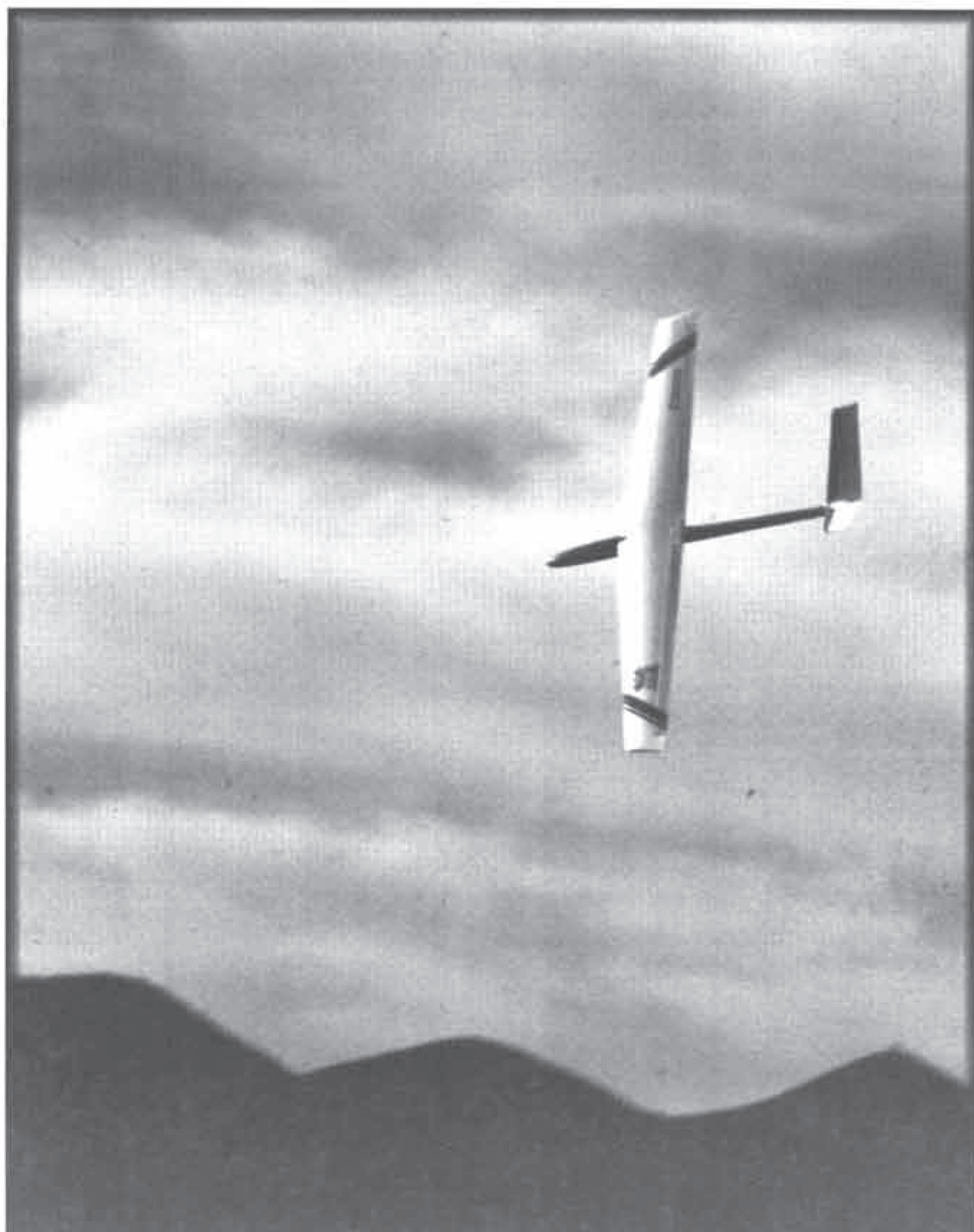


February, 2000

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



R/C SOARING DIGEST

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THE BEAUTY OF SILENT FLIGHT

A CR Aircraft Blazer, flown by Charlie Richardson, over Lake Hodges near Vista, California.

Photography by Dave Garwood, Scotia, New York.

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 contents of all articles, model designs, press & news releases, etc. are the opinion of the author and may not necessarily reflect those of RCSD. We encourage anyone who wishes to obtain additional information to contact the author. RCSD was founded by Jim Gray, lecturer and technical consultant. He can be reached at: 210 East Chateau Circle, Payson, AZ 85541, (520) 474-5015, <juniper@netzone.com>.

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..... 1/5 Scale Pilatus B-4 Jerry Slates

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..... 1/12 Scale U-2R/TR-1 Coming Soon

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Bookshelf Listings - A listing of recently published books of interest to aeromodelers.

Complete RCSD Index, 1984-1998

The Soaring Site

Sagitta XC Construction Booklet

In the December issue, we posted a "Help Wanted" request from Joel Lefkowitz in Connecticut. Joel had a Sagitta XC kit, but no construction booklet.

Much to our amazement, in short order, a copy appeared in the mail from Patrick Symons of Cottonwood, California. Our sincere thanks to Patrick for sending us a copy and for sending a second copy on to Joel! In a recent note from Joel, he says, "Just a note to thank you for your assistance. I now have the construction booklet

to build the Sagitta XC and also possess a kit of the Apogee!"

We have also sent a copy on to Bill & Bunny Kuhlman. They're wondering if anyone just happens to have a set of plans for the Sagitta XC lying around. If so, they'd like to borrow them just long enough to get a copy made. Their address is shown at the heading of their column.

If any of you require assistance, whether beginner or expert, please don't hesitate to ask. Every month we receive requests which we respond to and, if we think that

most of you either know the answer or might not be interested, those requests and responses don't usually appear in RCSD. However, we would like to share more of the day-to-day requests with all the readers in future months. And, if we don't know the answer, hopefully we'll hear from someone that does, like Lee Murray, Dale Uecker, or Patrick Symons who quickly responded to Joel's request.

Happy Flying!
Judy & Jerry Slates

Club Membership Ideas

by Mark Nankivil
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I wanted to pass on some good news that might be of use to other soaring and/or electric clubs out there.

A while back at a club meeting, we were discussing ways of advertising the club's existence and in the process, draw interested modelers to the club. We presently place printed one page flyers that are available in the local hobby shops and, when a visitor or someone expresses more than a passing interest in the club, we will send them a club information packet. This packet includes a copy of the "Getting Started in R/C Soaring" sheet, a copy of the club's newsletter, a copy of R/C Soaring Digest, a club membership application, and a letter inviting them to join the club.

Anyway, we batted around some ideas and when I went home after the meeting, I started playing with the label options in WordPerfect (Word has this feature, too), and came up with some ideas for labels that could be placed on model kit boxes at the hobby shop. Armed with a couple of sample layouts for the labels, I approached the owner of two of the local hobby shops and asked him what he thought of the idea. Mind you, he's normally a pretty laid back, unassuming kind of guy, but he got quite excited about the idea and gave it a big thumbs up. So it was back home to the PC and, armed with some fluorescent adhesive labels, I finalized the label design specifically for electric models and for sailplane models. I put these labels in marked folders and dropped them by the hobby shop where the staff could then place the labels on the model kit boxes. I don't have any real results or feedback yet, as they just were put into use this

week, but it is something positive in terms of advertising; anyone looking at or purchasing a kit cannot but help see them!

