along the bubble's height we encountered it. Figure 5 however completes the story. Note that the smoke is curling in at the base. The base is only three quarters as large in diameter as it is in figure 4. It looks like this is a small bubble and that we flew through the middle of it. Forty seconds later it has gently floated up and the internal circulation is beginning to turn the smoke inward at the bubble's base in preparation for its travel up through the core.

Contrast this to Figure 8 which again is a classic bubble. This time the bubble is much stronger. Its upward velocity is equal to about half the sailplane's airspeed resulting in about a twenty to thirty

Figure 7 - Airflow within a Bubble Thermal



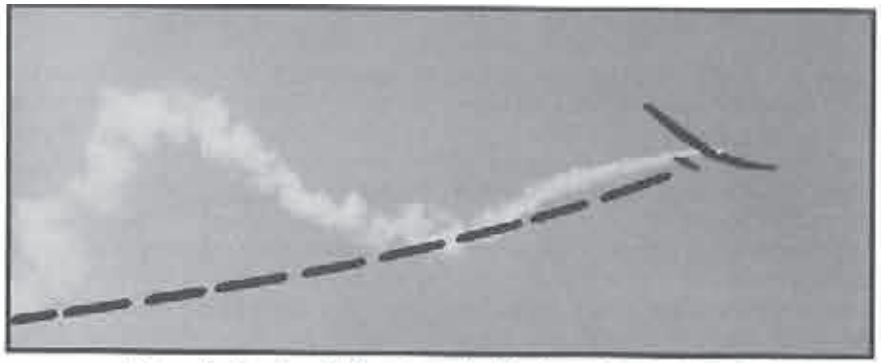


Figure 8 - Smoke path for a strong bubble thermal approximately 10 seconds after flying through.

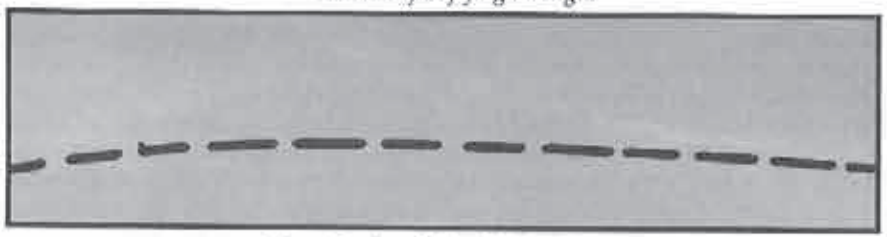


Figure 9 - A probable bubble wake trace.

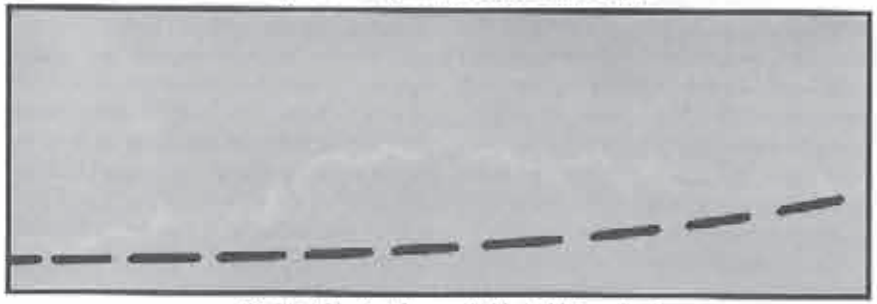


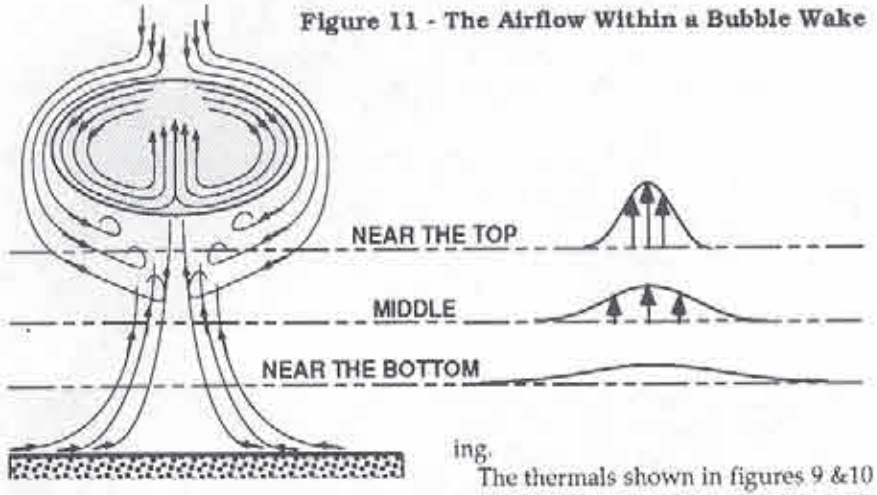
Figure 10 - Another probable bubble wake trace.

degree climb angle. This is a pretty good kick in the pants by any measure. Note that the bubble's diameter is only about 6 fuselage lengths - pretty small. Did you ever hit a strong bump, wheel around and try to find what caused it and come up empty? Well, here is a picture of the bad guy. If you miss this by a distance equal to half a wing span plus three fuselage lengths, you would never know it was there! That is just one reason small strong bubbles are so exciting.

Figures 9 &10 look like "bubble wake" traces to me. As the bubble part of the bubble thermal rises, the air around the outside must close in behind it as shown in figure 11. This requires a dramatic change in the flow direction of the ambient air as it wraps around the bubble that, in turn, leads to separation of the flow from the bubble surface and the generation of a turbulent wake below the bubble. The picture looks very similar to the turbulent wake behind a golf ball.

In addition to the flow around the bubble, air is actually drawn in behind the bubble forming a conical shaped wake as shown in figure 11. Immediately below the bubble the air is violently turbulent and rises at nearly the same speed as the bubble itself. Further behind the bubble a small core of smoother air surrounded by the turbulent air flowing around the bubble may appear. The size

Figure 11 - The Airflow Within a Bubble Wake



and extent of this core within the bubble wake depends on the size of the bubble itself, its rise rate and other factors. Further and further behind the bubble the core broadens, loses some of its upward velocity and the air around it, while still turbulent, is less violent. Eventually the lift is so low and the turbulence so light that they approach ambient conditions and it is hard to tell the bubble ever passed through.

If the thermal bubble is still near the ground (i.e., its altitude is only a few times its diameter), the wake interacts with the ground as shown at the bottom of figure 11. Clearly, at the surface of the ground the air cannot simply flow upward. Outside air must flow in from the surrounding area to form the wake. As it flows in behind the bubble it flows parallel to the ground and produces a wind. The area effected by the wind is a couple of times the diameter of the bubble and the intensity is related to the bubble's size, altitude and rise rate. (E.g., a large, rapidly rising bubble near the surface will cause very strong local winds.) These winds are commonly referred to as feeder air because they "feed the wake" behind the bubble. These feeder winds have long been recognized as indicators of nearby thermal activity. As such they provide vital information to a pilot intent on soaring.

The thermals shown in figures 9 &10 are broad, relatively flat and their vertical velocities are low. The smoke is pretty well dissipated indicating some turbulence but not much. These are all features that I would expect near the bottom (or end) of a bubble's wake. Hence, I think these are bubble wake thermals.

Figure 12 is supposed to be a picture of a "downer" but the more I study it the less I understand it. Basically it should look like a bubble or a bubble wake turned upside down (a bubble of cold air sinking should be similar to a bubble of warm air rising except upside down.) This was clearly a strong downer when we flew through it but the smoke trace is pretty confusing. It does not look like an inverted bell so we did not fly through the bubble. Yet, it isn't broad and flat like a wake either. The only explanation that seems to fit is that we flew through two cold bubbles that were falling side by side and, while not impossible, it seems a little too hookey to believe. At the very least this picture does confirm that the air goes down as well as up and at pretty good speed too!

My current favorite from the first round of photographs is figure 13 which I believe to be a clear rotor signature. A rotor is just a horizontal tornado of sorts as shown in figure 14. Note how closely the smoke in figure 13 matches the velocity

Figure 12 - Smoke trace for a strong but hard to explain "Downer".

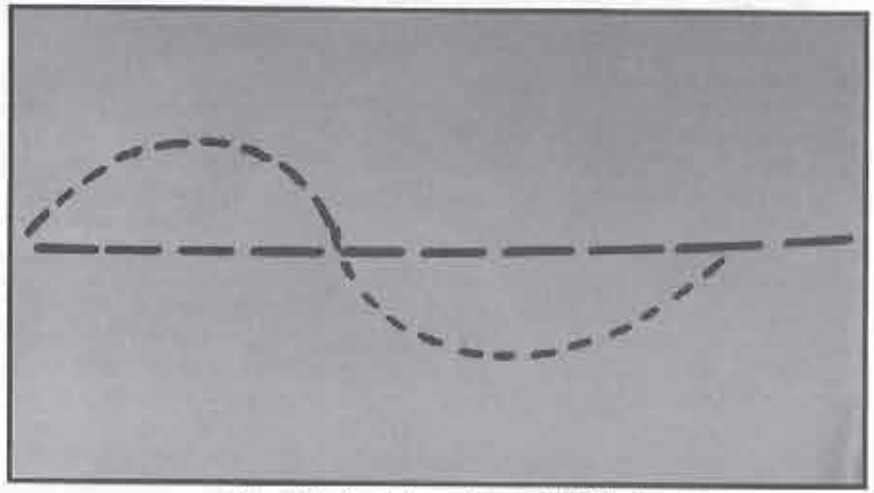


Figure 13 - Smoke trace for a small "Rotor".

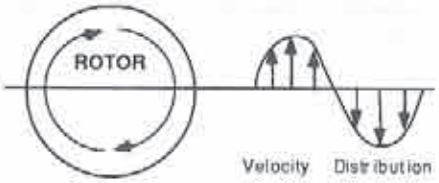


Figure 14 - Airflow Within a Rotor

distribution in figure 14.

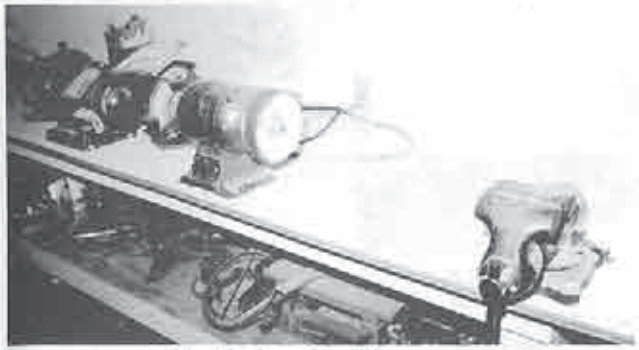
Everyone at PPSS was pretty impressed with the success of this first attempt to photograph thermals so when the weather turns nice, we will surely try again. I purchased a polarizing filter in hopes of improving the contrast between the smoke and the sky and a couple of club members want to try video taping a flight. With luck we should get some more interesting results.

If you try a research project like this you must be extra conscious of safety issues. The Smoke-riter burns pretty hot and puts out two jets of smoke. So, fire safety is paramount. Do not experiment where you will attract children or where the grass is dry or there is any kind of a safety hazard. Our Smoke-riters burned out and cooled down before we landed but your results may vary. The object of all this is to look at the smoke trail which is fine for everyone but the pilot - he must keep both eyes on the sailplane. I do not recommend these experiments unless conducted on an isolated field, dampened by recent rains or watering and with plenty of help from fellow club members. ■

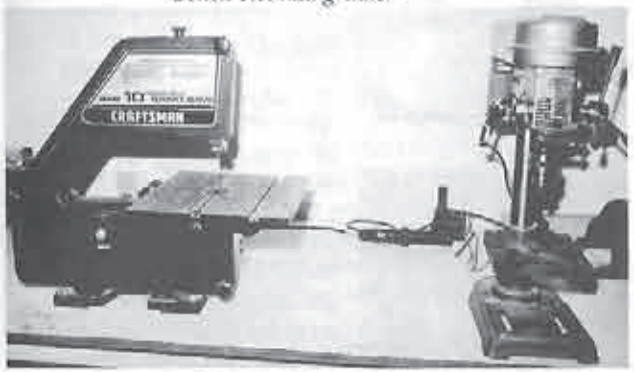
Jer's Workbench

Tools - Part 2

Last month I talked a bit about tools that one can get by with, particularly in the past. And today, with some of the deluxe kits that are on the market (fiberglass fuselage, pre-sheeted wings and pre-cut parts), there is very little building required. But for those of us who still build from plans and scratch build, there are a few more tools that are nice to have.



Bench vice and grinder



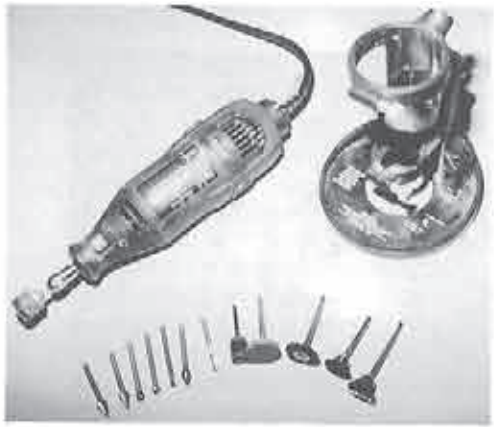
Band saw and drill press

Drill press accessories

I still use a building board, and currently have three of them. These are the kind that can be picked up and moved when they are not in use. This leaves the work bench open for other projects. My work benches (2) are quite large, 96X36 inches; the tops are 42 inches from the floor. I like the extra height so that I don't have to bend over while working; if I don't feel like standing I use a tall bar stool and belly up to the work bench. Also, these work benches are not against any wall; by being out away from the wall I can work from all four sides.

My three most important tools that no one should be without are a FIRE EXTINGUISHER, FIRST AID KIT, and a shop vacuum cleaner. It is to be hoped that the first two items will not be used, but the shop vacuum is obviously used a lot, so I keep it handy. Keeping the work area clean makes it a lot nicer to work in, plus there is less mess being tracking into the house.

On the work bench I have permanently mounted four tools that I use often, starting with a bench vice. Next



Dremel tool and accessories

Belt sander

7 1/2 inch table saw

Small air compressor with airbrush

is the bench grinder, which is a tool that's not used all that often but when I need it, it's there. The 10 inch band saw and drill press get a lot of use. If you have a drill press, there are accessories that are nice to have, an assortment of drill bits, hand vice, V-block and a micrometer. Drill bits come in many different sizes: fractional, numbered and lettered. For drilling a hole, the fractional size drill bits will do, but for a tight fit or for a press to fit, the numbered and letter sized drill bits are used. The micrometer measures in thousands of an inch, and is used to check the size of the rod or tube against the correct drill bit for the hole being bored. My Dremel tool get a lot of use. This tool is a must have for any modeler as it has many uses: drilling, cutting, grinding; the router attachment for the Dremel Tool is a must for me for cutting the flaps, ailerons and servo well in a foam wing. The 7 1/2 inch table saw and belt sander get more than their fair share of use. The last item is a small air compressor and airbrush, which has much better control than a spray can of paint.

There are many more tools that are nice to have, too many to list. But as time goes by tools can be obtained at flea markets, garage sales, and by making special requests of Santa Claus. This is how I built up my tool collection over the years. ■

Beginner's Corner

Useful Tools and Things

...by Ed Jentsch
Rockville, Maryland

This article responds to David Fruehwald's request, published in the March 1994 issue of *RCSD*, for a list of tools for beginner and intermediate pilots — "must haves; nice to haves; and nice to haves, but really expensive." As a starting point, I interpreted David's request broadly to mean anything necessary or useful to build and fly model gliders, and then pruned the list of common house-hold items, e.g., scissors, pencils, etc., where their utility is self-evident. The final list, below, is definitely subjective, profoundly mundane, but hopefully useful to its target audience.

Essential

Tools

Building Board — Either home made or purchased. Should be perfectly flat.
Razor Blades — Single-edge. Buy in bulk quantity (packages of 100). Discard blades at the first sign of dulling.
Exacto Knife and Blades — The comments about razor blades also apply to knife blades.
Modeling Pins — Minimum of 50. Hobby Lobby sells the best ones I've seen.
Screwdrivers — Both slotted and Phillips, small and medium.
Pliers — Regular and needle nose.
Wire cutters — Best tool for cutting control rods.
Tweezers — For maintaing the shape of your eyebrows. Also useful for digging dropped servo mounting screws out of fuselages.
Sanding Blocks — Several different sizes. Home made or purchased.
Center of Gravity (cg.) Stand — Home made. The thumb & forefinger approach is cheaper, but lacks precision.
Straight Edge — Good quality. Minimum length of 36 inches.
Machinist's Ruler — Metal, six inches long.
Combination Square
Covering Iron — Optional. Buy one only if you cover your planes with plastic.
Baby Socks — Optional. High (>95%) cotton content. Put one on the shoe of the covering iron to prevent scratches on plastic covering material.
Credit Card (Expired) — Optional. For spreading epoxy when sheeting wing cores.

Safety Equipment

Rubber/Vinyl Gloves — Always use these when handling uncured epoxy.
Safety Respirator — Rated for protection against both dust and fumes from epoxy, paints, thinners, etc.
Wide-Brim Hat — For sun protection when flying. Also useful as a dsiguise following crashes.
Sun Screen — High blocking factor, to ward off carcinoma.
CA Glue Remover — You will glue your fingers together at least once in your modeling career. Nail polish remover will also work in a pinch.

Supplies

Sandpaper — 60, 100 and 150 grit aluminum oxide. 220, 320 and 600 grit Silicon Carbide (wet & dry). Don't use the cheap stuff.
Lead Weights — For adjusting a plane's cg. Buy either the weights sold in hobby stores, or make your own from wheel balancing weights, which can be easily chopped up with a wire cutter.
Masking Tape — Paint grade.
Scotch Tape — For field repairs of wing covering. I like Scotch "Magic".
Wax Paper — For covering plans while doing built-up construction.
Denatured Alcohol — For cleaning up epoxy.

Adhesives

Epoxy — Long setting (30-60 minutes). Never use 5-minute epoxy unless you're tied for first at the NAT's, need to make a repair, then borrow some.
CA Glue — Fast, slow, and flexible.
CA Accelerator — To make the slow stuff set when it's recalcitrant.
PVA Glue — AKA "woodworkers glue" (yellow).
Micro Balloons — Or similar dry filler material for mixing with epoxy to make fillets, etc.
Light Weight Spackling Compound — It's cheaper than the balsa filler sold by hobby stores.

Other

Hi-Start — Optional. Not needed if you have guaranteed access to a club hi-start or winch.
Credit Card (valid & current) — Optional. For paying for all the things on this list.

Nice To Have

Tools

Tool Box — A plastic fishing tackle box is ideal and enables alternative entertainment when lift is lousy.
Vice — Machinist's preferred, but bench is okay.
Tap and Die Set — Typical modeling thread sizes (e.g., 2-56, 4-40, etc.).
Monokote Trimming Tool
Temperature Gauge — One made specifically to measure covering iron temperatures.
Battery Cycler — The Ram Simple Cycler is a good buy.
Razor Saw — With extra blades.
Razor Plane — With extra blades
Hack Saw
Tubing Cutter — Miniature.
Wire Stripper — Plain strippers are more fun, but distracting to all but die-hards.
Half-Round Files — one "second cut" and one "final cut" (avoid "bastard" files unless you build steel planes).
Needle Files — set of.
Soldering Irons — One small (for wiring) and one moderately large (for soldering metal parts together.
Z Bend Pliers — Optional. Only buy one if you use z-bends in control linkages.
Kwik Link Separator
Ball Link Separator
Wire Bender
C Clamps — Several, miniature.
Spring Clamps — Several, small to medium.
Sanding Jig — Buy or make one.
Kevlar Scissors — Only if you work with Kevlar. They're not cheap.

Supplies

Solder and Soldering Flux.
Heat-shrink Tubing — Assortment.
Steel Wool — Used to clean metal parts before soldering.

Adhesives

Spray Adhesive — E.g., 3M 77.

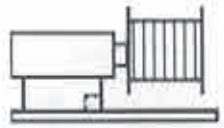
Other

Cooler — To keep lunch, soft drinks and snacks in edible condition. Get one with a lock if you need to protect the contents from two-legged carrion.
Lawn Chair — If you're under thirty, buy one anyway and rent it to the older pilots.
Shade Umbrella

Nice To Have, But Expensive

Drill Press — With complete set of drill bits.
Dremel Tool — Variable speed, with router attachment and router bits.
Disk Sander
Radial Arm or Table Saw

■



Winch Line

Gordon Jones, 214 Sunflower Drive, Garland, Texas 75041; (214) 271-5334 After 5:00 P.M. CST

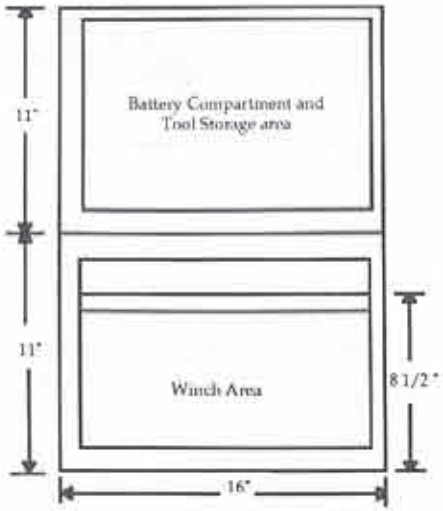
The Winch Cart

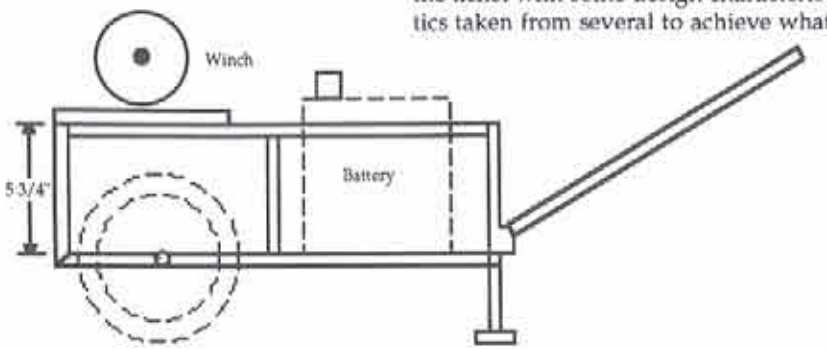
With flying fields becoming somewhat of a problem in parts of the country and the associated support gear becoming larger (we do like our accessories), moving all the winch stuff has become a problem. Take for instance the group of flyers that cannot drop the winch and accessories in the middle or edge of the field from the back of a car or truck but are forced to carry everything to the launch site by hand. This can get real old in a hurry with a 55 pound battery.

While looking at some of the winch arrangements of the F3B teams in several of the magazines it was noted that they have, for the most part, carts to carry all their equipment to the launch site and if the wind changes direction this also provides a means of moving the winch more easily. Here in Dallas we have several trailers designed by the club for that purpose. But for those who fly at other locations out in "never-never land" and who don't want to disturb farmer Brown's pasture the cart idea can be very handy. Looking at flying at such a site provided the impetus for building a cart.

The designs of the F3B teams were just the ticket with some design characteristics taken from several to achieve what

Top View

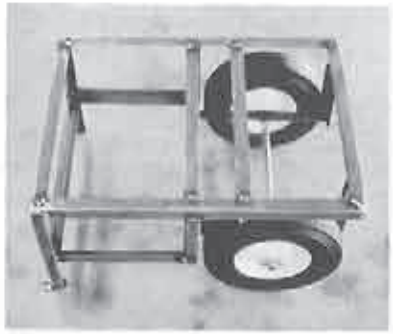


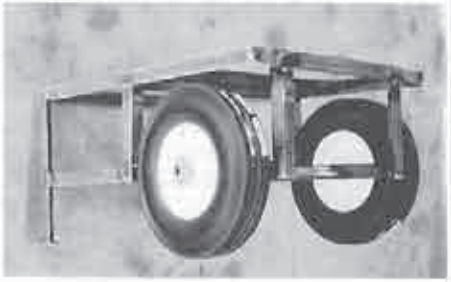


Side View

was a great little cart that carried everything in one package. It was decided to use 1x1x1/8 inch angle iron as it was strong enough to handle the rough rides and stress that some of the pot holes may put on it but workable enough. The second consideration was the wheels and axle assembly that would have to hold up all this stuff. Here a solid 10 inch wheel was located that would accept a 5/8 inch axle. The battery compartment was constructed out of 3/4 inch plywood on the bottom and 1/4 inch on the sides. To pull this monster, the top portion of an old lawnmower handle and the bottom brackets were used. The handle was set low enough so that when a person picked up the end of the cart he had to lean down a tad and when straightening up the weight would not unduly strain the "cartee".

The drawing and pictures describe the design better than words so I will let them speak for themselves. (I'll use the Ed Slegers approach.) ■





Painting Fuselages the Light Way

One of the things we try to accomplish in building a sailplane is to keep the weight of the plane as light as possible. This is especially important in electrics. I have seen some electrics where the builder has tried all the tricks in the book to keep the plane light, only to add a few ounces of paint to the fuselage. The method I use will give you a pretty light finish and of course this can also be applied to non-electric sailplanes.

1) Wash the fuselage with soap and warm water. This will get most of the mold release agents and waxes off the fuselage. Then, dry the fuselage. It does not have to be perfectly dry for the next step.
2) Take 80 grit sandpaper and sand the entire fuselage, especially the seam. Sand the seam down so that you can no longer see the seam. Do not worry about the scratches from the coarse sandpaper. The next few steps will get rid of these. Wipe the fuselage off with a rag dampened with alcohol.
3) Spray a coat of primer over the entire fuselage. This first coat of primer will make all the pin holes and voids in the fuselage very easy to see. I used to fill the pin holes first and then use the primer, but it seemed that I always missed some. By spraying the primer first, you should be able to see and fill all the holes, thus saving a lot of time. The primer that I have found to work better than any other is Pactra Prep #41-168 Primer-Surfacer. This can be found or ordered from most hobby shops. Pactra dries in less than an hour and is extremely easy to sand.
4) Fill all the pin holes with body filler. It is also sometimes called glazing compound. Body filler comes in a tube. It is a one part filler and is an air drying material. It usually comes in either red or gray. Use whatever color you find. The color is not important. I apply the filler with a small piece of plastic similar to a credit card. A nice feature of the body filler is that it goes on very easily, dries in what seems like minutes, fills holes and sands easily.
5) The next step you may want to do outdoors as it gets a little messy. Once you are sure that the body filler is dry, it is time to sand the entire fuselage. Use 400 wet or dry paper WET. This is one of the most important steps. Wet sanding is the only way to remove most of the primer and filler and still get a smooth surface for painting. I like to use a small bucket with warm water. Dip the paper in the water and start sanding. I usually start at the fin and work my way toward the nose. Make sure to keep the paper and the fuselage wet. If you try to sand with dry paper, the results will not be nearly as good as the results you will get wet sanding.
6) When you think you are finished, take a rag soaked in water and wash off the fuselage. What you should have now is a fuselage that has almost no primer left on the fuselage, and is glass smooth. A word of caution!!! Make sure the fuselage is dry both inside and out. If only one drop should run out of the crevice while you are painting, the paint job will be ruined. For this reason, I usually wait a day or two before painting.
7) The last step. Time for painting. The paint I use the most is Krylon. Krylon is inexpensive, easy to find in most home improvement stores, comes in many colors, sprays well, and does not run easily. Although Krylon is not as durable as some of the automotive lacquers, you will still get a good finish with a minimal amount of weight added to your sailplane. Before spraying, it would be a good idea to practice on a piece of cardboard. The first coat should only be a very fine coat of paint. So fine that the primer and glazing compound will be easily seen through the paint. Let this coat dry for about 20 minutes and then spray on another light coat. This coat should also be allowed to dry for about 20 minutes. The third and final coat should be sprayed on a little heavier. Remember to do this in a very well ventilated area.

The above procedure will give you a very respectable finish with very little weight gain.

Happy Flying!! ■

Cold Weather Radio Problems

...by Steve Savoie
DownEast Soaring Club
Gorham, Maine

Marginally cracked capacitors (in receivers) can sometimes work in warm weather, but in cold temperatures they can affect the range of the receiver. Winter fliers should allow their radio equipment to assume the temperature of their surroundings before range checking. Range checking electronics still warm from a heated vehicle interior may yield false results. A crash could result if the plane is in flight when the electronics cool down. This same problem happened to three different members of the DownEast soaring club in recent years during winter sloping.

Airtronics has the capability to test electronics at reduced temperatures to check for these problems. Just let them know the circumstances about cold weather related failures. ■

On The Air With Cornfed

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"It's All in the Name of Fun"

I never thought this weekend would get here. It's Friday night, the batteries are on charge, and the truck is packed and fueled up. All's needed is for this long night to pass.

What a night! Seemed like I had just fallen asleep only to hear the alarm go off. That's okay. I'm outta here.

I figured I would be there in about an hour. Directions are kinda poor, but not to worry. *There's the field. How about that! Front row parking. You know, I had one of those gut feelings this would be my day.*

Hey, there's Joe. "How's the family, Sam?"

I see Gary finally got his new plane in the air. Just doing a little morning small talk. *I wish they would get the meeting over with.* Hmmm... Let me get this straight. You say five rounds: one five minute, two sevens, and two tens? *I can do that. No problem-mo-so!* What! I'm up first? *Come on, there are fifty folks here. Why me? Cliff's about twenty-fifth. Lucky dog.*

Cornfed to the flight line. *Ok, ok.* I'm comin'. Just need to get a sweat towel. All I was doing was bagging a little sand for the tent in case the wind tries to blow it away.

Got a good launch, eased back on the elevator trim, and just went a lookin'. Oh! What's that? Na. Let me look more to the left. Alright, I'm hooked.

I asked Cliff, "How much time left? Now look, give it to me every ten seconds til' the last thirty, then every five."

"You did real good, Cliff. Thanks for the time." How about that landing. All I need is four more rounds like that. "They should just go ahead and give me the trophy," I told Cliff as we walked back to the tent.

My, this is the life! Good air, good friends, having fun. Cliff got his time. Landing was fair. We were cutting up and having a good time. My second round was a piece of cake. I could have threaded a needle with the plane on that landing.

"Let's ease over to the landing circle and watch the landings, Cliff." He said, "Alright."

"Man, that was a good landing. Now look at that bonehead. He flew right past the spot. What a moron! How about that plane. What a pile of trash!" Cliff quickly pointed out, "Yeah, but he got a good landing."

"Cornfed, let's check in on the launching department," said Cliff. "Hey, Jim is the winch master this round," I all but shouted. "You know, he sure can spot lift. My third round will be a breeze. Between him pointing me in the right direction and my flying, I will do great."

"Let's go, Cliff. I'll be up in five minutes. You get the radio, and I'll get the plane. My, would you look at the lift up there! It's everywhere. All I've got to do is just throw that baby up, and it will fly til' the cows come home." Cliff howled, "You're up next."

"How's it going, Jim? That's good. Now, what way would you go if you were me, Jim?" I laughed as I spoke. Jim looked at me quickly, but then you would have thought he had been snake bitten. I mean, he was movin'. I looked over only to find the winch line had broken. "What do you mean, give you a few minutes? Don't you know I've got to go? All I need is a short launch. The lift is right there," I exclaimed to no avail.

Well, up the line I finally got to go. "Cliff, where did everyone go?" I asked as I looked around. He said, "Well, they got their time and landed, and you're all alone." My, the air was cold, cold, cold. I felt like I needed a jacket. I had that sinking feeling like there was a hole in my boat. "Come on, just get your landing," Cliff said. "We will get 'em next round," I told him as we snuck back to the tent.

Alright, alright. Here we go. I just need two more good rounds. I'm comin' from the rear of the pack, but I can do it. "Look good, Cliff. Hey, where did Jim go? Oh, who needs him anyway," I mumbled to myself. *Dog gone it, weak battery. Gee, some launch that was.* "What they doing over there, Cliff? What about that bird? Hmmm, too far away. All I need is five more minutes. I think I can make it to the bird." Cliff said, "It will be hard gettin' back if you don't make it." I replied, "Let's try." *Okay, okay! Pick a spot through the trees. Maybe I will hit a bump. There it is. Now, there's the sink. Forget the time. Let me do one of those downwind landings.* I practiced that just the other day. "Watch out for the other plane," Cliff yelled. Wouldn't you know it. I tip stalled and busted the wing! "Cliff, remember that gut feeling I was tellin' you about this morning? Well, it must have been indigestion." The two of us snuck back to the tent again with broken plane in hand. If that wasn't enough, the wind had been blowing alright. The lawn chair was laying on my back-up plane with the rudder hanging off the fin. It just can't get any worse!

"Listen to them over there, Cliff, in the next tent. Look at them high fiving and having fun. Don't they realize there is a funeral going on in the tent beside them?" To top it all off, the knuckle head sitting on the corner howlers out, "Keep them landings up, Cornfed." That's just pouring salt in the wounds. Cliff looked at me and said, "Having fun yet?"

I said all that to say this.

Contest flying is on us now, and as you enter the contest season just remember, we do this hobby for the fun and camaraderie. Yes, we all like to win and to strut like a big rooster with victory in hand, but that's not all it's about. It's about meeting new friends, learning and sharing ideas, and just having some fun.

Contest directors, please remember to help us stay safe this season. Your decisions could be the difference between a good or bad outcome. Thanks.

Signing off,
Cornfed

P.S. Say your prayers and drive safely.

Attention: Bob Sowder of Memphis, Tennessee. Do you think your wife would mind if I bring my wife and baby and our two dogs to your house to spend the month of June with ya'll? I need to practice for the Mid South Championships in ya'lls air. You know, to learn the lift. ■

Ridge Writer

...by Wil Byers

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Current Drain on a Battery Flight Pack

As slope soarers we know that often times a trip to our favorite site means one launch and one landing. Not because our super soarer isn't able to stay aloft or suffers from a fatal landing, but rather because often times we just fly the model one time each trip out. That's because slope soaring is flying in lift that can often be good enough that one really just needs to launch the model once to get 30, 45, 60, 120, 240 minutes or more of air time on the model's airframe.