A couple of ideas to keep in mind should your club decide to give this a try, too:

1. Work up samples of the labels and have someone who is a "regular" at the hobby shop make the approach to the owner or manager. The relationship that person has with the hobby shop owner can be a very important part of making the pitch. I made a point of how we are wanting to develop new membership that "sticks" in the hobby and this in turn means a valued, long term customer to the hobby shop.
2. Keep the label simple and to the point. I chose to print them on fluorescent labels but these are hard to find (I found MACO brand labels at Office Depot.), so you may want to print them in color on easier to find white labels. Don't make them too big as they crowd the kit box top and too small and you don't

have room to say much. It seems that labels of 8 to 10 a sheet (8.5" x 11") are the optimum size for visual impact.

3. The club should supply the printed labels to the hobby shop. The cost is negligible (\$7.50 for 15 sheets of labels = 150 labels). Place them in well labeled folders so that it is easy for the hobby shop staff to find the labels and remember to put them on new stock as it is inventoried and shelved.

I hope that others can put this idea to use in their local hobby shops. Good Luck!

Good Health and Good Lift! ■

Congratulations!!

Welcome to the world of electric powered models and congratulations on your purchase of this kit! If you're interested in learning more about electric models and to fly with a St. Louis area club, the Mississippi Valley Soaring Association, that has a strong core of active electric fliers, you can contact us.

Peter George
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TWOEMETER@worldnet.att.net

Mark Nankivil
314/781-9175
nankmc@quixnet.net

Welcome!!

Congratulations on your purchase of this sailplane kit. If you are interested in learning more about R/C Soaring and fly with the only St. Louis area club focusing on R/C sailplanes, the Mississippi Valley Soaring Association (MVSA), you can contact:

Bob Keeler
314/434-8640
keelerpad@aol.com

Mark Nankivil
314/781-9175
nankmc@QuixNet.net



Jer's Workbench

Jerry Slates
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RCSDigest@aol.com

Wonder Pole

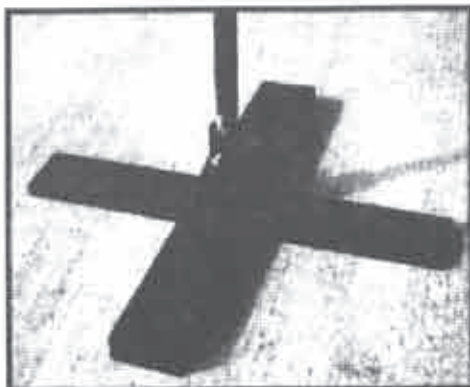
Have you ever gone shopping and seen something that you just had to have, but really didn't know what you'd do with it when you got it home?

Well, that happened to me. I knew I could find a good use for it, but not at the moment I purchased the item and carted it home.

What did I find? An old fashioned, cane fishing pole! It caught my eye when I realized it was made of fiberglass, and not cane. There are 5 fiberglass sections which allow for a total length of 16'.

So, OK. Now what does one do with a fishing pole at a soaring site where the nearest pond is miles away? How about a weathercock or a wind vane?

The photographs depict a simple base which I constructed, similar to a Christmas tree stand. The pole was installed on the base. A 12 foot length of magnetic tape from an old cassette was tied to the end of the pole, completing the weathercock.



A simple Christmas tree type stand.

Now, the first thing I'd do, after arriving at a flying site, is set it up to determine the wind direction. This will aid in identifying a good spot to set up the high start or winch. And, then, a passing thermal will note its presence, as well.

Of course, if the wind is strong enough to blow the weathercock over, then it's likely time to pack up and go home.

The pole can also come in handy should a tree snag your favorite plane.

Fuselage, too?

If I were to build a pod and boom type fuselage, there are 4 usable sections of the pole that could be used for a boom. The sizes of the 4 sections are as follows:

- 44 1/2" long x 1 1/8" x 1"
- 43 1/2" long x 7/8" x 13/16"
- 39 3/8" long x 3/4" x 5/8"
- 37" long x 9/16" x 1/4"

There is a heavy coat of paint on these 4 sections, but it can be scraped off to save some weight.

The last section of the pole is much too light and flexible to be of use in a model, but if you were to tie a string on it, it would make one heck of a cat toy.

The pole should be available at a local fishing supply store. Ask for a "Shakespeare Wonder Pole" model # TSP-16. The price should be around \$17.95. ■



The 5 sections of the Wonder Pole.



If the wind blows the wind vane over like this, it's time to pack up and go home!



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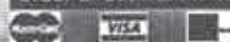


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CROSS COUNTRY SOARING



by Scott Gradwell
Medford, Oregon
rcpilot@cdsnet.net

If you have wanted to try Cross-Country soaring, hopefully this column will help you understand what it takes to give it a try and help you get started.

1st - The Sailplane

Actually, there isn't a special sailplane required to give Cross-Country soaring a try. You can have a sailplane ranging from an Oly II to a SB/XC and still go out and have fun with them. If you really want to cover some ground, then you should go for a large efficient sailplane. The larger it is, the higher you can go and still see it. This lets you cover more ground looking for thermals, so your chances of finding one and being able to continue are better. Also, larger sailplanes with higher wing loadings penetrate better. If you are flying an Oly II and the wind picks up, it might feel like you have hit a brick wall. But if you just want to see what Cross-Country soaring is like, just take the sailplane you have now and go give it a try.

2nd - The Team

To be able to go out on course you will need at least one other person to help you out, but more are better. The first person you have to round up is someone to drive the vehicle. The driver's job is fairly simple, but demanding. Safety is the first priority of the driver; he must watch the road and not the sailplane. You have to choose a driver that you trust; you will not be able to look down to see what's going on and he will be pulling on and off the road repeatedly. Before you go out on course, you will have to work on communications between you and the driver. Depending on the vehicle you are using it might be just talking back and forth, or getting a third person to relay messages to the driver. You should at least have signals to stop, slow down incrementally, and speed up incrementally. If you have a variometer you are using, such as the Helios Multiplex Vario, you can have an additional speaker so the driver can hear it. So when you tell him you are going to be taking the next good thermal, he can listen and anticipate when you might be telling him to stop. One thing you should not do is yell at the driver. If you are leaving a thermal and starting to cruise, but the vehicle is just sitting there, it might be because of traffic and yelling at him won't help. The next person you should look for is a copilot. In addition to flying the sailplane when you

need a quick break, the copilot should improve your situational awareness. He should observe the terrain and give you hints on where to find lift, look for other sailplanes that are in lift, give you your location on the course, and as you slow down he should check the wind direction and velocity. If you are lucky enough to round up a fourth person for your team, they can actually help also. The fourth member would be sitting up front with the driver. They can help with communications between the driver and pilot. Also they can keep track of time, the actual mileage flown, and your exact position from the next turnpoint. They also can mark where you have found thermals previously if you are going over the same route more than once. Cross-Country is really a team effort and a good team will make a difference.

3rd - The Vehicle

Basically to do Cross-Country soaring you need a vehicle you can see out of so you can fly the sailplane. This limits your choices to convertibles, trucks, or vehicles where the top is removable, such as Blazers. Each type of vehicle has good and bad points. With a convertible the good points are that you sit next to the driver so communication is pretty good, you are low and out of the wind, and you have factory seatbelts. Some of the bad points are that the sailplane is difficult to transport back to the field once you land and it is hard to turn in your seat if the sailplane gets behind you. With a truck you have to realize that some states require each person to have a seatbelt and sometimes it has to be a factory installed seatbelt. Also in a truck you get blown around pretty good and it is hard to communicate back and forth with the driver. But it is great for holding your equipment and carrying the sailplane back to the field. A Blazer or similar vehicle with the top removed would be a great choice, but not everyone has one of those lying around. Also the tops on those things are pretty heavy and not a lot of fun to just take off and put back on all the time. I am sure not many people will run out and buy a vehicle just for Cross-Country soaring, so take a look at what you have available and see if it will work and how you can improve it.

4th - Equipment

To be able to fly Cross-Country well you need a variometer. They are expensive and might be hard to find, but they are worth every penny if you want to rack up some miles. When you are traveling down the road at 40 mph way up at altitude it is hard to notice when you go through thermals. If you do not have a variometer you will have to wait until you get fairly low and can see when your sailplane goes through a thermal, which usually means you are stopped on the side of the road not making any progress. It is much better to be flying along in cruise mode and have the variometer tell you when you hit lift and if the lift is strong enough to stop and circle in. You should also consider water, sunscreen, and lip balm containing sunblock important equipment. Pilots in our contest have spent over 4 hours out in the sun with the wind blowing in their faces and if you aren't

prepared you will pay the price the next day.

I hope this helps describes some of what Cross-Country soaring requires and you will give it a try. If anyone has any hints, questions, or additional items I missed, please e-mail them to me and I will be sure and answer them or get them in the next column. Next month I will talk about the Montague Cross-Country Challenge. ■

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This year we expect to see some excellent pilots from Europe attending, including 1999 Akro Cup winners. National and international vendors will be showing their wares. The emphasis will be on fun and aerotowing, as well as some fantastic slope soaring if conditions dictate. Tow planes and experienced pilots will be there to tow you to altitude. We will be blocking out channels 17-25-26-29-57 for tug use this year. Bring a scale sailplane with nose release and join us at historic Harris Hill. On Friday evening there will be a Banquet at the Harris Hill Youth Camp adjacent to the flying field. Guest speakers to be announced. More exciting plans are in the works; keep an eye out for further developments as they become available. Current AMA or MAAC membership is required. There will be a \$25.00 pilot registration fee (\$20.00 in advance, check payable to HH L/D by April 15th). Bring the family and enjoy a few extra days in the NY State wine country, or visit the National Warplane Museum, or the Glenn Curtiss Museum.

For details & information (including shipping your sailplane to Elmira) contact:

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Swept Wings and Effective Dihedral Part 2

Last month, in Part 1, we examined pitch, yaw and roll and how each is affected by specific control surface deflections. We also talked about the roll maneuver and how it causes a yaw and sideslip, and how the generated restoring moments contribute to lateral stability. An aircraft is said to have static lateral stability if the right wing rolls upward when there is a sideslip to the right, and the left wing rolls upward when there is a sideslip to the left. Because dihedral causes this response to a sideslip, lateral stability is sometimes referred to as "dihedral effect." Having the wing mounted high on the fuselage contributes to dihedral effect and can take the place of geometric dihedral in the wing.

Yaw-Roll Coupling

Having said that a roll causes a sideslip and then a yaw, it is imperative to note that the reverse is also true — a yaw causes a sideslip and then a roll. The coupling of roll, yaw, and sideslip cannot be separated.

As an indication of these interactions, place a model aircraft with dihedral on a wire such that the wire goes directly from nose to tail through the CG. If the model is canted (rolled) slightly and then pushed forcibly down the wire, the model will not right itself. This is because without sideslip there is no restoring force, only damping forces, as explained in the previous section. In fact, then, it is the interaction of roll, sideslip and yaw which allows the designer to produce a stable aircraft.

Aircraft controlled by rudder only (no ailerons) must have substantial dihedral. As the rudder is deflected, the effective angle of attack of the outboard wing is increased, generating a rolling motion into the turn. Without dihedral, rudder deflection would simply yaw the aircraft, and no roll component would be generated. If the dihedral angle and vertical tail area are correct, the

aircraft will continue to circle at a constant bank angle once the rudder is returned to the neutral position. (See also End Note 1, Aileron drag and adverse yaw.)

We often think adverse yaw is the direct result of aileron deflection. Because aileron deflection changes wing camber, it is easy to see that this differentially affects the drag of the wings. The aircraft tends to yaw toward the downward deflected aileron, an action opposite to what is wanted. Rudder deflection must be imparted to counteract this adverse yaw, substantially increasing drag during turns.

But there is a second, and more important reason for the appearance of adverse yaw. We'll let Steve Morris explain... "Adverse yaw is affected by a drag imbalance between the wings while rolling, but it is not only the drag of aileron deflection that

causes this. Imagine the wing is balanced in a perfect rolling motion (constant roll rate) with the ailerons deflected and the rolling motion fully developed so that the span loading is identical to before the maneuver began. This implies the ailerons changed the loading to cause the roll and the motion of the wing induces angle of attack changes that cancel this roll torque when a steady-state roll rate is achieved. The downward moving wing sees a greater angle of attack due to the rolling motion (greatest at the wing tip) and the upward moving wing sees a lower angle of attack. The local lift vectors are tilted forward on the downward moving wing and backward on the upward wing by the rolling motion. This change in lift direction due to the induced velocities of rolling produces powerful adverse yaw regardless of profile drag