With air time, however, comes the necessity to judge just how much current/voltage potential is stored in the model's battery pack. Unfortunately, the reality is that sometimes we don't accurately judge just how much potential is left in a battery pack and the consequences are usually BAD! I guess that is why a new R/C slope soaring pilot asked me the other day, "How long can I fly this model before the batteries go dead?" Good question!

So, this month's topic is current drain on a battery flight pack and how it affects battery life. This may be a subject that you are familiar with so skip to the end of the column where we have a brief discussion about a new type of battery.

What is current drain? Simply, current drain is the flow of electrons from the battery pack to the load, which in this case is the servos and the receiver. Current is measured in amperes (A). One ampere is the amount of current that flows through a resistance of one ohm when one volt of potential difference is applied across it. In other words, 1 Amp = 1 Volt/1 Ohm.

The batteries we put in our gliders, however, are almost always rated in milliamps. Therefore, we need a definition of a milliamp. A milliamp is defined as 1/1000 of an ampere or .001 amps. So, if you have a battery pack that is rated at 500 mAh it is capable of delivering 1/2 amp. Note here, that mAh stands for milliamp hours. In other words, our example pack can deliver 500 milliamps for 1 hour (important point).

Why is all the explanation necessary? Well, with our current state-of-the-art multi-channel gliders we often employ multiple servos to drive the controls. It is not uncommon to see a sloper that uses as many as six servos. For example, the model might have two servos driving the flaps, two servos for the ailerons, one for the rudder and one for the elevator. If it is a big scale ship it might have spoilers and a retract. What this means is that the more servos the model uses to drive the controls the larger the current drain, of course. And, one must be able to analyze how much current will be required to drive all the servos. As well, this current demand will affect the battery life, right?

To demonstrate the different current drains of differing servos we will look at the statistics of some JR servos. JR, as with many of the manufacturers today, make a number of servos designed for specific applications. They encompass the micro, mini, mid-size, standard, ultra precision models and they will be either cored or coreless. As well, the manufacturer will employ different materials for the core of the motor such as cobalt to reduce weight, current drain and increase torque.

In the micro range it is interesting to note that the model 341 servo has an idle current of only 8.5 mAh. So, if we used six (6) 341 servos in our super sloper it would have a total idle current drain of roughly 51 mAh. Therefore, a 500 mAh battery pack, supplying load current to six JR 341 servos at idle, would be able to sustain them for 9.8 hours. However, this is only idle current and the current those servos will draw under load is significantly different. This idle current figure is not realistic because when the model is flying the servos are having to provide torque. Torque requires current from the battery pack and this will be much greater than the demand at idle. Also, servos may have to overcome the friction or sticktion in the controls which will further require additional current.

To further the discussion, let's look at what happens when a servo is loaded and begins to draw additional current. For example, our model is now zooming about the sky and the servos are having to do some work. Now instead of only drawing 8.5 mAh they are drawing 25 mAh. For simplicity sake we multiply 6 time 25 mAh and get 150 mAh. The result is that our 500 mAh pack is now only going to sustain the model for about 3 hours. It gets even worse if the servos really have to work and they are forced to draw say 50 mAh. Or, 50 mAh x 6 = 300 milliamp load on a 500 mAh pack. The pack is then really only good to sustain the model for 1.67 hours and that is probably pushing it.

Also, other things begin to happen to the battery pack when it is discharged. Things like the internal resistance of the pack begins to generate heat which then begins to increase the internal resistance, and internal resistance then consumes some of the power of the battery pack and then, etc. Anyway, the point is, a battery pack can provide a lot of flying time if it is only having to drive a couple of servos. But, if it is having to provide current for 6 or 8 servos the life of the battery pack can be seriously eroded and the length of the model's flight can be shortened.

If you want to have long flying sessions there are options available. Probably the simplest is to just put a larger pack in the model; i.e., a 1200 mAh has 2.4 times more current to deliver than a 500 mAh pack. Plus it will dissipate more heat thereby keeping the internal resistance down. Also, the new battery models are quite compact and relatively light weight. An example of size is the Sanyo KR-1200AE which delivers 1200 mAh Min or 1300 mAh typical and is only 17 mm (.43 in) in diameter and 50 mm (1.27 in) long. Note too, the cell weighs approximately 3 grams (1.3 ounces). Also, their internal resistance is rated at only 7.6 milliohms at 50% discharge condition at a frequency of 1,000 Hz. In other words, if you load the battery pack such that it has to deliver 1 ampere of current to the load continuously it will survive for approximately 1.2 hours before it knees over on the discharge curve at approximately 1.0 volts.

To sum up the discussion, take time to analyze the flight pack and the load you will be putting on it. And, remember if you require that your servos deliver a lot of torque they will also require a lot more current from the battery pack. One final point, if you stall a servo it will become a tremendous current sink!!! As such, the stalled servo will heat up as it sucks your battery pack dry. Further, it will use up current and voltage that the other servos in the model need to keep it under control.

As stated earlier, there are some new batteries available to you that might be of interest. They are the SANYO "KF Series" rechargeable CADNICA SLIM batteries. These are a rectangular shaped battery. They come in model KF-A600, KF-A900 and KF-A1200. These batteries delivery 600, 900 and 1200 mAh of current respectively.

This rectangular configuration may just make it easier to fit the pack into your latest slope ship. If you are interested you might want to contact SANYO Energy Corp. at 1201 Sanyo Ave.; San Diego, CA 92073. Or call 619-661-6620. ■

on the Wing

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

Kelly McCombs' Spar System

Several of our past articles have dealt with flutter problems in swept wings and examined various means of inhibiting that destructive behavior. Kelly McCombs of Utah sent us a rather complete package of materials which details his method of building a very strong box spar using the vacuum bagging process. The package included a small cross-sectional piece of an actual wing built using his system.

A box spar is inherently strong in torsion, but Kelly's technique allows tailoring of the various parts so the assembled spar can withstand specific loads of high intensity. By using various types of fiberglass and carbon fabrics, for example, the spar can be made more rigid in the span-wise direction. The spar can also be made stronger at the wing root than at the tip by adjusting the types of materials and the number of layers used.

The real "secret" of Kelly's spar system is the use of 3M's "77" spray adhesive to hold the fiberglass and/or carbon fiber in place during application of epoxy and the vacuum bagging process. Kelly says it works great. An added benefit is the leading edge is close to being finished right out of the vacuum bag.

Kelly uses polycarbonate as the carrier, rather than Mylar™. He finds the polycarbonate material is available at a lower price than mylar — a 2' by 4' piece costs about $3.50 at any plastics shop. The polycarbonate is optically clear and gives an excellent finish. After coating with Armor-All™ or Rain-X™, this material can be painted so the finished wing is colored. As with mylar, the polycarbonate can be reused if you're careful with it. Kelly cut his carrier so it was just 1/16" short of the leading edge.

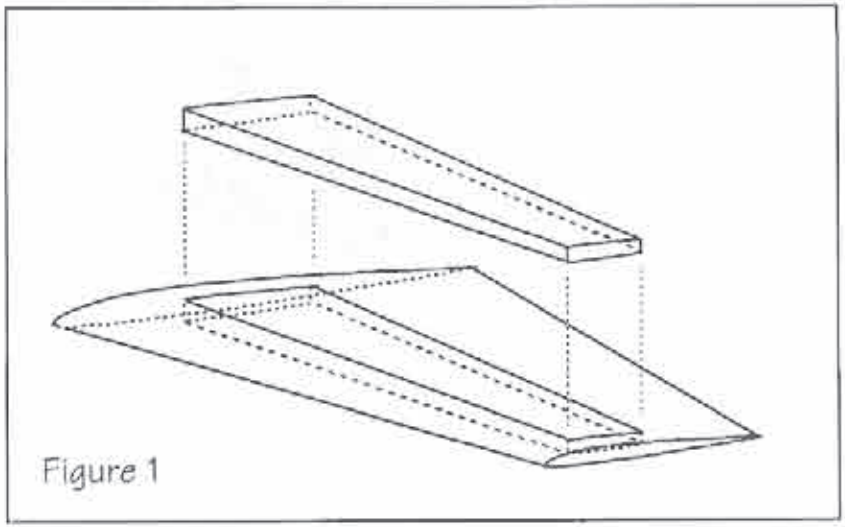
Kelly's process is a bit different than what is usually seen, as the box spar core is first cut out of the wing core, then replaced after fiberglass and/or carbon fiber is applied to it as deemed appropriate by the builder. Epoxy needs to flow into the spar area while the wing is under vacuum, but this is not a problem so long as Kelly's directions are followed.

Begin by cutting out the foam core. Note the length of the core will need to be about 1" more than the eventual length of the wing panel. Cut out the foam core as is your usual practice, then cut out the area which will form the box spar. Leave the last 1/2" of each end of the core untouched, as seen in Figure1. That last 1/2" at each end serves to hold the main part of the core in alignment.

Apply strips of fiberglass to both the front and rear face of the spar. Use 3M "77" spray adhesive in light coats to hold everything together. Don't forget you can make this webbing thicker at the root by putting on more layers. Once finished with this stage, spray the box spar with 3M "77" and wrap a layer of fiberglass around the assembly. Once satisfied with the box spar structure, push it back into the foam core.

Apply the fiberglass skin to the foam core, again using 3M "77." Spar caps of carbon fiber can be laid out on the upper and lower surfaces of the wing directly over the vertical spar webbing and between layers of the fiberglass wing skins. Brush epoxy over the wing surface using a 1 1/2" brush. The polycarbonate, previously sprayed with a layer or two of paint, is then brushed with epoxy. Brushing another coat of epoxy on the core assures there is a sufficient supply of epoxy to the spar area.

Once the polycarbonate is laid out over the fiberglass and epoxy, the vacuum is applied and the entire wing assembly is left to cure.



The resulting structure is very strong, torsionally rigid, and relatively light. For additional information on this type of wing structure, look at the sketch and of the Vari-EZE wing in the September 1991 issue of *RCSD* or in "On the 'Wing... the book."

One additional trick... Kelly has found Kevlar™ thread laced vertically through the foam core before vacuum bagging really helps in preventing the fiberglass skin from peeling away at critical areas of the wing. The thread is not at all noticeable when the wing is completed, but it does become an integral part of the fiberglass skin. ■

Infinity 600A Tip

...by Pancho Morris
Mesquite, Texas

I purchased one of the early versions of the Infinity 600A radios from Airtronics and had been very happy with it. When they came out with an upgrade that made it possible to get full span camber coupled with elevator, I sent mine in for the upgrade. It came back with the new instructions and I set up my two planes following the wonderful set up instructions that came with the radio. It worked great. The camber coupling is accomplished by a compensation mixer that is assigned to a switch so that you can turn the coupling on and off. One problem I found is that when the coupling is engaged, when you pull the throttle stick for CROW, the flaps do not move. The ailerons and elevator deflect but not the flaps. This puts the plane into a radical dive. When you set up to land, you must remember to turn the coupling off. This almost got me several times.

I was setting up a new plane and programmed it as I had done the other planes. While I was checking out the controls, I found that the flaps worked when I had the coupling engaged. I did not understand why it was working this time and not with the other planes, so I went back through all the settings and found that, somehow, I had set the compensation mixer slave settings to 100% rather than the 0% that you end up with the instructions. I did not find this mentioned at all in the instructions, but it works. Now, you don't have to remember to uncouple before landing. ■

The Aria

...by Dale King
Wylie, Texas

The Aria is a handlaunch with a slightly different approach to the handlaunch realm with its use of the SD 6080 airfoil. The idea is to get some altitude and then keep it moving to let the airfoil work to cover ground and search for lift. When you open the box (which is of very heavy cardboard to protect things) you are impressed with the initial look at the kit. The fiberglass fuselage is very nice to say the least; very slim sleek eye appeal plus good aerodynamics. Mine weighed in at 1.7 ounces. The wing and stab cores are nicely cut and the rest of the parts are all of top quality. It even come with an assembly manual and a sheet of rolled plans which are complete and accurate. So much for what's in the box; let's start building.

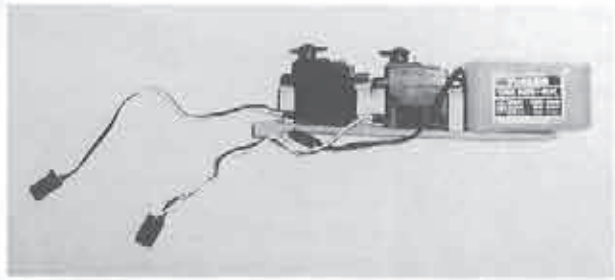
I might say here, that if you follow the instructions you can't go wrong. They are very complete and give warning to keep you out of trouble. The basic construction is pretty straight forward and does not hold any great surprises. It is a standard foam/obeche wing and stab with carbon fiber at the trailing edge, which I liked very much. I built mine polyhedral, but there are instructions for flaperons if you are into that. The rudder is conventional balsa construction and building over the plans is no problem as they are very accurate.

As I said the cores for both the rudder and stab are excellent. I vacuum bagged my wing panels and stab as that is what I am into; but 3M 77 spray as called for in the instructions, will work equally as well. Also another building modification I made was to cut the dihedral into the panels after I had sheeted the wing panels. Again, this is from personal preference but pre-sanding the angles prior to assembly works just fine.

The fuselage is the part of construction that will take some planning and thinking about each step. With the narrow fuselage you have a very tight working area and things need to be really cut to fit to make everything work properly. At this stage slow down and plan each step of the way. The moulded finger rest/holddown is one of the nicest parts of the kit and a neat idea. It serves as the finger hole and the wing holddown all in one piece.

The servo tray and arrangement in the front of the fuselage is where things get interesting. Building the servo tray was a lot of fun and plus it's a good idea. Rather than go through a step by step on this, I will let the pictures show the finished product and you will get the idea from that. As I said, it is a good idea in a small plane like this and provides not only a place to put the servos but also strengthens the front of the airplane. It is held in place with a single screw and provides a great arrangement.

One thing that you will want to pay special attention to is the control cables. Remember that you have a servo tray that slides into the front of the fuselage and must have the cables hooked up before you slide the tray into the fuselage. A great deal of care here is required so that you get the correct length and don't end up with a bunch of slop. In addition, you will want to tie the control cables down in the rear of the fuselage and fin so that the curve of the elevator pushrod does not move around and cause control problems. I used a small balsa block and epoxied that and the cable in place to alleviate this problem.

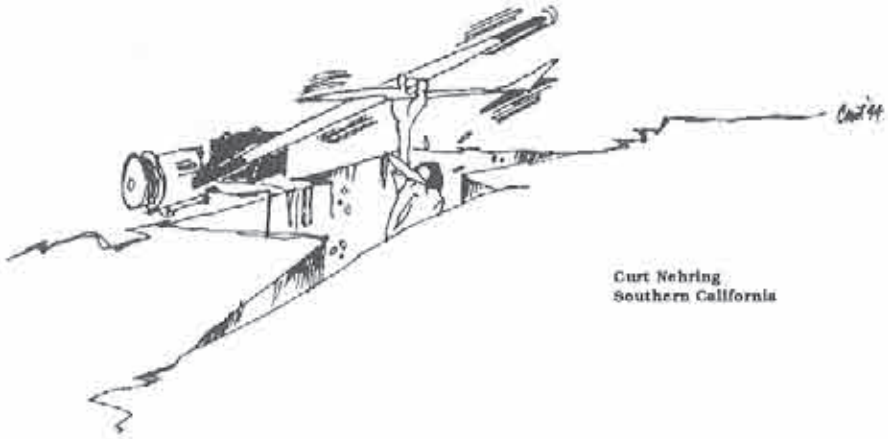


When setting up the Aria a couple of good points are given about the center of gravity and a rough guide is given for various percentages and the measurement from the trailing edge of the wing. This was very helpful in the initial flights and makes things go a lot smoother. I ended up about 36.5% (5 inches from the trailing edge). It will probably be moved forward just a tad for a while but that will depend on individual flying style. In addition, there are guides to initial rudder and elevator throws which work out real well.

Flying the Aria is an interesting change from the normal handlaunch glider. After a couple of hand tosses to check the controls and bringing the center of gravity to a reasonable point, I was ready to go. With a good toss I was amazed at the height I got. The launch is much higher than any other handlaunch I have flown and it is really fast to boot. The input of down at the top of the launch was easy to read and the Aria climbs out very nicely. One thing to remember is to keep the speed up with this airfoil. I have flown the HQ airfoils a lot over the years and this one reacts much the same way.

With the additional speed and ability to make it home again you can chase thermals a bit further than the average handlaunch which is reassuring if you are riding one downwind and don't want to let go. With the added speed you also get the increased penetration that will help on those windy days.