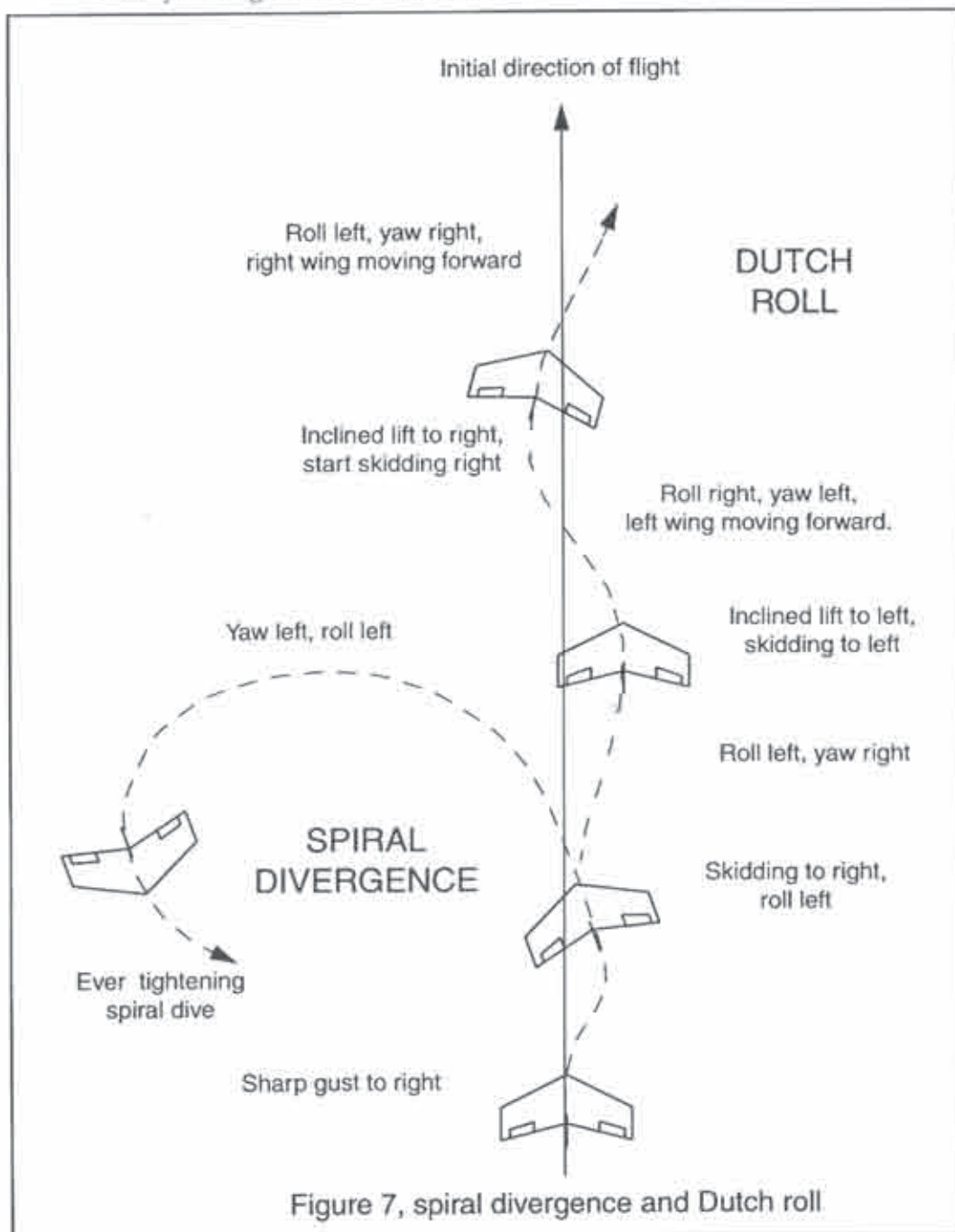


Figure 7, spiral divergence and Dutch roll

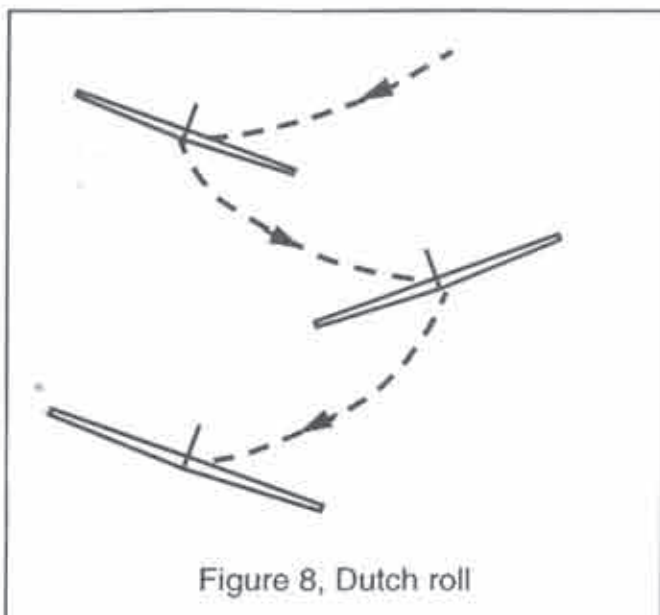


Figure 8, Dutch roll

changes. The same induced velocities tilt the lift vectors on birds when they flap their wings and this is how they get thrust on the downstroke. Aileron drag is a much smaller part of the adverse yaw than this induced effect."

Directional Stability & Spiral Instability

In RC sailplanes, if vertical stabilizer area is too large, the pilot must continuously input rudder controls to maintain the correct heading. This is because the aircraft will always tend to turn into any sideslip, and bank more steeply. If corrective commands are not made, the yaw will increase gradually to the point the aircraft is in a spiral — an increasing turn of decreasing radius with the nose pointing downward and speed rapidly increasing and altitude rapidly decreasing. See Figure 7.

A similar effect takes place if the vertical fin is too large and there is a slight roll. If, for example, the roll is to the right, there is a sideslip to the right. The fin, being too large, reacts to the yaw by turning the aircraft to the right and increasing the bank

angle. With a steeper bank angle, sideslip and yaw moment both increase. As in the above paragraph, the aircraft will quickly be in spiral toward the ground. In both cases, the aircraft has too much directional stability, making it prone to spiral instability. See "spiral divergence" in Figure 7.

Steve Morris brought another reason for spiral divergence to our attention. He said, "Spiral divergence is also strongly affected by Clr, roll torque due to yaw rate, which is a very strong effect on long-span airplanes which fly slowly. The inboard wing is flying very slow compared to the outboard

wing when turning and this velocity difference, due to yaw rate, causes the lift across the wing to vary, and the aircraft rolls into the turn. Clr is a big effect on human powered aircraft, hang gliders, sailplanes, and model sailplanes, especially high aspect ratio slow flyers."

Decreasing vertical stabilizer size decreases directional stability and increases spiral stability. Increasing dihedral effect has a similar action. But it should be noted that most full size aircraft are at least somewhat prone to spiral divergence. That is, the aircraft has too much directional stability, and the pilot is nearly always making very small corrections to prevent a spiral. Why this is so will be clear shortly.

Too much dihedral causes its own problems. If dihedral is excessive, crosswind landings are more difficult as the aircraft is operating in a sideslip, and lateral gusts may induce large roll angles and high roll rates. And there is also an increased tendency toward the notorious Dutch roll, especially at high speeds.

Dutch Roll

A small gust hitting the wing or vertical tail can initiate a rather complex oscillatory motion consisting of roll and yaw which are out of phase with each other. First there is a yaw and roll in one direction, then recovery with an overshoot to yaw and roll in the opposite direction. From the rear, the tail cone traces a circular arc. See Figure 7 and Figure 8.

While not inherently dangerous, Dutch roll produces a tremendous amount of drag. In conventional tailed RC sailplanes, Dutch roll most often occurs while flying at high speed. Dutch roll is caused by too much dihedral and insufficient vertical stabilizer area. There is too much spiral stability and insufficient directional stability.

The cure for spiral divergence, reducing vertical stabilizer area and/or increasing dihedral, thus makes the aircraft more prone to Dutch roll. The cure for Dutch roll, increasing vertical stabilizer size and/or reducing dihedral, makes the aircraft more directionally stable and more prone to spiral instability and spiral divergence.

As is usual when designing aircraft, some compromise must be made, and the aircraft then designed around what is seen as the best overall performance.

The Effects of Taper Ratio on Effective Dihedral

Taper ratio affects effective dihedral. Both the included chart and this short discussion assume taper ratio to be defined as tip chord/root chord.

From McCormick, page 544, for a linearly tapered wing, the increment for dihedral angle is:

$$C_{l\beta} = \frac{a}{6} \left(\frac{1 + 2\lambda}{1 + \lambda} \right) \Gamma$$

where

$C_{l\beta}$ = increment for dihedral angle, where -0.0021 is equivalent to one degree of effective dihedral;

a = the lift curve slope of the wing in radians;

λ = the taper ratio (no taper = 1, sharp tip = 0.0);

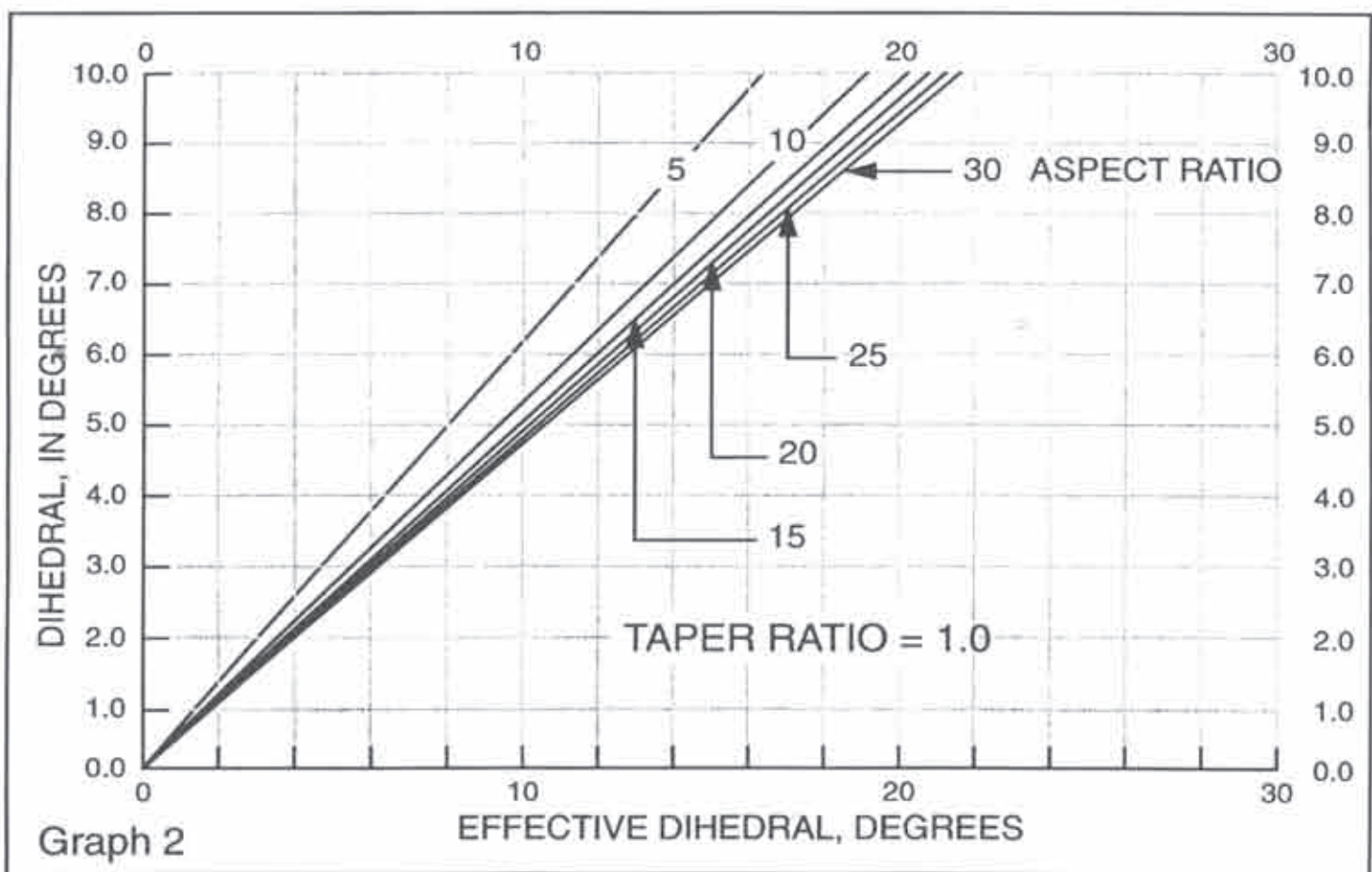
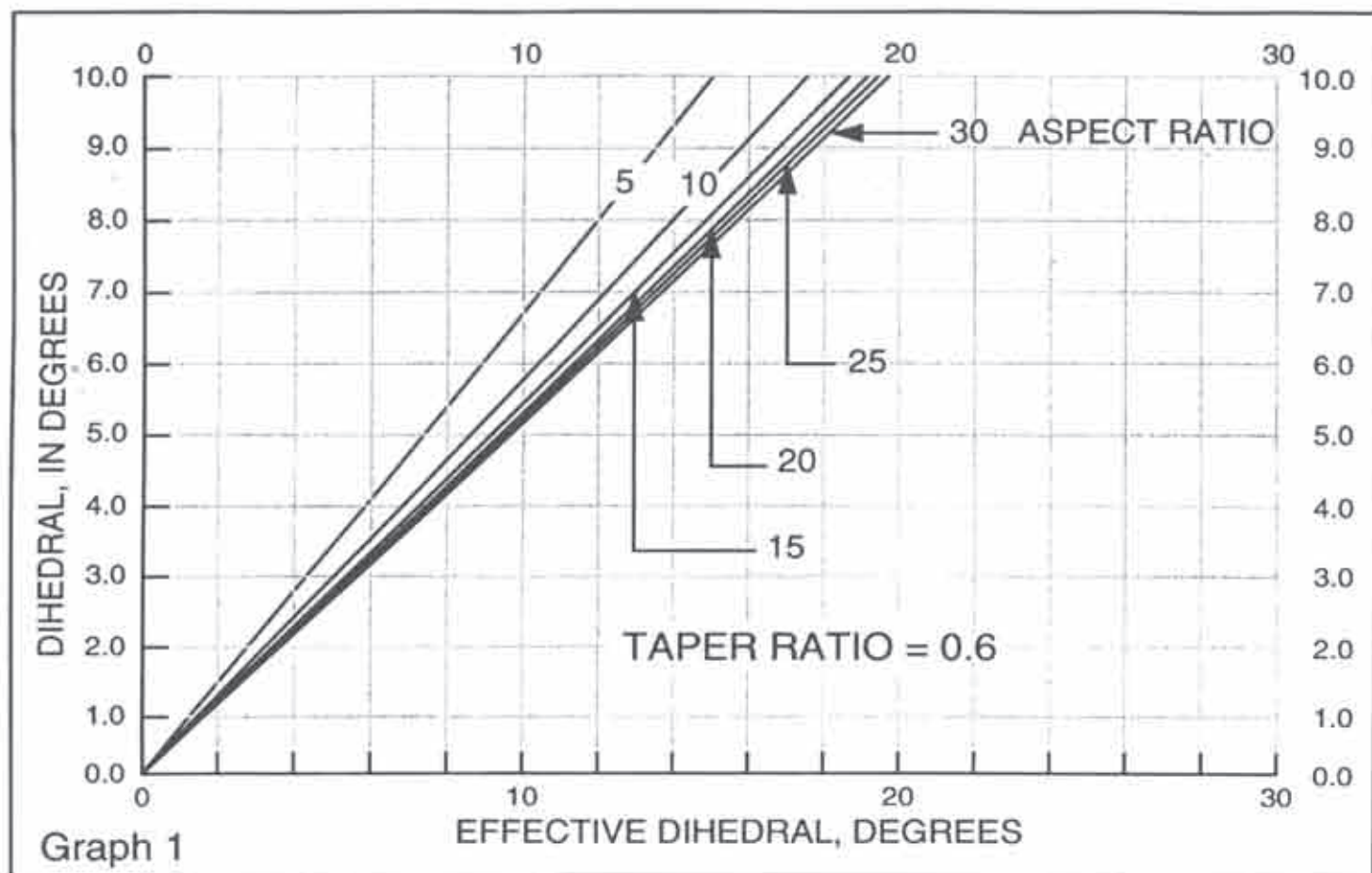
Γ = the wing dihedral angle in radians, small angles only.