The Aria is a high quality kit that turns into a great little handlauch when finished. While I am not an expert on handlaunch gliders, the end result was worth the time and effort. In addition, I think this might be the answer to a light air ship on the slopes. ■



Curt Nehring
Southern California

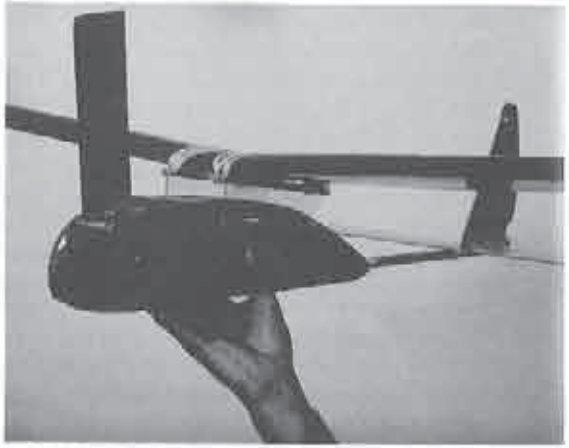
A New Control System for Small/Light Thermal Soarers?

...by George Siposs
2855 Velasco Lane
Costa Mesa, California 92626

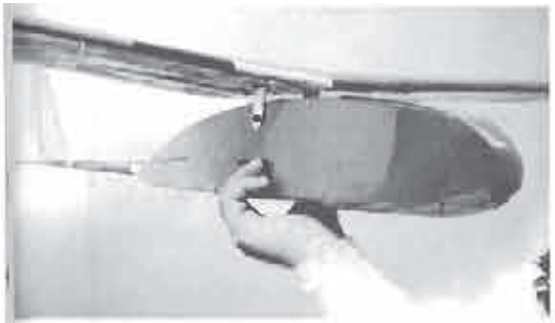
I like to experiment with new concepts, so this article is written to elicit comment, to germinate thought and to share my views with you on a potentially worthwhile idea.

It came to me one day when I observed birds flying. They had no rudder, yet they changed their direction by merely twisting their tails. Suddenly I remembered the 1/2A gas models I'd built that had a slight misalignment, by design, of the tail complex relative to the wing. After the engine cuts off, this misalignment causes the model to turn in a gentle circle without any input from the rudder. I also recall the indoor models I'd built with similar tail-rotation. (The stab remains horizontal while the wing banks and the plane turns. See diagram 1. I don't know exactly how the tail rotation causes the plane to turn, but it seems more natural than a moving rudder or elevator, both of which create air turbulence, hence drag.

I also wondered what could be done to reduce the air turbulence created by the rudder and elevator horns. I also considered that whenever I add one ounce to the tail surfaces, it takes about three ounces of nose weight to counterbalance it, so the all-up weight increases by four ounces. Conversely, if I can reduce the tail weight by an ounce, I reduce the flying weight by four ounces. Think what a great floater you could have if you had no control rods, horns hinges, etc. in the tail! Concentrating the control functions in the fuselage near the wing also greatly reduces the polar moment of inertia. The model can fly in a tighter circle and can go in and out of turns easier.



Rotating Wing Model. Lifting-body pod, arrowshaft boom.



"Rotating Wing... No elevator!" Experimental Model.

Wing Rotation - for ASW - 17. Third model in the series.

To control direction, I wanted to eliminate the rudder by rotating the tail surfaces around the longitudinal (roll) axis. What about the elevator? I recalled that some old German full-sized gliders in the late 1920's incorporated a mechanism that changed the wing angle relative to the fuselage. This had two advantages if I recall correctly:

1) When the angle of incidence is increased, the center of pressure shifts forward, so the total effect is the same as up-elevator and vice versa, and
2) When the wing angle is changed, the fuselage and stabilizer keep flying straight, so air resistance is minimized, even though the plane rises or dips. (In a conventional plane when the elevator is deflected, the plane and therefore the fuselage momentarily create resistance because they are not aligned with the flight path. Up elevator also depresses the tail which increases unwanted down-force.)

I also recalled that the early designers figured that with angle of incidence increased, the plane may rise spontaneously, making it possible to self-start from a near stationary condition.

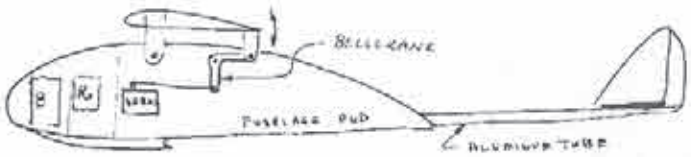
A simple sheet-metal pylon under the main spar of the wing, with a transverse pin, serves as a pivot. Under the trailing edge a vertical strut can be connected to a servo that changes the angle of incidence. Being thin, the struts should present very little air resistance.

In shoulder-wing models, the wing tube could be used as the pivot and the rear wires as the actuating mechanism with actuating bellcrank in the fuselage.

To test the idea, I built a test bed using an already built old Wanderer wing whose fuselage was wrecked by my son, years ago. I designed a simple fuselage to incorporate the "works". Because the tail was so light, the two servos were practically under the wing and the small battery in the nose is enough to balance the plane. Figuring that the fuselage might as well do some lifting, I made it in the shape of a Clark "Y" airfoil, even though the aspect ratio is atrocious. I won't bore you with construction details because they are pretty straight forward with the exception of the angle of incidence changing mechanism. The fuselage was an aluminum arrow shaft and the tail surfaces quite simple balsa frame with monocote covering without moving control surfaces. The tube rotated in a paper tube built into the aft tip of the pod fuselage.

I first tried a V-tail, trying to keep weight and complexity at a minimum. The all-up weight came out extremely low and the plane floated, giving me

Gas powered pylon model "Twisted Tail" plane 1/2A (viewed from rear) Making a right turn



Mid-wing actuation by rear wire

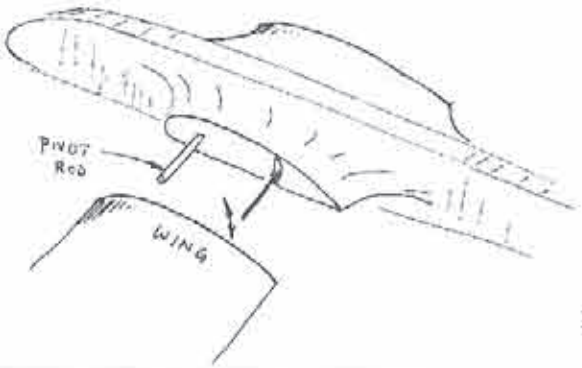


Diagram 1

ideas about an R/C glider that would catch the tiniest of thermals, much like a free flight glider would. (With a little more care, an extremely light glider could be created because the tail is so light, hence the all-up weight reduction is tremendous!)

Sorry to say, in flight tests, I found the tail rotation to be ineffective as a means of replacing the rudder. I built conventional tail feathers with vertical fin with horizontal stab and no moving control surfaces, with the same results. So I added a conventional rudder to the fin, operated by a pushrod wire that runs on the aluminum tube boom and, servo in the fuselage.

On the other hand, the wing incidence change as a means of replacing elevator, works perfectly. Martin Simons is concerned about flutter with this arrangement. Because the plane is so light, it flies very slowly, so flutter may never be a problem.

I am planning to develop this idea to a higher level and would like to hear from others regarding their thoughts or experiences. The concept is so enticing because we could really have very low polar moment planes with low all-up weight and thus thermalling performance could be improved tremendously.

The control functions are not all that difficult to achieve with fairly conventional bellcranks and servos. My first wing pylon was made from sheet metal. In the future, I will use good quality plywood that hugs the fuselage slab sides. (My prototype wing twists easily around the vertical axis because this sheet metal pylon is flimsy.) The wing rotation control system responds very well and in a natural manner. You don't have to relearn anything to fly it.

I think we may be onto something here. Am I missing something? Please let me know what you think.

Wing Rotation for Elevator Control

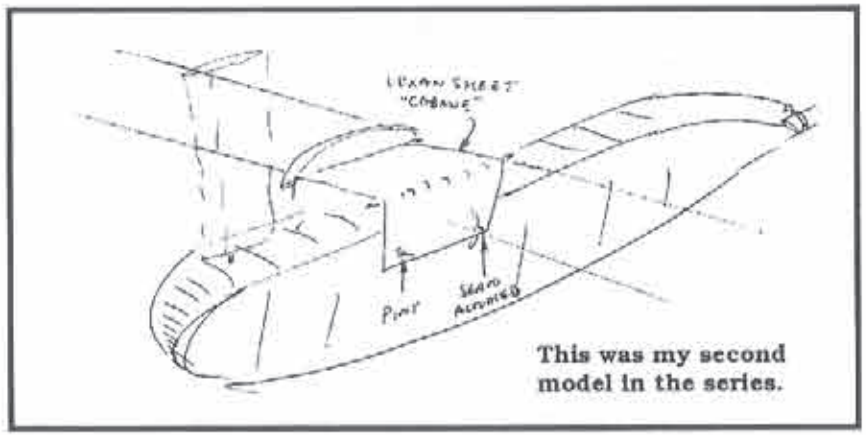
Further to my article on wing rotation, I wanted to conclude my experiments with a front rudder and an improved wing mounting platform. Why? In my mind, a conventional rudder adds excess weight to the tail which has to be counterbalanced with lead in the front. So, why not put a rudder in the front instead of lead? For a better wing, I used a Pierce Arrow 2m wing. The model was so light that the wing loading was about 9 oz./sq. ft. (My same size Mesa Flyer built-up fuselage is comparable in size and weighs a lot more than the pod-and-boom SPECIAL.)

I installed a 15 square inch servo controlled rudder to the top of the nose. Because it is above the C.G., I felt that it would give me a slight aileron effect, as well. It wasn't effective enough, so I increased its size to more than 34 sq. in. It was too much. I think that the next time that I try this I will extend the nose (like magnet-guided gliders) to get more leverage (i.e., nose moment).

In the latest experiment, I mounted the wing on a cabane made from .078" Lexan sheet, heat-bent to an inverted U-shape. It worked very well. Now the wing is secure and control is excellent.

In my experiments, flutter was never a problem. The model flew under complete control over a slope and on a high-start. Coordinated turns were easy. The wing rotation was 10 degrees positive and 8 degrees negative incidence maximum. The fuselage remained more or less horizontal even when the plane was climbing or in a shallow dive. I think that the rotated wing could act as a good "flap" or airbrake, much like a landing bird uses its wings. During dives, speed did not increase much. The immovable stabilizer keeps the fuselage horizontal.

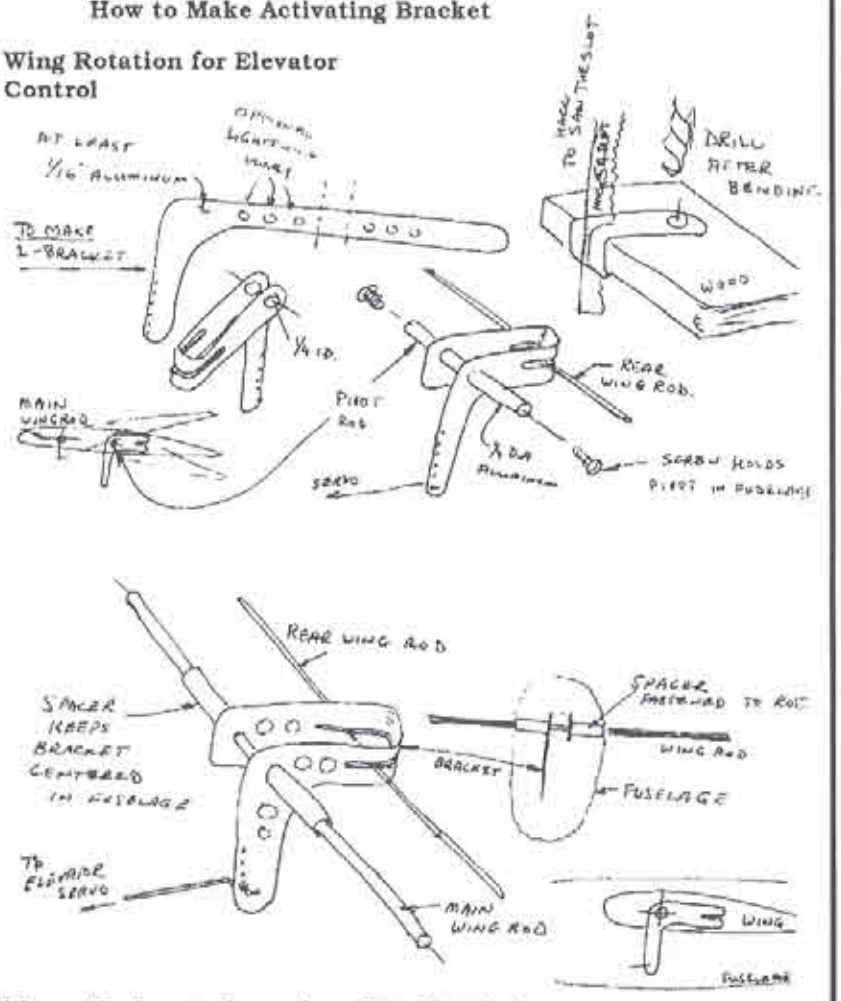
My conclusion at this point is that wing rotation significantly lightens the plane by removing the weight of the elevator control system. A very light rudder system should be left in the tail. The best method still seems to be one where the wing is shoulder-mounted and the wing rod is the fulcrum for rotation. Please let



This was my second model in the series.

How to Make Activating Bracket

Wing Rotation for Elevator Control



This method uses the main rod as the pivot

Diagram 2

me know about your experiences.

More on Wing Rotation

In regards to elevator control by pivoting the wing, I have since built three (gradually more advanced) models with this wing arrangement so I can give you a final report. I have been corresponding with Martin Simons in Australia about it, and it turns out that a few years ago there was a Hungarian full-size glider that employed a somewhat similar control. Martin worried about flutter. I experienced none, maybe because I like slow planes.

Anyway, I can tell you that the elevator control works very well when you rotate the wing about a wing rod as a pivot. The control mechanism is relatively simple to make from aluminum sheet, as shown in diagram 2. The best method is a shoulder mounted wing so the rod can be used as a pivot. The second model used a plastic cabane platform and it also worked very well. Of

course, we have heard about wingerons that can also be actuated together so there is absolutely no need for pushrods and controls to the tail to actuate the rudder and elevator. The wing will do it all! Just rotate the wings independently (for aileron), then rotate the wings together to achieve elevator and... Make the turn! The system is no more difficult to install than a conventional elev-rudder system, and it works very well, smoothly, and reliably. One advantage is that with no elevator pushing the tail down when you want the plane to go upwards (an unnatural action when you think about it), the fuselage more or less stays horizontal as the plane goes up or down.

I emphasize again that the control action is very smooth and requires absolutely no retraining if you set up the transmitter in the conventional mode (i.e., pull to go up, etc.).

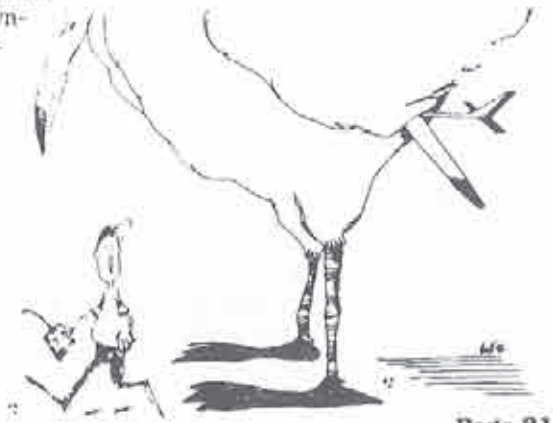
Miscellaneous Ramblings

Regarding the article on spoilers in a recent issue of *RCSD*, I think the answer does not lie in the shifted center of lift. Tapered wing planes also experience the same dropped-nose phenomenon and on tapered wings the center of lift does not shift. Therefore, I believe the answer lies in the fact that as the lift is suddenly dropped and the speed is suddenly diminished (because of extra drag), the plane does what every plane would do under similar circumstances of reduced speed and reduced lift: it drops its nose and will accelerate downwards, hoping (aerodynamically) to increase speed until the wing is capable of lift again.

Regarding flaps, when a flap is deployed it increases lift and this shifts the CG forward, and therefore the nose lifts. In fact this phenomenon has been utilized on an award-winning full-size Hungarian glider which uses full span flaperons (i.e., flap + ailerons combined with a mixer). When they are deflected, the nose lifts and vice versa. Thus, the designer has done away with the elevator and only a small stabilizer is used in the T-tail. Ailerons are coupled to the flaps to form flaperons. The initial experiments were performed with partial conventional elevators until the pilot felt comfortable that flaperons worked alone. The improved next version glider used absolutely no elevator surfaces, just a stabilizer.

I have built the model in the photos to prove this theory, except I rotated the entire wing around the CG. When the angle of incidence is increased the nose lifts and the plane is completely controllable around the pitch axis. When the angle of incidence is negative, the nose drops. This eliminates the weights of pushrods, elevator, hinges, etc. from the tail. This is an ideal way to reduce weight because any weight in the tail has to be counterbalanced in the nose. Because the tail is about 3 times longer than the nose, three times more weight has to be added to the nose. This, plus the weight of the excess baggage in the tail adds up to four times the weight of the pushrod, etc., weight.

So, if you save one ounce from the tail, you actually save four ounces of flying weight! Worth doing in HL models, me thinks. ■



My Favorite Servo Mounting Method

...by Jim Thomas
Woodinville, Washington

More and more of today's sailplanes are equipped with foam-core wings. This yields a light, strong wing system, but introduces a new problem to the building process. Namely, how to mount the servos in the wing so they are 1) accessible (read that removable), 2) solidly mounted so no control-surface slop is introduced, and 3) easy to install.