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The relationship of taper ratio and effective dihedral is graphically illustrated in the differences between Graphs 1 and 2. Note that effective dihedral is always somewhat larger than geometric dihedral.

As the taper ratio gets larger (approaches and exceeds unity), effective dihedral gets larger. This is because effective dihedral is influenced by the position of the wing centroid. As the centroid moves outboard with larger taper ratio, effective dihedral increases. The area added at the tip increases the dihedral effect strongly because of its large moment arm.

Next month: How effective dihedral is affected by sweep and winglets, and a method for approximating effective dihedral based on specific design parameters. One complex formula and one simple formula. And yes, the complex formula has been translated into a graph. Stay tuned!

Suggestions for future topics may be sent to us at either P.O. Box 975, Olalla, WA 98359-0975, or <bsquared@halcyon.com>.



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GORDY'S TRAVELS

The FMA Razor Series An Electric That Bounces!

by Gordy Stahl
Louisville, Kentucky
GordySoar@aol.com

(See photography on back cover of this issue.)

One thing a traveling guy really needs is a Razor, so as soon as I saw FMA's new foamie speed 400 wing, the Razor, I knew I had to try one!

Now I have to warn you, this is a real breakthrough RC innovation, so this article is gonna be full of neat information.

"Whoa!" You say, foamies have been around for a while and putting a speed 400 on one is nothing new? Okay, I agree with that, but this is not your dad's old EPP foamie. In fact, it's not made of EPP! No, it's not made of Styrofoam, either.

But wait, I'll get into the blood and guts of its composition later in the article. First, let's talk about some of the FMA innovations. One of the innovations is the way you can order the kit. I have to give them credit here. Most companies wouldn't attempt this kind of customer convenience, thinking that it's too confusing for us to decide.

The Razor comes in twelve component configurations, starting with a kid's free flight toy that is high start-able. It does not use any reinforcing tape on its wings. The second version is sold complete with a Micro Hi-Start.

The next version is RC. It is offered as the 'Slope' version that includes control system hardware and the servo pockets molded in place. The second version comes complete with RX, micro servos, and 110mah RX pack.

The electric versions all include a vacuum-formed 'cockpit' which actually provides storage, protection for the radio, controller and the motor mount.

This cockpit is actually two plastic components that get scissor-trimmed; then the lower part gets glued to the foam and the upper cover is tape-hinged to the front of the lower part. The back of it gets some

Velcro pieces to secure the cover over the radio and motor components.

All that being said, you can get just the electric version base unit but, since there is a Sp400 and a Sp600 version offered, the "Cockpit" is formed to fit the motor diameters; so, this 'base' unit actually is offered two ways.

Each of these base units upgrade to a version that includes motor, controller, prop, and 7 cell 600AE pack (Sp400) or 800AR pack (Sp600).

Got that? Well, the next versions offer the works: RX, motor, controller, prop, servos, batteries... IN THE BOX!

Two separate power packages are offered with the SP 600 units, one for 'Endurance' and one for 'Performance', the difference being the motor version.

Prices? Well the RC Razor 'base' unit starts at \$45 and the 'whole' package \$250. Now \$45 is hard to believe, for a plane that is nearly indestructible and builds in about an hour, and \$250 a little steep, but not when you figure all that is included. Mine was the whole package system and it made building QUICK.

Okay, the building and flying.

The kit includes two molded wing panels. They are molded from Arcel. This is the stuff auto dashboards are filled with. So flexible that you can bend one half panel, tip to root without breaking the panel! Molded means shaped with interlocking root tabs, shaped/snug servo pockets, and very little sanding to dress up edges.

Arcel differs from Epp and Styrofoam (EPS), in that it can be painted and glued with everything. Yep, you can paint it with any paint; you can use Super Glue on it, too.

Another neat thing about the Razor that differs it from EPP foamie wings is that it doesn't need all that strapping tape. The Razor comes with strips of .010" Lexan tape, one piece top and bottom, and it really stiffens up. Unlike strapping tape, this Lexan tape provides stiffness in compression as well as in tension. It also comes with some .005" Lexan tape strips for hinging the elevons. No need to pre-

Razor Specifications

RAZOR is molded from a foam new to the model industry. It is used in auto bumpers and dash boards. ARCEL is much more durable than EPP and vastly more durable than EPS. In fact, you can bend a wing panel double and it does not break. However, with the tough skin formed as it comes out of the mold, the wing panels are very much stiffer than EPS or EPP.

The molded foam is a little bit different than the hot wire product cut from molded blanks. The manufacturer has confirmed that one can use CYA on the foam and it does not attack it. Epoxy also works fine. Strapping tape and such do not stick to the new foam unless you first coat the foam with contact cement, so they worked out an adhesive system with 3M that works great. They also advised us that the foam can be painted with anything, including lacquer, dope, etc.

Specifications:

All airframes come from the same mold and are 48 inch span. Wing area is 480 square inches = 3.3 square feet. Weight for the bare airframe is approximately 5 ounces. The Speed 400 all up weight is 20 ounces. The Speed 600 all up weight is 32 ounces.

Pricing varies from \$44.95 to \$249.95. ■

spray the foam surfaces either; you just 'wash' the foam with a cloth dampened with denatured alcohol.

While the instructions mention 5 minute epoxy for joining the wing panels and all of the other joints, I would suggest using Goop for gluing the Cockpit to the wings and for the tiplets.... Unless you decide on the slope version; then I would suggest taping the tiplets on. The tiplets are pre-formed lite-ply that get glued to the tips. They don't need to be that firm but, if they are glued on, chances are, under slope conditions, they'll get knocked off fairly often.

I mentioned that the wing panels have molded servo pockets. These pockets fit the FMA 80 super micro servos, but other sizes



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can be fit with a little cutting and fitting. The wing loading is so light that if standard size servos were used, you probably wouldn't notice the difference.

Another neat feature of the FMA Razor is that the Arcel foam comes in three colors: a really nice blue, white and gray, so you and your friends can each have different colors without painting or adding some covering. The Arcel material can be described as looking like white styrofoam, but it has very large beads. It's very resilient and flexible, yet firm and stiff. Kind of hard to imagine, but this is some pretty great stuff for our hobby.

Everyone who sees me open the cockpit cover remarks at the tiny size of the FMA Controller. When you order the Power package or the Complete Kit, the motor, controller, off/on switch and battery are already wired and connectors in place. Very nice and saves a bunch of "oh darns!" because of reversed polarity electronic destruction.

The motor is simply placed in the mount and a single tie wrap pulled around it to hold it in place. The motor runs in reverse direction and, while it's a 'pusher' cuz of the motor/prop being in the back, the prop is mounted backwards; so, no special prop is needed. (I had some old three bladed plastic Cox props that look pretty cool and work almost as well as the prop that comes with it.)

The Electric version has a cavity on the top toward the nose for the battery compartment, which is very nice for those occasional nose first hard landings. The pack just sits in place and takes the bounce, where if it were sitting in the cockpit it would try to blow out with most of the components.

I really put it through some hits, including hitting my clubmates at full speed! In the interest of tests, of course (Notice I didn't refer to them as friends...), and the only time I had a pack come out was on a full speed, head-on collision on the slope with another foamie. Of course, the pack fell out and the plane spiraled to the ground, ready for re-connect and re-launch.

How does it fly? Well I can tell you it flies a long time on that little set of 600mah NiCads... And it flies great!

Mine weighs in at 20 oz. with the stock equipment, and I fly it at low speed right around my body. High speed is fast, but the thick root foil really brings it to a nice, slow landing speed. That 'pod' fuselage is easy to grip for firm launches, but the FMA Razor will fly right out of your hand with a gentle push.

Recently, I flew it with a friend who had the Zagi 400 and we compared climb and roll rate, glide and, well, everything. We found that the Z came in at about 17.5 oz. and seemed to be a little faster because of its thinner foil than the FMA Razor; however, that being said...

We both agreed that the molded features, the exceptional handling and speed range (the FMA Razor's thicker foil made it a little more docile for slow flying) — the convenience of the battery compartment, the integrated pod/fuselage for launching/landing, and the simplicity of constructing

with Arcel (and a little nicer price), made the FMA a really excellent value/performance.

Since that day, I have switched to a new 1500mah Sanyo NiCad from Mr. NiCad. These cells are 4/5's A cells, which means they are a little more than double the length of the 600AE's and weigh a little more, but they fit perfect and more than double the flight time. I haven't bothered to time the flights, but the 600AE's really give you great flight time so you can imagine what it is to just keep flying and flying and flying.... You get the point.

They are called 1500AUL's, weigh .95 oz., and are 1.690" long. The 600AE's weigh in at .63 oz. and are 1.1" long. So, they are about a third heavier but give more than double the run time! With the huge wing area of the Razor, the little change in weight is not noticeable. For those of you who haven't dealt with Mr. NiCad, Ed Yost and his crew (wife) have been selling to the RC industry for years. So when you call and start talking application, it doesn't matter if you want a TX pack for a Stylus or a specialty pack for some super-duration, super-light contest ship; they KNOW what you are talking about.

That also means that when new cell design comes out they are already thinking of RC applications for them. Like the new Nickel Metal Hydride 1950's that are virtually identical in size and weight to the 1500AUL's I am using! (A little higher price

too!)

I told them how I wanted the packs configured and they came that way. So no need for me to be soldering cells. The losses of spot welded connections, at this low of amp draw, are not noticeable.

Where can you see more about the new FMA Razor? Go to their web site at www.FMADirect.com or call them at (800) 343-2934. Of course, FMA Direct has been known for innovation in the RC hobby for years: among the best design receivers in the world, motor controllers, and lots of other excellent RC products, including a huge selection of super micro servo options.

Mr. Nicad: www.batteriesamerica.com or call (608)831-3443.

I really like this plane. It's fun to be carefree about the airframe and radio/motor components. It looks nice and does everything fun in the air. I seldom fly it about 5' off the ground, and mostly I keep the throttle set at 'cruise'. My dog loves to chase it around and he needs the exercise. (You know how those Catahoula Leopard Dogs like to run.) It rolls nice and it flies inverted with amazingly little down elevator compensation.

All in all, I give the FMA Razor my seal of 'recommendation'. (That coming from a guy who hates futzing with foamies and little airplanes too!)

Hope you all enjoyed this trip. I know I had lots of fun and still am! See you next trip! ■

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TECH TOPICS

by Dave Register
Bartlesville, Oklahoma
regdave@aol.com

Oh, Say Can You

..... Cl, Cd, Cm, Cp, Cg

From time to time the subject of airfoil and planform coefficients comes up for discussion. As abstruse as these numbers may seem, the topic generates a surprising amount of passionate argument among sailplane modelers. It's not so much the numbers themselves as the interpretation of how to use them. This is especially true of the often misunderstood Cm. So let's take a moment this month to discuss the definitions and uses of airfoil and planform coefficients.

There are a number of standard references for all of these terms. If you are an aeronautical engineer (which I'm not, by the way), you'll find them in most introductory engineering texts. For modelers, the following resources may be more available:

- 1) UIUC reports. Volume 3 is particularly descriptive of the moment coefficients,
- 2) Martin Simons' many informative columns in *RCSD* and his book "Model Aircraft Aerodynamics",
- 3) "Theory of Wing Sections" by Ira Abbott and Albert VonDoenhoff, with particular emphasis on chapter 4,
- 4) "Low-Speed Wind Tunnel Testing" by William Rae and Alan Pope.

References 1 and 2 are aimed specifically at the modeling community while references 3 and 4 are engineering texts and provide greater detail on the theory and measurement of these data.