Over the last few years, I have evolved a system that can be used in white foam or blue foam wings, regardless of whether they come to you pre-sheeted or as a full construction kit. I first saw this servo mounting style used on a European F3B ship, and the logic and simplicity of it was really impressive. In essence, the servo is press fit into the wing and held in place with a piece of tape over the exposed surface of the servo and wing underside.

The key is the fact that blue (or grey or pink) closed cell foam is non-compressible. This means that the foam will resist the tendancy to crush under load and will hold its shape. Anything that is held firmly in this material will stay put. White bead foam is compressible, will not hold its shape under load, thus is totally unsuited to the task. I will go through the case of the white-foam full construction kit first, then highlight the differences for the other systems.

First, choose your servo locations and mark the center of each on the bottom of the core prior to sheeting. Then, make a sketch of the wing and note the exact center point of each servo, so you can locate it later after the wing is covered. Now, get some blue (or grey or pink) foam and cut it into 2" x 2" blocks, a bit thicker than the thickest part of your core. The blocks can be larger if you are using large servos, but this size seems fine for Airtronics 141, 401, 501 and like-sized servos.

I find it easiest to do this next step on the bottom of the wing core, since it is flatter. Draw a 2" x 2" square evenly around each of the servo center marks that you made. Using a **sharp** #11 blade and a straightedge, slowly and carefully cut out the 2" x 2" square of white foam. Keep the sides of the cutout as square as possible and try not to gouge the foam. Now glue (white glue or UFO, not epoxy) the blue foam block in the hole. A little sanding with a Perma-grit or sanding block will bring the blue foam block to the exact surface of the wing core.

The hardest part is now done. Go ahead and skin the wing with whatever method you choose. After the wing is sanded and ready to finish, go ahead and complete the servo wells. The next operation consists of cutting the skin away and routing out the servo well. The easiest way to do this is make a router guide and use a Dremel tool with router attachment. The router guide need be nothing more than a piece of 1/16" plywood that is cut to the exact size of the servo (plus room for the servo arm to move fore and aft). It isn't critical that it be exact to the 0.001", but the closer the better.

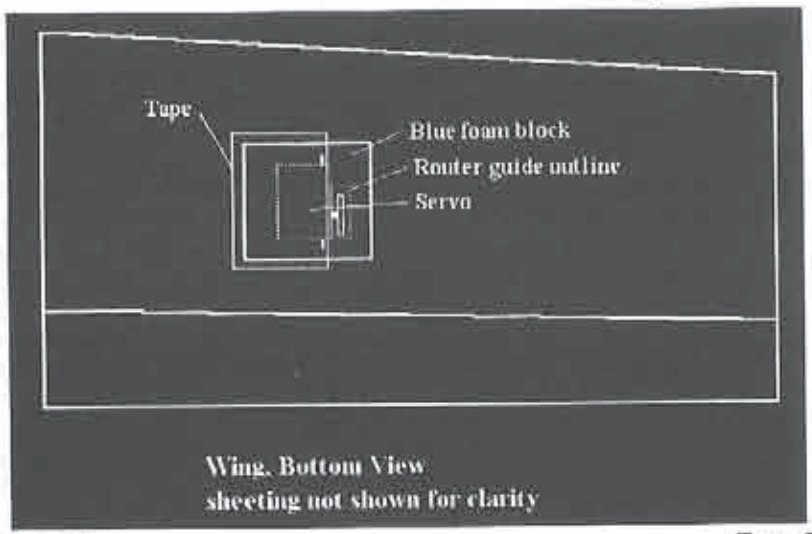
Using the sketch you made before starting, locate and mark the centers of each servo cutout. Use the router guide as a template and draw the actual cutout line for each servo. Again using a sharp #11 blade and a straightedge, cut away the surface skin over the servo well by cutting through along the line and lifting the flap of skin away. Tape your router guide in place over the exposed blue foam. Set the router depth to the thickness of the servo plus the router guide. If you neglect the extra for the guide, the servo will protrude from the wing. Run the Dremel tool at low speed (so it cuts and doesn't melt the foam) and cut away all of the material inside the guide. I do the perimeter and then the interior. The only thing left to do is cut an access for the mounting lugs (if you choose to leave them on the servo), and bore or burn an channel for the wires, but that can be the subject of another article.

On a pre-sheeted white foam wing, I use a variation of this system. Since I can't install a blue foam block before the wing is skinned, I do it afterward. Mark the desired servo center locations and draw your 2" x 2" box around it. Cut through the skin and lift it away, then carefully cut out or rout out the block of white foam that you will replace with a 2"x2" blue foam block. Don't cut through the top skin. Glue in the blue foam block and carefully sand it to match the bottom surface of the wing. I don't bother to put any wood over the blue foam, but you could if desired. It would mean a bit more fitting before glueing in the blue foam block to allow some room for a piece of balsa or obechi, which would then be glued over the foam. From this point, carry on as above using the router template to cut out the servo well.

On a blue foam wing, skinned with either fiberglass or wood, the task is very simple. Just mark your servo location, cut out the piece of skin, and route out the servo well directly in the wing using the router template.

Just in case you over do it a bit, you can shim the servo with piece(s) of 1/64" ply to ensure that the servo is level with the surface of the wing, and doesn't have any play (read that slop) forward, backward or sideways. Just press the needed shims in place between the servo and the foam well and the tape will hold all in place. I have found that package tape works great. It has good tack and doesn't stretch, so it will keep everything where you put it. The tape should cover all of the exposed body of the servo and overlap the wing at least 1/2" on three sides. Don't cover the area that the control horn is in, you will just have to cut it away. Oh yeah, before you finally put the tape on, be sure that the control horn is in the proper location and the safety screw is in place.

This might sound like a lot of work, but it really isn't. After you have done it once, you will never have to glue a servo into foam again. Servo repairs are as easy as removing the piece of tape, popping the servo out, repairing (or replacing as necessary), then just pop it back in and tape it in place. I have made a field repair of a blown gear set in under 5 minutes, and replaced a servo in 10 minutes, only because some soldering and wire insulation was required. ■



Wing, Bottom View
sheeting not shown for clarity

The Legend of the Legionair

...by Al Sugar
Carrollton, Texas

Cecil Haga, the creator of the Legionair, did more for the model sailplane enthusiasts than they might realize. When Lamon Payne blew his speed run in South Africa at the world champs F3B in 1978, it kind of spelled the end of the Legionair legacy. Yes, Lamon's Legionair was one of a kind because his wing structure was strengthened by overlaying spruce spars over the aluminum tubing plus some other personal embellishments. If carbon fiber matte would have been available at the time, maybe his stabilizer would not have blown up at high speed. One can speculate a lot of "what if" when it comes to looking back, however something occurred in the following years that most of us did not see. Cecil's basic philosophy was to build the biggest, lightest machine within the strength requirements, and get rid of unnecessary lift by thinning the airfoil (instead of adding parasitic ballast). Note: "Lite like a butterfly, sting like a bee" concept.

At the time Cecil closed up Legionair, I made him an offer that he refused. Although the contracts he had were sufficient to warrant investment, he was too shrewd a business man to yield enough margin for growth. He did me a favor, because I would never really carry on the Legionair tradition in the manner he would. There were two machines he built after the Legionair that requires commenting on because they show us the "missing link" in our flying today. The Legionair was built to utilize the launching equipment of the time: the 12 pound standard hi-start and the toned down 6 volt winch (that had a 12 volt starter motor). Unlike the present catapult biased compact machines we fly presently, the early Legionair's had to fly the launch with peak tension ranging up to 17 pounds. This is one of the reasons that Chaparell and the Ariba were built by Cecil. These two machines that dwarfed the Sailair were extremely air worthy and capable of great tasks, however they were missing good controls that were not available at that time. Although Cecil was looking at 1/2 crow by using trailing edge spoilers, you have to picture a 16 foot spanned 2000 square inch winged sailplane that possesses an L/D greater than 30 to 1 diving onto the spot we "crash" into today. There is a lesson that Cecil tried to show the world about soaring (his way), because the design centers for these machines were that they had to be launched by the 12 volt Ford long shaft starter motor winch (approximately 2 times the launch tension needed by the Legionair). When he demonstrated the Chaparell to the Dallas League of Silent Flight, most of us complained that he sucked our batteries down with each launch. (With present state of art batteries, and a 1/4 hp PM motor, this would not have happened!) This shadowed the fact that he launched comfortably, and could handle a flying task that was 50% greater than anything we could do with our older designs. Yes, he needed all of the UTD (the field is about 1 million square feet) to land his creation, however it was a FLYING machine. When I flew the Chaparell, I was unimpressed with its controllability, however its amazing performance has not been surpassed, let alone equaled today in my point of view.

Let me take you into the world of full-size soaring 40 years ago in Germany. We used a winch to launch our club segelfliegen's (sailplanes). 4000 feet of cable to winch, and a beam of light was the communication link between the ground control at the launch site and the engineer (winch master) controlling the power. A jeep brought the cable up to be hooked onto the releasable towhook, and tension put onto the cable to take up the slack. When I wagged the rudder, ground control told the winch master to start launching procedure. The 65 hp motor

was wound up and the torque converter engaged by a manual clutch. The Burfalk (German equivalent of the Switzer TG-3 sailplane) accelerated and lifted off at 40 mph while accelerating to hit 50 mph before rotating. At the peak of the climb, where airspeed was falling off and no more altitude was to be gained, the nose was lowered to reduce tension, and release pulled. At 1300 feet altitude, we could easily fly to Hemsbach and enjoy the ridges of mountainous terrain. At 3000 feet, Mr. Zeppel, my instructor, spotted a batch of sheep far below, pried back the side window making the wind howl through the canopy, and proceeded to yodel at the mountains. Flying back to the launch site was a race with airspeed exceeding 65 mph to ensure some altitude to try thermal soaring before going home. Although landing 5 minutes late, and over shooting the landing by 100 meters, the friendly Germans cheered my success. I was now accepted as a pilot.

The reason for this story is to give one the insight of what occurs with the launching of full size equipment. Yes, the winch has been replaced by the aerotow in our modern times, however nothing can replace the 2000 foot per minute thrill of a safe climb that never really taxed the structure. Now one can see the similarity of the Legionair, and the philosophy of the real "McCoy". Let's look at the size of machine that launching horsepower creates rather than the open ended concept of "more horsepower than what is needed never hurts".

Legionair for launching at 30 lbs. of tension:
Note: configuration altered to match modern materials

Wing span	196"
Wing chord	11"
Area	2160 sq. in.
AR	18
Fuse.	78"
Rudder	163 sq. in.
Stabilizer	219 sq. in.
Weight	114 oz.

The real fun begins when enlarging the Legionair for 100 lbs. tension... 29 feet of wing span, 13 inches of wing chord, with a light flying weight of 18 lbs. Yeess, the AMA/FAI landing circle is a bit tight for these biggees. If decent controls were utilized to match the potential of performance, the air speed of these machines would be awesome in comparison to what we are flying presently.

The point that I am trying to make is that current designs have lost the concept that the launch is something that should handle the maximum size of a sailplane that can accomplish the task realistically. It is humorous to think that the typical landing task is best accomplished by a small glider (two meter), that the flying task has become a conditional task sated by the typical standard size machine, and the launching system that is available is capable of launching a sailplane that could double the typical flying task (and return the word "soaring" back onto the word "contest"). A flier with a 10 pound sailplane may demonstrate air supremacy with a machine that makes flying the typical task a cinch, whereas another flier with say a 46 oz. sailplane throws away a lot of soaring potential to nail the spot.

I am stating that, in my opinion, the present high tech equipment has retarded the growth of soaring rather than expanding it. I am looking at this art only in the flying sense because I feel that it is of paramount importance. The Thermal Sniffler was a development that has become passé, but would have become important if the flying task was increased. The next development to come along should have been the "bird-brain". (I.E., a velocity [air speed] and/or angular readout device that would operate similar to a gyro feeding into an onboard computer so that longitudinal stability could be programmed into the flying design the modeler selects.) Why do we

limit ourselves to the point that there is only one way to skin a cat? Look at all the full size successful airplanes that have no inherent stability. I love free flights concepts, but the future has a better way in store for us. So what if a big flying wing with the onboard computer ends up in the winners circle. This is what evolution via competition is all about. Rather than go for the current state of the art equipment with the computer (transmitter) at the wrong location, I would prefer to follow my true leader, Cecil Haga, (to a degree) and ballast my machine with chips of silicon, instead of chunks of lead. Unfortunately, I am not physically fit to heave the behemoth that would result from matching my sailplane to the present state of the art launching systems available to accomplish the perfection of soaring (i.e., flying) that I believe in, and have witnessed. So, I simply play with the sailplanes that match my limited launching system, and have fun going flying. Sure beats fishing!!!

For the fun of it, let's put a little Sugar on the Haga concept and see what could have happened to soaring. The contest of 10 minute precision would probably be the typical flying task. A 50 meter square is the designated landing area. A 1/4 hp motor for the winch with 300 meters to the turnaround, and a 1/8 hp for the retriever. Failure to make the landing in the designated area creates a one minute penalty that is added onto the flying task that must be flown. The types of sailplanes competing range from large 20 footers with retractable landing gear, to two meter machines with "thermal sniffer" and "bird brain" electronics aboard. These may even be flying wings, or designs compromised to transport easily! How about FAI, F3B tasks? No problem! As long as the weight is not altered after completing the 10 minute thermal task. This is actually a lot rougher on the contestant, and opens the door to the luck factor, however the "winners" will still be the same people (plus a few more). The Legionair introduced the present philosophy of soaring that we modelers know today. Originally, this philosophy complimented full size soaring machines with pilots aboard. Whether we choose to build our creations of wood and film or fiberglass is really unimportant in our goal to learn the art of soaring. Each of us can only master this art to the limit of our abilities, because there is no "secret weapon" that will transform us into the Grand Master of Soaring. ■

Hello Everyone Who Joined the SMSK International Postal Soaring Contest in 1993

...by Morten Munkesoe
Valmuebakken 22
DK-2625 Vallensbaek
Denmark

(SMSK, Sealand's Model Soaring Club, has a World Postal 2M Contest, with the original invitation and rules published in the July, 1992 issue of RCSD. The event is once again scheduled for 1994. ED.)

SMSK would like to thank you for participating in the International Postal Soaring Contest in 1993. We have been delayed this time, which we much apologize. We, in SMSK, didn't succeed getting in the air in September, so we did not get any photographs to distribute from our own air field. So we have awaited some snapshots from the other participating clubs. Anyway, here are the final results of the competition.

As the result shows, Denmark didn't perform as well this time, but due to the very poor weather conditions in October, we are pleased to be among the participants, as it was raining cats and dogs most of the time during the event.

We have already sent Christmas greetings to Carl Strautins in Australia who became the unofficial champion of the

Jan Hansen & Jesper Jensen
Both equipped with "Blue Phoenixes", a Swedish model. Jan and Jesper were some of the very few in Denmark who got airborne in September, obtaining good scores despite the horrible weather in Scandinavia.

Robert Anderson and his Flying Circus in the 1992 postal event.

World in the 2 meter contest, obtaining no less than 4430 points. Carl is only 15 years old and he is a member of Werrington Park Model Aero Club. Carl also chose the Spirit for the contest and it seems that this model is a very good all-around flying machine. However, it takes a great deal of flying skill to achieve such a result in a contest. And top fliers get nothing for free in this category of 2 meter events. The result shows there has been a serious battle in the top this year, and the point level is so high that nobody can claim it is easy to win a 2 meter contest. The experienced Danes have to train a little more to stay on the top.

Even though the number of participants is lower than in 1992, we are glad to se that the event has expanded world wide, as new countries have joined the game. Australia was a newcomer to the event, and what a debut. Congratulations to you, Australia! Bruce Abell, who is the soaring editor of the model magazine, *Airborne*, was among the pilots this year, but didn't succeed the second round. We hope he will tell us what happened during his flight. Anyway, it must be highlighted that it takes at least two rounds to win the cup in this 2 meter contest.

England has joined us, too, and we are pleased that our contact, Chas Gardiner from *RCM & E*, distributed the message in the U.K. Maybe we will meet more pilots from England next time. They shall be very welcome.

New Zealand was really doing a good job. 25 pilots from New Zealand is much above what we had expected for only one country. They seem to have taken this kind of flying to their hearts. Thank you, Down Under. We hope you will return next year.

U.S.A. has also contributed with no less than 16 pilots. Robert Anderson, who was number 2, was also joining us for the first time, and we think he has done some landing and flying exercises, as he improved his flying dramatically. Robert is one of the few participants who flies his own construction, and his scratch built V-tailed construction has really shown what it's made of. (What is it made of, Robert?)

We would at the same time like to thank Judy and Jerry Slates from *RCSD*

who have made it possible to arrange this kind of competition. You have, from the beginning, been giving much support to this event. And due to this, we have been able to create an interest for a 2 meter event in the homeland of the 2 meter, the U.S.A.

Sweden has suffered from poor weather just like Denmark, but still they try to keep up the good flying. And we in Denmark are glad to have the Scandinavian competition, as we can appreciate what flying is like under stormy and rainy skies. So, to you, Sweden, please tell your neighbors in Norway that they must try to show what they can do with a 2 meter soarer, as we still await competition from this part of Scandinavia.

If some of you out there read the German magazine, *FMT*, you may have seen our group picture from SMSK on one of the first pages of the 1993 March issue. Earlier, we had the introduction of the contest published, as well. Further more, some potential pilots have contacted us during the summer of 1993 in order to participate in the postal soaring event, and I have personally contacted a club in Mönchen Gladbach having 120 soaring enthusiasts. So, we were certain that there would be Germans among the pilots in 1993. Until now, nobody has flown the contest in Germany. We must wait until 1994 and hope for German competitors. They shall also be very welcome.

Now, if any of you around the world would like to join us again in 1994, please do not hesitate to do that. The dates for the next event are already fixed, so you can arrange your calendar now, and if necessary build a new winning model.

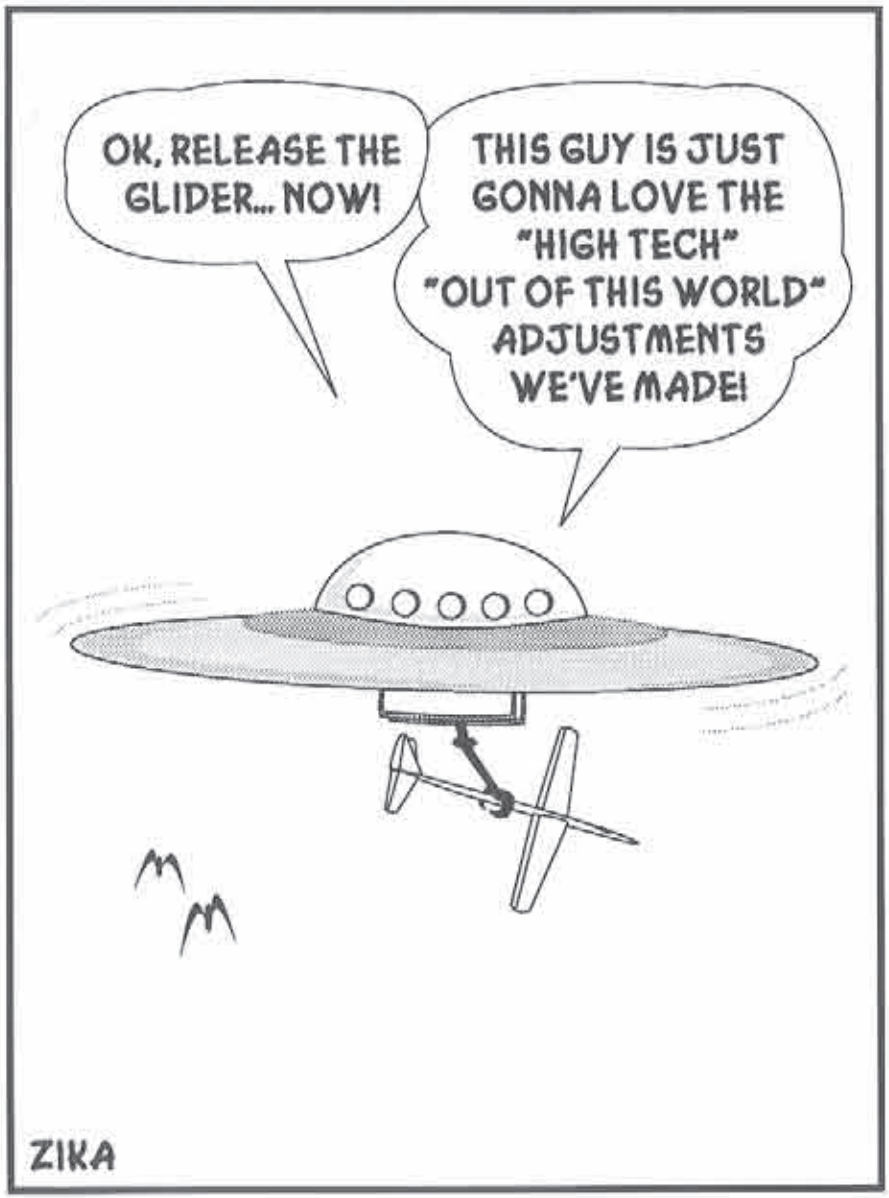
1st Flying Day September 25, 1994
2nd Flying Day (Reserve) October 2, 1994
Results Deadline November 7, 1994
Contact person is Steen Hoej Rasmussen, Tjornehusene 20, DK-2600 Glostrup, Denmark.

Thank you for joining us and hope to hear from you again. If you need any score sheets or have any questions, you are welcome to contact me. Any photographs, comments, or good suggestions regarding the event, are always more than welcome. Crash with care. ■

Participants of the 2m Postal

Name/Model if avail./Location

Carl Strautins/Spirit 2m/Australia
Robert Anderson/Scratch V-tail/U.S.A. CA
Jan Hansen/Danmark
Jesper Jensen/Danmark
Vern Poehls/Spirit 2m/U.S.A. AZ
Brett Robinson/New Zealand
Alan Schwerin/Spirit 2m/U.S.A. LA
Mathew Dimock/Electra/New Zealand
B. Yed/England
David Griffin/Spirit 2m/New Zealand
Rune Olsson/Sverige
Horace Bounds/U.S.A. AZ
John Dolphin/Riser/New Zealand
Finn Mathiesen/Danmark
John Ingram-Seal/Gentle Lady/New Zealand
Torben Dam/Danmark
Peter Parata/New Zealand
Craig Trout/Spirit 2m mod./U.S.A. AZ
Angus Mac Donald/New Zealand
Dave Morgan/New Zealand
Antero Hurtig/Sverige
William Melcher/Gentle Lady/U.S.A.
Rob Condliffe/Spirit 2m/New Zealand
Frank Higgins/Spirit variant/New Zealand
Max Cutts/New Zealand
B.A. Manners/England
Keld Jensen/Danmark
Ulrich Richmann/Danmark
Karsten Ottesen/Danmark
Jesper Bergsjö/Sverige
John Ensoll/Spirit 2m/New Zealand
Tony Bell/Spirit 2m/U.S.A.
H. Robinson/England
Chris Kaiser/Spirit 2m/New Zealand
Hap Merrifield/Spirit 2m/U.S.A.
Jan Asplund/Sverige
Peter Burhoj/Danmark
Leif Hederström/Sverige
Roger Hort/Oly 650/U.S.A.
Georg Stringwell/England
Ian Harvey/Spirit 2m/New Zealand
Soren Larsen/Danmark
Don Richmond/Scratch Built/U.S.A.
John Archibald/Oly 650/U.S.A.
Peter Sorensen/Danmark
Hayden Dakers/New Zealand
Chris Pennell/Spirit 2m/New Zealand
Ken Campbell/Gentle Lady/New Zealand
Bengt Olov Carlen/Sverige
Henning Sorensen/Danmark
George Hoffer/Spirit 2m/U.S.A. AZ
John Turner/Electra/New Zealand
Dave Crook/New Zealand
Christian Hurtig, Jun./Sverige
Bob Becker/Gentle Lady/U.S.A.
Peter Stott/Spirit 2m/New Zealand
Simon Ballentyne/Spirit 2m/New Zealand
John Hatlelid/Oly 650/U.S.A. AZ
Burt Kline/Wanderer/U.S.A.
Sven-Eric Hallin/Sverige
C. Walker/Australia
Rod Patterson/OD/New Zealand
A. Hutchinson/Australia
Bill Roseberry/Spirit 2m/U.S.A. AZ
Bryan Leeves/New Zealand
Kerry Sargison/New Zealand
Chris Johns/New Zealand
A.B. Abell/Australia
N. Mollov/Australia



Arm Repair or Hand-Launch Topics

...by Scott Smith
2 Sugarpine, Irvine, CA 92714
(714) 651-8488 evenings after 7:00 PST

Still Grounded!

I've tried a few very mild throws, but haven't pressed it yet. My arm is still sore, though tolerable. One thing I have been extremely careful to do is to throw with my arm fully extended the whole time. In other words, my elbow is locked straight. Now all I need to do is find the correct exercise.

A Shoulder Exercise

Bill West was kind enough to send me a copy of an article by Herk Stokely in the April issue of *Flying Models*. In it, Herk reports an arm injury similar to mine and describes an exercise that can help. Originally, this exercise was developed for swimmers who develop a sore shoulder from the freestyle swimming stroke.

I'll let Herk describe it himself:

"They're done in sets; use a weight that tires the muscle in 10 to 15 repetitions, and do each set of exercises three times at each session. I began to do the exercises four or five times a week, and within a month or so, I found that I could throw the model for much longer periods of time without feeling those warning twinges that said it's time to stop. These exercises don't seem to make the throwing muscles stronger. Instead, they seem to strengthen more obscure muscles that hold the shoulder joint in the proper alignment during the throwing movements."

"The first exercise is done while standing. With the arms straight out to the side and raised almost but not quite to the horizontal, move the arms forward about 30°. With the wrist turned so that the thumbs point toward the floor, slowly lower the arms to vertical, and then back up to the starting position (about 80 degrees up - not quite level; and about 30° forward). Start with weights of about 2 points and work up to no more than 10 (I'm using 6.6 now), and do three sets of 10 to 15 repetitions at each session."

"The second exercise is done while lying on your side on the floor. With the elbow of the upper arm held against your body, allow the forearm to hang vertically to the floor (the elbow is bent 90° and the upper arm is against your side). Then raise the forearm toward the ceiling while keeping the elbow bent 90° and the upper arm against your side. Again, you should work weights in the range of 2 to 10 pounds and do several sets at each exercise session."

Herk credits Bob Harold for the exercise and offers Bob's original instructions for a SASE plus an extra stamp inside to cover copying costs to:

Herk Stokely
1504 N. Horseshoe Circle
Virginia Beach, VA 23451

Needless to say, I've sent for mine. Thanks to Herk and *Flying Models* for publishing this very useful information.

New Design Directions

Seems like some builders are itching to try thinned out versions of the present airfoils and reduce the loading. Hence, instead of 13 oz., go for 10 oz. or even 9. Finally, increase camber towards the tip while reducing angle of attack to prevent tip stalling.

Seems this will work wonders in the early morning light lift; how will it do when the wind picks up? I will let you know what I see. ■

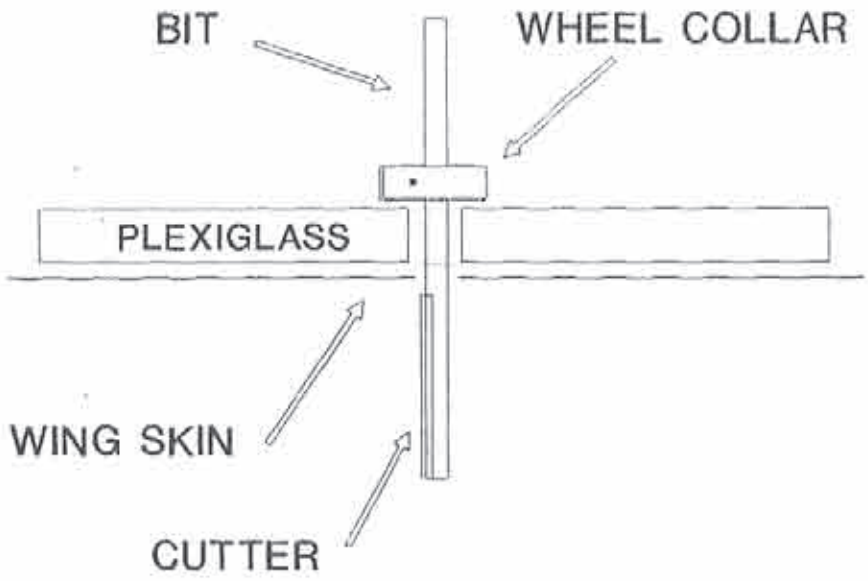
A Poor Man's Router

...by Steve Savoie
DownEast Soaring Club
RR#3 Box 569
Gorham, Maine 04038

Not owning one of those fancy full size dremel power tools I found myself needing to route out servo wells on a newly constructed Catalina wing. My Dremel MiniMite can not be used with the standard dremel router adapter so I had to come up with another method. I purchased a dremel 1/8" straight router bit and a set of 1/8" adjustable wheel collars, the ones with a small allen set screw. Next, I cut a 3" x 3" square of 1/8" Plexiglass and rounded off the corners and carefully drilled a 11/64" hole in the center of the Plexiglass.

The balsa or glass wing skins are first cut with a small hole saw, (by hand) and the skin is removed; remember to recess the pilot bit first. Unusual shapes, or exact servo outlines can be cut with an exacto knife. Once the skin is removed, I adjust the depth of cut with the wheel collar on the bit while ensuring that the cutting edge of the bit is positioned just below wing skin. By doing this, the non-cutting shaft of the bit contacts the edge of the skins surface and therefore becomes a template. The Plexiglass supports the wing collar which is attached to the bit and limits the depth of cut. After the first cut, I adjust the wheel collar to give the final cut.

The Plexiglass slides over the wing surface very well and allows me to see exactly what I'm cutting and keeps all the cuttings in the well. Try it, you'll like it. ■



Club Newsletters & Publications

This list includes clubs, newsletters and/or publications and a primary contact which is usually the editor unless otherwise noted. Based on information we have received, the list is current as of January 18, 1994. Additional contacts are included in the "R/C Soaring Resources" section.

Albuquerque Soaring Association
What's Up?
John Ihlein
5800 Klondike NE
Albuquerque, NM 87111
(505) 294-7943

Baltimore Area Soaring Society
BASS Newsletter
Steve Pasierb (Contact)
21 Redare Ct.
Baltimore, MD 21234
(410) 661-6641

California Slope Racers
John Dvorak
1063 Glen Echo Ave.
San Jose, CA 95125
(408) 259-4205

Capital Area Soaring Association
CASA Comments
Gus Peleuses
12504 Circle Drive
Potomac, MD 20850
(703) 385-2829 (H)

Central Arizona Soaring League
CASL
Chuck Wehofer
P.O. Box 2472
Chandler, AZ 85244-2472
(602) 834-5680

Cincinnati Soaring Society
Chuck Lohre
3015 Beaver Ave.
Cincinnati, OH 45213
(513) 731-3429

Clarence Sailplane Society
Clarence Silent Flyair
Roman Paryz
59 Steinfeldt Rd.
Lancaster, NY 14086-2326
(716) 684-4177

Dayton Area Thermal Soarers
Glide Lines
Robert Massmann
282 Jodie Lane
Wilmington, OH 45177
(513) 382-4612

Downeast Soaring Club
Steve Savoie
RR #3 Box 569
Gorham, ME 04038
(207) 929-6639

Eastern Soaring League
Mike Lachowski
253 Bloomsbury - Pittstown Rd.
Milford, NJ 08848
(908) 479-6704

F3B USA • F3F/USA
George Spitzer
87 1/2 North Catalina
Pasadena, CA 91106
(818) 796-5024

Florida Soaring Society
Bob Wargo
3333 Finch Dr.
Holiday, FL 34690
(813) 938-6582

Greater Detroit Soaring & Hiking Society - *Tangled Lines*
W. Hutchings
B. Manning
2320 E. Hammond Lake Road
Bloomfield Hills, MI 48302

Harbor Soaring Society
Plane Rap
Pete Young
6592 Belgrave Ave.
Garden Grove, CA 92645
(714) 892-3473

Heart of Texas Soaring Society
H.O.T.S.S.
Perry Van
824 Maple Dr.
Schertz, TX 78154
(210) 658-8842

Intermountain Silent Flyers
Wind Dummy
Bob Harman (Contact)
10424 Golden Willow Dr.
Sandy, UT 84070
(801) 571-6406

Long Island Silent Flyers
LI Silent Flyer
Gordon Stratton
255 Brevoort St.
Kew Gardens, NY 11415
(718) 847-8299

Memphis Area Soaring Society
MASS MAIL
Tom Ernst
507 S. Yates Rd
Memphis, TN 38120
(901) 767-9518

Modesto R/C Club
Thermal Topics
Dave Darling
2705 Harvest Road
Modesto, CA 95355-3430
(209) 521-5412

Northwest Arkansas Soaring Society
When Pigs Fly!
Kevin O'Dell
c/o Wings 'n Things
2201 S. Thompson Suite 4
Springdale, AR 72764

Northwest Soaring Society
Roger Breedlove
6680 SW Wisteria PL
Beaverton, OR 97005
(503) 646-1695 (H)
(503) 297-7691 (O)

Pelican Soaring Association
Pelican Droppings
Frank Strommer
7225 Arbor View Lane
New Port Richey, FL 34653
(813) 844-7225

Portland Area Sailplane Society
PASS
Barry Kurath (Contact)
105 NE 61st #12
Portland, OR 97213
(503) 236-4067

Rocky Mountain Soaring Association
Thermals
Jim Laniewicz
330 Cottonwood Court
Broomfield, CO 80020
(303) 465-4495

Sacramento Valley Soaring Society
The Eagle's Nest
Ron Kucera
P.O. Box 2086
Sacramento, CA 95759
(916) 684-2141

Seattle Area Soaring Society
SASS Updraft
Waid Reynolds
12448 - 83rd Ave. So.
Seattle, WA 98178
(206) 772-0291

Silverado Soaring Society
Ray McGowan (Pres.)
2661 Adrian St.
Napa, CA 94558
(707) 224-2104)

S.O.A.R.
Soaring Flight
Stanley Watson
10414 W. 134th St.
Palos Park, IL 60464
(708) 448-6371

Soaring League of North Texas
Update
David Clarke
3017 Oak Ridge
Hurst, TX 76054
(817) 498-5838

Soaring With Intent Of Finding Thermals (S.W.I.F.T.) - *Visible Lift*
Ron Ponec
P.O. Box 546
Elkhorn, NE 68022
(402) 289-4507

South Bay Soaring Society
Silent Flyer
Joe Thomas
P.O. Box 2012
Sunnyvale, CA 94087
(408) 923-3045

Tidewater Model Soaring Society
TMSS Newsletter
Herk Stokely
1504 North Horseshoe Circle
Virginia Beach, VA 23451
(804) 428-8064

Torrey Pines Gulls
Steven Stricklett
P.O. Box 370356
San Diego, CA 92137
(619) 741-1037

Tulsa RC Soaring Club
Dale Nutter (Contact)
7935 S New Haven
Tulsa, OK 74136
(918) 492-3760

British Association of R/C Soarers
Soarer
Jack Sile
21 Bures Close
Stowmarket, Suffolk IP14 2PL
England
0449-675190

British Electric Flight Association
Electric Flight U.K.
Dave Durnford
32 West Drayton Rd.
Hillingdon, Middlesex UB8 3LA
England

New Zealand Soaring Society
Peter Presant
30 Cleland Crescent
Naenae, Lower Hutt. 6301
New Zealand
(04) 567-4976

Southern Soaring Club
Southeaster
John Lightfoot
66 Second Ave.
Rondebosch East 7780
South Africa
021 697 4077 (H)

T.W.I.T.T.
Andy Kecskes
P.O. Box 20430
El Cajon, CA 92021
(619) 589-1898

White Sheet Radio Flying Club
The White Sheet
Sean Walbank
Woolcombe Hays
Melbury Bubb, Dorchester
Dorset, England DT2 0NJ
(0935) 83316

From "Aspectivity," of the Victorian Association of Radio Model Soaring, Australia, and the pen of Cameron Dyson, via DELTA #4, Reinhard Werner, Editor

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How To Read Your Label for Expiration

214 1ST 94/01

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94/01 - The subscription is good through the December, 1993 issue. It must be renewed prior to January 1, 1994, or it will be logged in as a new subscription.

Back Issues

We receive many inquiries every month about the availability of back issues for *R/C Soaring Digest (RCSD)*. So, we try to print sufficient quantities each month for those of you who wish to obtain back issues or want additional copies. We hope you enjoy *RCSD* but, if you are NOT satisfied, please return them for a full refund, no questions asked!

(Quanties are limited for some months.)

	1992	1993	1994
January	❒	❒	❒
February	❒	❒	❒
March	❒	❒	❒
April	❒	❒	❒
May	❒	❒	
June	❒	❒	
July	❒	❒	
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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*.

New Stuff...

...from Slegers International

Slegers International is proud to announce two new kits: the NightHawk and the ElectricHawk. These two new comers on the flying scene come with the same high quality prefabrication as the Spectrum, with reinforced fiberglass fuselages and high quality presheeted flying surfaces. Both the NightHawk and the ElectricHawk were designed by Mark Allen using his years of slope racing experience in the case of the NightHawk and new found interest in electric soaring to design the ElectricHawk.

NightHawk

The NightHawk is a 60 inch sloper that is simple in design yet offers some of Mark Allens' 10+ years of slope race winning experience to the 60 inch slope racing class. The design itself uses a slightly longer fuselage and larger stab for high speed stability and to provide better energy retention through the turns and for aerobatics. Attention to detail in this new design technology and an eye on practicality include a conventional "T-Tail" so that the builder does not have that trickey V-Tail alignment and setup to contend with. With a double taper RG15 wing planform the center of gravity can be pushed back to 40 plus percent while retaining positive aircraft balance.

Flying is where the NightHawk excels. With an area of 370 square inches and a weight of 23 to 27 ounces this little rocket loads out at 9 to 11 ounces per square foot providing some great light air flying. The prototype was initially flown in 3 to 5 mile per hour breezes for over an hour and a half. These light air flights equate to excellent flying for either inland or coastal slope conditions. For those days that the winds are stronger, load this little jewel up and stand back for some exciting flying.

ElectricHawk

When designing the ElectricHawk, Mark Allen wanted improvement over his 550E design while choosing to keep simplicity in mind for the main theme. The first consideration was a 7 to 10 cell electric that would provide great thermal ability with out any tip stall tendencies like so many designs out today. The climb rate on either cell combination had to be positive without fall off so the SD7037 and a wingspan of 74 inches was used to provide 510 square inches to keep this bird aloft. At 38 to 44 ounces of all up weight and a wing loading of 10.7 to 12.5 this goal was easily achieved. Again the double taper planform was selected to enhance aerodynamics and provide a slightly aft center of gravity with good balance.

A couple of other considerations taken into account for this design were the space required for radio and batteries; this plane has plenty to spare. The use of the Aveox motor or the new Astro 10 cell motor were also consideration with many flyers moving over to these two great power plants. With the easy handling and great flying on 7 to 10 cells this electric should be an easy choice for that next electric.

Welcome Hobby Dynamics

Slegers has just become a dealer for Hobby Dynamics. This means that Slegers can offer the latest in JR radios and radio accessories. In addition the full line of Hobby Dynamics products will be available.

Slegers International, Route 15, Wharton, NJ 07885; (201) 366-0880. ■

Mid-South Soaring Championships - Update

...by Bob Sowder
Memphis, Tennessee

Pre-registration for Mid-South Soaring Championships ends June 1, 1994

Entries for the 3rd annual Mid-South Soaring Championships are coming in from all corners of the country. The contest spans four days, June 23 - 26, with the Show / Exhibition and Modeler's Mall on Saturday and Sunday.

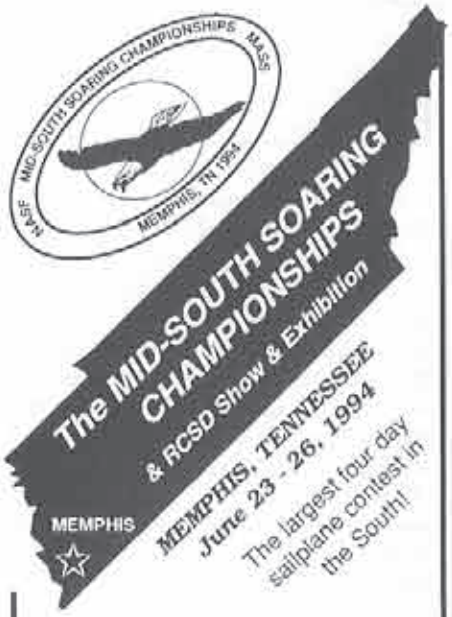
The event kicks off with two days of cross country on Thursday and Friday, June 23 - 24. The course is 27 miles long over flat Mississippi Delta terrain.

Judging from the strong pre-entry count, Friday's hand-launch glider event will be a real shoot-out. Sport flying will also open at noon on Friday. Sport flying frequencies will be available on a non-interference basis with the hand-launch contest.

Saturday and Sunday, June 25 and 26 will consist of two separate one day thermal duration contests with an overall Championship award presented on Sunday. Sailplane class will be unlimited both days and contestant classes will consist of Junior, Novice, Sportsman and Expert. Saturday evening, MASS will host an on-site BBQ.

With this year's expanded events, the sponsors and organizers promise to deliver the best Mid-South Championship contest ever.

Pre-registration ends June 1, 1994 and frequencies are limited in all classes. If you would like to receive a pre-registration brochure, or would like to reserve "booth" space at Modeler's Mall, call Bob Sowder days or evenings at (901) 757-5536. The Mid-south soaring Championships is sponsored by the Memphis Area Soaring Society, the North Alabama Silent Flyers and *RCSD*. ■



June 23 - 24
CROSS COUNTRY
Awards: 1st - 4th place
Junior/Senior/Open - Combined

June 24
HAND-LAUNCH GLIDER
Awards: 1st - 3rd place
Junior/Senior - Combined
& 1st - 3rd place, Open

June 25 - 26
UNLIMITED SAILPLANE
Awards: 1st - 5th place both days
Novice, Sportsman, Expert
& 1st - 3rd place both days, Junior

Due to the popularity of this contest, pre-registration is required by June 1, 1994. For complete information, write to Mike Kelly, 273 Sanga Road, Cordova, TN 38018, (901) 756-9410.

SPONSORED BY
MEMPHIS AREA SOARING SOCIETY
NORTH ALABAMA SILENT FLYERS
R/C SOARING DIGEST
AMA Sanctioned

Schedule of Special Events

Date	Event	Location	Contact
May 14	Mid-South Warm Up	Huntsville, AL	Lars Ericsson, (205) 859-0255
May 14-15	Masters of Soaring	Covina, CA	Pete Olsen, (909) 597-2095
May 14-15	SVSS Spring Fling	Davis, CA	Joan Nolte, (916) 966-0857
May 20-22	Fun Flying & Combat	Wichita, KS	Pat McCleave, (316) 721-5647
May 21-22	Renewed CVRC	Visalia, CA	Ed Hipp, (209) 625-2352
May 21-22	CSR International	Davenport, CA	John Dvorak, (408) 259-4205
May 21	SASS Novice Classic	Seattle, WA	Sherman Knight, (206) 455-2345
May 29-30	Radio Glide	Oxford, England	Jack Sile, 0449-675190
May 29	1.5m Hi-Start Contest	Lancaster, PA	Frank Wren, (717) 397-9032
May 30	Hand Launch	Poway, CA	Bill West, (619) 222-5296
May 28-June 6	World Soaring Jamboree	Richland, WA	Wil Byers, (509) 627-5224
June 4	Hand Launch	Poway, CA	Bill West, (619) 222-5296
June 11-12	XC Race - SCSA California Double-Cross	California Valley, CA	Keven Anderson, (805) 296-5126
June 11-12	Nebraska Soaring Open	Lincoln, NE	Loren Blinde, (402) 467-4765
June 11-12	BASS 2nd Annual HL & 2m	Baltimore, MD	Frank Weston, (410) 974-0968
June 18	Ohio Cup Thermal A&C	Dayton, OH	Jim Martin, (513) 376-9046
June 19	Ohio Cup Thermal B&D	Dayton, OH	Jerry Shape, (513) 843-5085
June 18-19	WRCC Spring Fling	Wichita, KS	Pat McCleave, (316) 721-5647
June 18-19	Cross Country	Portland, ME	Steve Savoie, (207) 929-6639
June 25-26	Flatland Open	Hillsdale, KS	Ed Kempf, (913) 780-5543
June 23-26	Mid-South Championships	Memphis, TN	Bob Sowder, (901) 757-5536
June 26	SASS Novice Classic	Seattle, WA	Sherman Knight, (206) 455-2345
July 4	Short High Start Unl.	North Texas	Al Sugar
July 9	10th Annual HL (A)	Dayton, OH	Gale Leach, (513) 429-2543
July 10	Open B&D	Dayton, OH	Bob Massman, (513) 382-4612
July 10	XC Fun Fly	Mead, NE	Christopher Knowles, (402) 330-5335
July 16-17	COCC XC "Dash for Cash"	Cookstown, Ont. Canada	Jack Nunn, (705) 728-4467
July 16-24	AMA NATS	Lubbock, TX	AMA
July 23-24	Inter Glide F3J	Birmingham, England	Jack Sile, 0449-675190
July 30-31	20th Annual Thermal	Montreal, Canada	Etienne Dorig, (514) 449-9094
Aug. 6-13	LSF Nationals	Muncie, IN	Mike Stump, (616) 775-7445
Aug. 6	Hand Launch	Poway, CA	Bill West, (619) 222-5296
Aug. 8 (eve.)	1.5m Mini Hi-Start	Muncie, IN	Ray Hayes, (810) 781-7018
Aug. 13-14 & Aug. 20-21	Holland Glide	Amsterdam / Amay Belgium	Jack Sile, 0449-675190
Sept. 10-11	F3J - Germany - Heerieden, Bavaria		Jack Sile, 0449-675190
Sept. 17-18	SIG/EISS Glider Contest At the Antique Airfield	Blakesburg, IA	Jim Porter, (800) 524-7805
Sept. 24	SASS Novice Classic	Seattle, WA	Sherman Knight, (206) 455-2345
Sept. 24-25	TNT	Austin, TX	George Parks, (512) 443-7029
Sept. 25 & Oct. 2	2m Postal - Details 5/94 RCSD - Everywhere		Steen Hoej Rasmussen
Oct. 1-2	21th Annual CVRC Fall Soaring Festival	Visalia, CA	Phil Hill, (209) 686-8867
Oct. 9	SASS Novice Classic	Seattle, WA	Sherman Knight, (206) 455-2345
Dec. 3	Hand Launch	Poway, CA	Bill West, (619) 222-5296

International Slope Race

...by Gavin Botha

Windy Weather. The first part of the year is usually the windy season. Instead of finding ways to avoid the wind with your thermal ship, use the wind on the slope. I have been circulating various articles announcing this year's International Slope Race at Davenport, and will include a write-up in this article.

World's best slope pilots. California Slope Racers (CSR) are a group of slightly off-beat RC modelers who all share the desire to race a fully ballasted glider at high speeds and low altitudes. Crazy? No way! It is the ultimate way to fly. CSR has evolved into a Northern and Southern California league that competes in a series of races in both regions, including the season championship which is held in central California. Competitors are required to compete in 7 races from their own region and in at least two combined North/South races. The result is a highly competitive series that has produced some of the world's best slope pilots.

New to slope? For those of you who have not had the opportunity to experience slope flying, let me attempt to share the experience. Well, after completing a few high speed dives well below the cliff line, then rolling vertical back up to altitude, and 'nailing' a few high speed turns, the odds are you are going to look around for someone to challenge. If this sounds like you, then you are either a combat pilot or a slope racer. Sometimes it is hard to tell the difference. The vertical wind component created by the cliff face provides free lift, making thermals a memory. There is nothing more exhilarating than flying at eye level with all the speed and control of a power ship. Don't get me wrong, slope flying can also be relaxing and majestic. Nothing looks more spectacular than a large scale model soaring within close proximity. But right now I'm talking racing!

F3B Pilots. The slope is an excellent practice ground for F3B pilots. All the carving tight turns apply to both slope and F3B. The slope provides an easy way of 'dialing in' an F3B ship for speed runs without having to continuously relaunch. Joe Wurts and Daryl Perkins have both won their share of slope races. Many CSR racers are also F3B pilots who have discovered the common link between the two forms of competition. The reigning CSR champion is Thomas Pils, last years champion was Gavin Botha, and Richard Tiltman had the honors the year before.

International Slope Race

CSR was formed in 1989 to continue the strong tradition of the *RCM* Trophy Races. *R/C Modeler* magazine sponsored the annual ISR who's roots extend way back making it one of the longest running annual events. South Bay Soaring Society hosted the ISR for several years after the demise of *RCM*, until CSR was formed in 1989. When CSR took over the ISR the present CSR series was formed. The ISR has always attracted the big names in the RC soaring community, both locally and abroad. Attendees include competitors from Germany, Canada and England. Joe Wurts, Rich Spicer, and last year's winner, Jerry Bridgeman, all have their names engraved on the winners trophy.

Torry Pines Gulls hosted last years ISR at San Diego, California. (See *Model Airplane News*, November 1993 for a review and spectacular cover shot.) In 1994 the ISR will return to Davenport on May 21 and 22. SBSS in conjunction with CSR will host the event. The Davenport site is a favorite among slope racers, known for its howling winds and phenomenal lift. The month of May is known for its predictable high winds along the coast. First time slope pilots need not fear the slope. Despite the high winds the lift is smooth and uniform, and with a little ballast almost any thermal ship will perform quite well. If you are a competent RC glider pilot, then you have the necessary skills to begin slope racing.

Anatomy of a Slope Race

A typical slope race goes something like this. Four pilots will be called up to the flight area. (Of course everyone is on time and prepared.) The pilot or helper will then hold up the model so that the officials at both turns can ID the aircraft. The turn judges or 'flaggers' operate a battery powered light tree, replacing the old fashioned flags. The far turn is located about 150 yards away from the start/finish line, and the near turn about 20 yards the other side of the start finish/line. After all gliders have been identified, the CD will yell "launch red, launch blue, launch orange, launch white" in about two second intervals. When all four gliders are in the air the 60 second count-down tape begins.

The start of a race is critical, and much like a sailboat race combines tactic, planning and a little guts. Most of the 60 seconds are spent trying to gain altitude. As the tape/clock nears zero the pilot positions his glider to enter the course with as much speed and as close to zero time as possible. From this point on the race begins. The pilot's caller will help guide the racing glider around the course by providing information like 'in a little' or 'dive more' (often followed by a swift kick if the pilot does not respond). For safety reasons all turns are away from the slope, resulting in a figure 8 shape course. When the caller sees his colored light flash, he instructs the pilot to turn and head towards the other turn. The caller provides the same guiding information throughout the race, keeping the pilot on the fast line and preventing mid-airs. After eight laps of intense wing tip to wing tip racing you give it an all out last effort, diving down across the finish line, then pull back up, victory rolling towards the sky.

The race format will combine three or four pilots competing in an eight lap race. The individual race times will then be normalized with respect to the fastest time of that race. The fastest pilot receives 1000 points with the remaining pilots receiving a normalized ratio based on their times. With two days of racing we expect to fly 6 or 7 rounds allowing each pilot to drop their lowest round. The contestant with the highest score at the end of the contest will be declared the winner. This year all proceeds will be donated to the Make-A-Wish Foundation. Trophies will be awarded to tenth place, along with a generous raffle for pilots and workers.

John Dvorak is the ISR contact, and can be reached at (408) 259-4205.

See ya at the slope. ■

North Texas Aeromodelers Soaring Contest

July 4, 1994

The contest will be at the North Texas Aeromodelers Field. The class is Unlimited and it is the pilot's responsibility to make sure his machine will launch with the existing launch system: short high-start with 12 lbs. thrust.

The task is 18 minutes cumulative duration; 5 flights with a 6 minute maximum. The landing area is designated (approximately 1/2 size football field), and a landing tape of 10 feet will be used for the 20 point bonus (i.e., on an in-out basis). An added minute that the pilot must fly which is not part of his score is the standard penalty for an infraction, such as a pop-off that the pilot wishes to have relaunched immediately, off-field landing, holding up the contest by excessive sandbagging, etc.

All pilots have one flight (total) they can throw away in a given round. They must announce the throwaway immediately upon landing so that the score will not be recorded until after the new flight has occurred. Remember, this is only one relaunch with no questions asked for the whole contest. (But it still costs 1 penalty.)

Interested parties should contact Al Sugar, P.O. Box 113315, Carrollton, TX 75011-3315. ■

Cross Country in Maine

The Downeast Soaring Club of Portland, Maine will be sponsoring a 2-day AMA sanctioned cross country event on June 18 and 19. The course length will be 10K. Advanced registration is mandatory. Distances will be marked to meet LSF goal and return tasks. A beginner's category may be added if enough interested parties apply. For more information, contact: Steve Savoie, RR #3 Box 569, Gorham, ME 04038; (207) 929-6639. ■

R/C Soaring Resources

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

Seminars & Workshops

Free instruction for beginners on construction and flight techniques. Friday & week-ends (Excluding contest days) Bob Fairman, 3274 Kathleen St., San Jose, California, 95124; (408) 377-2115.

California Composite Seminars - Thirty five dollars for a six hour plus Composite Technician lesson includes lunch! Two people minimum, please. Clubs? We travel, too! Please call (805) 822-7991 and ask for Scott Metze.

Reference Material

Madison Area Radio Control Society (M.A.R.C.S.) *National Sailplane Symposium Proceedings*, 2 day conference, on the subject and direction of soaring. 1983 for $7.00, 1984 for $7.00, 1985 for $8.00, 1986 for $8.00, 1987 for $9.00, 1988 for $9.00, 1989 for $10.00, 1992 for $12.00. Delivery in U.S.A. is $3.00 per copy. Outside U.S.A. is $6.00 per copy. Set of 8 sent UPS in U.S.A. for $75.00, outside U.S.A. for $80.00. Last 4 (1987-1992) in U.S.A. is $45.00, outside is $50.00. Allan Scidmore, 5013 Dorsett Dr., Madison, WI 53711.

BBS

BBS: SLOPETECH I, Southern California; (714) 525-7932, 2400 - 8-N-1

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

BBS: Tehachapi Mountain Bird's Nest, California; (805) 822-5434, 14.4 - 8-N-1

Contacts & Soaring Groups

Arizona - Southern Arizona Glider Enthusiasts, Bill Melcher (contact), 14260 N. Silwind Way, Tucson, Arizona 85737 U.S.A., (602) 325-2729. SAGE welcomes all level of flyers!

California - California Slope Racers, John Dvorak, 1063 Glen Echo Ave., San Jose, California 95125 U.S.A., (408) 259-4205.

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

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

England (BARCS & European contests), Jack Sile (Editor), 21 Bures Close, Stowmarket, Suffolk, IP14 2PL, England, Tele. # 0449-675190.

Illinois - Silent Order of Aeromodeling by Radio (S.O.A.R.), Jim McIntyre (contact), 23546 W. Fern St., Plainfield, Illinois 60544-2324 U.S.A., (815) 436-2744.

Iowa - Eastern Iowa Soaring Society (Iowa, Illinois, Wisconsin, Minnesota), Bob Baker (Editor), 1408 62nd St., Des Moines, IA 50311 U.S.A., (515) 277-5258.

Kansas - Wichita Area Soaring Association, Pat McCleave (Contact), 11621 Nantucket, Wichita, Kansas 67212 U.S.A., (316) 721-5647.

Maine - DownEast Soaring Club (Northern New England area), Steve Savoie (Contact), RR#3 Box 569, Gorham ME 04038 U.S.A., (207) 929-6639.

Maryland - Baltimore Area Soaring Society, Bill Cavanaugh (President), 1428 Park Ave., Baltimore, Maryland 21217 U.S.A., (410) 523-0778.

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

Nebraska - S.W.I.F.T., Christopher Knowles (contact), 12821 Jackson St., Omaha, Nebraska 68154-2934 U.S.A., (402) 330-5335.

Nevada - Las Vegas Soaring Club, Jeff Burg (President), 853 Shrubbery Lane, Las Vegas, Nevada 89110 U.S.A., (702) 459-8100.

Northwest Soaring Society (Oregon, Washington, Idaho, Montana, Alaska, British Columbia, Alberta), Roger Breedlove (Editor), 6680 S.W. Wisteria Pl, Beaverton, OR 97005 U.S.A., (503) 646-1695 (H) (503) 297-7691 (O).

Texas - Texas Soaring Conference (Texas, Oklahoma, New Mexico, Louisiana, Arkansas), Gordon Jones (Contact), 214 Sunflower Drive, Garland, Texas 75041 U.S.A., (214) 271-5334.

Utah (U.S.A.) - Intermountain Silent Flyers (IMSF), Bob Harman (contact), (801) 571-6406... "Come Fly With Us!"

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

NASSA
North American Scale Soaring Association

The North American Scale Soaring Association is an organization of scale soaring enthusiasts dedicated to the furtherance and enjoyment of scale soaring in North America. Membership dues are $10.00 a year, and provide for sponsorship of NASSA Scale Fun Flys & Rallies, and for the implementation of a National Scale Building and Soaring Achievement Program. Join NASSA and join a network of scale soaring enthusiasts that influence the direction of scale sailplanes in North America. Please provide your address, phone #, and AMA #, and we will send you a membership card and membership roster. A bi-monthly column keeping NASSA members up to date is included in *RCSD*, with additional information available periodically direct from NASSA. Help promote and support the continuation of scale soaring by sending $10.00 to: NASSA, P.O. Box 4267, W. Richland, WA 99352.

F3B/USA • F3F/USA
RC Sailplane Technical Journal

F3B/USA is a bi-monthly publication dedicated to the sports of F3B and F3F. The journal is intended for the beginning as well as experienced multi-task soaring enthusiast. Articles cover a wide variety of areas including: technical data issues, description of techniques, and articles written by and about the top people in the sports.

Subscription Rates: $14 per year (6 issues)
For More Info Write: F3B/USA,
87 1/2 N. Catalina, Pasadena, CA 91106

LSF

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

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

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

The Vintage Sailplane Association

Soaring from the past and into the future! The VSA is dedicated to the preservation and flying of vintage and classic sailplanes. Members include modelers, historians, collectors, soaring veterans, and enthusiasts from around the world. Vintage sailplane meets are held each year. VSA publishes the quarterly BUNGEE CORD newsletter. Sample issue: $1.00. Membership is $15.00 per year. For more information, write to the:

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

T.W.I.T.T.

(The Wing Is The Thing)

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

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

You are invited to join the
NATIONAL SOARING SOCIETY

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

For Info., Contact NSS Secretary/Treasurer
Robert Massmann
282 Jodie Lane
Wilmington, OH 45177
(513) 382-4612

Advertiser Index

Classified Advertising Policy

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

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

MINI HI START KIT designed especially for 1-1/2 meter (hand launch) Thirty feet of 1/8 tubing stretches four times relaxed length for gentle launches. Two day glow colored tow lines, 120' and 150', use separately or together. $29.95 + $4.00 shipping. Sky Bench Aerotech, 58030 Cyrenus Lane, Washington, MI 48094; (313) 781-7018.

GLIDER RETRACTS - high quality, 1/5, 1/4, 1/3 scale made in U.S.A. 1/4 are standard or heavy duty. Contact Bill Liscomb, 7034 Fern Place, Carlsbad, CA 92009; (619) 931-1438.

JOUSTER FIBERGLASS FUSELAGES available from American Craftsman. 3 meter. Harley has seen and commended. Made of fiberglass, epoxy and kevlar. Extremely strong, average weight 14 oz. $90.00 plus S&H. Call Bill Iurato @ (201) 327-2476 or Jack Strehl @ (914) 357-4013.

PRECISION COMPUTER CUT FOAM CORES for your sailplane. Any airfoil combination, washout, taper, sweep, skin thickness. $28 for typical four panel 2M. For complete info. send SASE to: Wings!, 3198 Shady Oak Lane, Verona, WI 53593; (608) 845-7961.

SPRING IS HERE. I can get you in the air in a hurry. Will build open, 2-meter, slope, hand launch and electric sailplanes. Please call **Tom's Custom Building Service** with inquiries, (612) 944-6246, 9:00 am - 8:00 pm CST.

Wanted

2 or 3 ch single stick radios, Tx & Rx. Send details to Mike McQuisten, 8400 East Road, Potter Valley, CA 95469.

For Sale - Personal

Multiplex FIESTA, NIB... $200.00 plus shipping. Mark Hoffman @ (214) 386-8613 eve., Texas.

GENESIS, NIB, dark blue & white... $350.00. Bob Belton @ (602) 526-8012, Arizona.

GENESIS with or w/o servos in wings (141's flaps, 3102's for ailerons)... $375.00 w/o or $530.00 with. Plus UPS shipping. Leigh Hodgdon @ (415) 858-3582 day, (408) 243-7250 eve., N. Calif.

RCD 5 ch FM micro receiver, Airtronics connectors, 53.6 mhz, 6 meter conversion by Kraft Midwest... $50.00; Graupner speed 700 motor, Graupner folding prop, extension shaft w/ball bearing support. For 7 - 12 cells... $25.00. 1 high Sky on/off controllers (2), good to about 30 amps... $20.00 EA. Motor almost new, other items used but xlnt shape. Craig LaChance @ (805) 529-1349, Calif.

"Rowing" (Roland Sommers) all fiberglass German 4.1 m scale LS6. Tremendous performance from thermal to speed. This all composite, white gelcoat model sailplane comes completely RTF with 8 Airtronics high performance servos and German wing bags... $1650.00 O.B.O. includes custom shipping/carry case. Don Troxell @ (714) 831-8013, S. Calif.

6.5 m (2.5 = 1 scale) LS4 CLUB, Wortman FX60 - 126 airfoil for wide speed range. Fiberglass fuselage with white gelcoat, wings are foam, fiberglass, and thick obechi. Fuselage length = 10 feet, fin height = 24", wing chord at root = 16", low hours, immaculate condition. Price includes all 8 servos, aero-tow hook (installed), 1/2 scale pilot (3 ft. tall with blue jump suit and felt beany) and heavy duty wing bags. Flying weight only 40 lb. Can be hand launched from slope by only one person! Magnificent sailplane... $2800.00 O.B.O. includes shipping crate and freight charges within U.S. Don Troxell @ (714) 831-8013, S. Calif.

SONIC (mid-tail prototype for Spectrum), thermal version, 100" foam/obechi bagged wings, RG-15 nose cone, 58 oz. up weight... $400.00 w/elev. servo in fin - no gear but negotiable; SONIC, F3B version, 115" wing, RG-15, blue foam, carbon fiber skins top & bottom, bagged wings, meets F3B sportsman (SMT) limits, excellent slope racer, no R/C gear... $350.00. Leigh Hodgdon @ (415) 858-3582 day, (408) 243-7250 eve., N. Calif.

Airtronics Infinity 660, NIB, bench set up only, channel 36, PCM, 5 102 servos, moving up to a Vision... $350.00. Steve Savoie (207) 929-6639, Maine.

HOBIE HAWK w/broken left wing panel, otherwise good condition... $85.00 obo; Bob Martin BOBCAT, 2 m w/three piece wing and removable T-tail, includes wing servo, very few flights... $95.00; RTF ANABAT, good condition... $35.00; Graupner TRICO, 2.5 m, RTF... $75.00 obo. Add shipping to all prices. Bob @ (301) 286-3481 weekdays, (301) 439-7464 eve, Maryland.

Müller COMET 88A, NIB, fuse painted with Black Baron primer. Wing: three piece, natural wood, carbon fiber, RG-15 airfoil. Slip on/off nose cone type fuse, used for thermal, F3B & slope racing... cost $700.00 asking $500.00 and you pay shipping. Jerry @ (408) 462-2827, N. Calif.

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880 FALCON, 3021 airfoil, 60 oz. wt., 6th place at AMA NATS & LSF, never crashed, good condition... $400.00 plus shipping; MARIAH 2 m, kit, complete with carbon boom... $200.00. Tom Williams @ (405) 741-8016, OKLA.

"The AVION"

(ah-V_YOHNG)

Fuselage

The AVION is a small lightweight epoxy glass sailplane fuselage. The AVION Professional is reinforced full length both sides with 1.7 oz. kevlar and features carbon tow molded into the canopy saddle and wing saddle areas for longlasting strength. The AVION can be used as an optional glass fuselage for a number of popular built-up fuselages, outdated glass fuselages or your own new handlaunch or slope sailplane design.

Specifications: Length w/ rudder: 35.5"; Width at widest point: 4.3"; Weight: 3.5 oz.. The AVION features a molded fin. The AVION accommodates bolt-on wings with a 7"-8" root chord between 59"-72" length.

Capacity: Up to 3 micro servos; micro receiver; up to 600 mah battery; switch harness.

AVION Professional price is $65.00(US.)
AVION Standard price is $55.00(US.)
Price includes a fiberglass canopy and CAD drawings showing the empennage and fuselage construction and the electro-mechanical control system.

206-821-1258

"Another Wright Manufactured Product"

WRIGHT MANUFACTURING CO.
P.O. Box 3281 / Bellevue, Wa. / 98009

Liberty

Liberty is a generic two-meter thermal or slope fuselage. Liberty is the second in a series of generic sailplane fuselages from Wright Mfg. Co. with specifications necessary to support a two-meter plug-in wing. Liberty Plus is reinforced with kevlar and carbon fiber in specific stress areas for longlasting strength.

Liberty Plus: $75.00 (US)
Liberty Standard: $65.00 (US)

Available from
SLEGERS INTERNATIONAL
201-398-0880 (8:30am-5:30pm EST)
and

Specifications: Length: 40 inches; weight: 6oz.; width at widest point: 2" molded fin; full flying removeable stabilizer; accomodates 2-meter plug in wings with a 9-10" root chord up to 84" long.

Capacity: Up to 4 standard servos; standard receiver; up to 1200 mah battery power; switch harness.

Includes: Molded glass canopy.

206-821-1258

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WRIGHT MANUFACTURING CO.
P.O. Box 3281 / Bellevue, Wa. / 98009

Spartacus

Spartacus is an open-class thermal duration competition sailplane fuselage. Spartacus combines the beauty of our popular AVION in an open-class configuration. Spartacus Competitor is reinforced in high stress areas with carbon tow and kevlar tape. Spartacus is designed to accomodate an SD7037 airfoil with a 10" root chord.

Spartacus Competitor: $90.00 (US)

Available from
SLEGERS INTERNATIONAL
201-398-0880 (8:30am-5:30pm EST)
and

Specifications: Length: 53 inches; weight: 11oz.; width at widest point: 2.2"; molded fin; accomodates open-class plug in wings using an SD7037 airfoil with a 10" root chord.

Capacity: Up to 6 standard servos; standard 8-channel receiver; up to 1200 mah battery power; switch harness.

Includes: Molded canopy.

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NEW
From Spectrum Enterprises

Spectrum F3B

$895.00
+ S & H

Specifications:
Airfoil: RG 15
Wingspan: 117 in.
Wing Area: 908 in.^{2}
Aspect Ratio: 15:1
Weight: 70-75 oz.
Wing Loading: 11.0-11.5 oz./ft.^{2}
Stab Area: 102 in.^{2}

Spectrum F3B

- All surfaces pre-painted and hollow molded
- Ail., flaps & elev., incorporate a top surface skin hinge with all surfaces pre-cut and wiper seals installed
- Fuselage – Custom painted with no seam line including: slip-on nosecone, pushrod housings pre-installed, wingrod hole pre-drilled
- 5/8 carbon fiber wingrod

Call Spectrum at:

(707) 838-1427