Both the lift Coefficient (Cl) and the drag Coefficient (Cd) directly represent the amount of force to either lift a wing up or resist its movement through the airstream. In each case, the total force generated depends on the wing area, velocity and air density. So it is convenient to represent these forces as coefficients that are independent of the local flying conditions and planform. These coefficients capture the

POTENTIAL performance of an airfoil. The true performance of a sailplane is dependent on these airfoil specific properties AND the planform and local flying environment.

$$\text{LIFT} = \text{Rho} \cdot V^2 \cdot S \cdot C_l / 2$$

$$\text{DRAG} = \text{Rho} \cdot V^2 \cdot S \cdot C_d / 2$$

where Rho is the local air density, V is the airspeed, S is the wing area and Cl, Cd are the lift and drag coefficients respectively.

There are several qualifiers to the above formulation. For details I'd look over Abbott VonDoenhoff pretty carefully. But with these practical definitions, let's look at

Figure 1: Airfoil Comparison

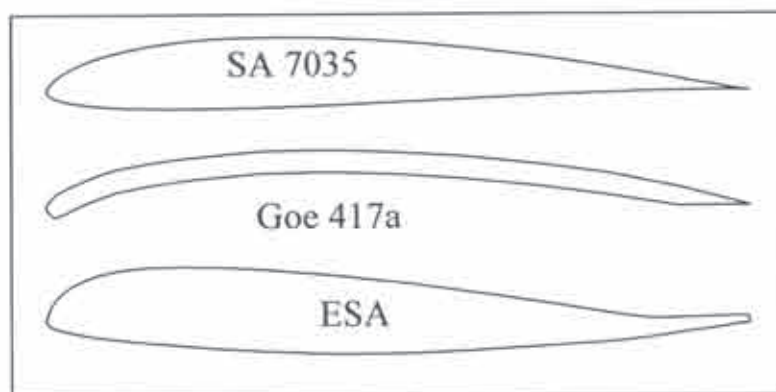
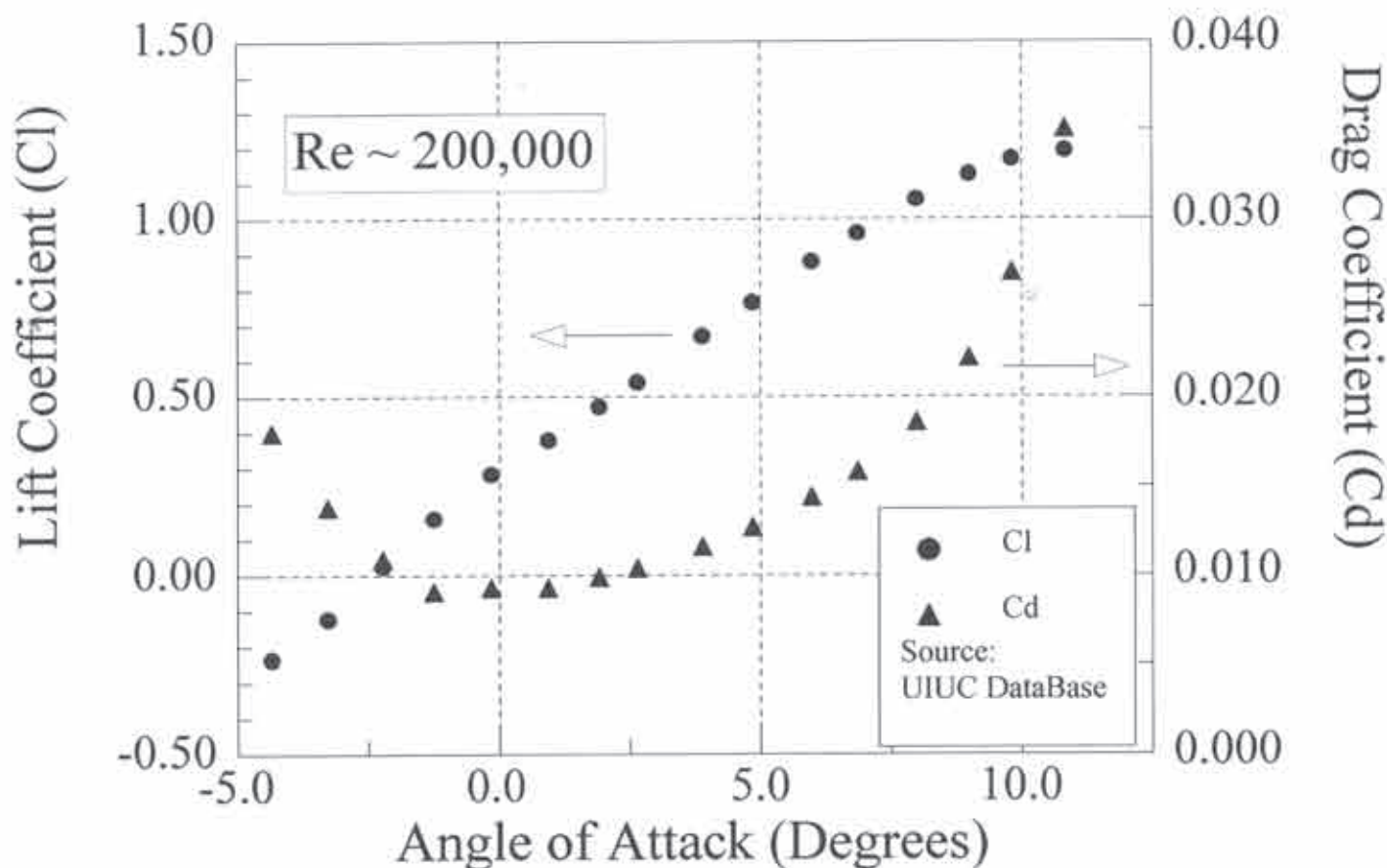


Figure 2: Lift and Drag Coefficients, SA 7035



the C_l and C_d coefficients.

C_l - this is universally known as the lift coefficient. For most well behaved airfoils, it has an essentially linear response to airfoil angle attack up to about 7 or 8 degrees. Beyond that point, the airflow over a wing begins to separate and the wing eventually stalls. Although the slope of the lift curve is generally constant (and approximately equal to the theoretical value $2\pi/\text{radian}$), the intercept changes as a function of airfoil design. Typically the largest effect on this intercept is the maximum height of the camber line and its location expressed as a percent of the chord length.

C_d - the drag Coefficient! Drag is a measure of the force which resists the movement of an airfoil through the air. Although we sometimes like to think of this as primarily responding to the overall thickness of the airfoil, that's not always the case.

In order for an airfoil to work properly, the air flow must remain attached over most of the contour. As the airflow detaches from the surface, drag typically increases. At modest speeds and airfoil sizes, the airflow stays attached over a reasonable range of angles of attack. At about the point where C_l starts to lose linearity, C_d starts to pick up. The reason for both of these effects is the onset of separation. At very low speeds, separation can sometimes occur at modest angles of attack. Controlling separation is

one of the major aims of low speed airfoil research.

For a quick look at how these coefficients respond to airfoil design, let's look at Figures 2 to 4 and Table 1. Figure 1 shows the outlines of three very different airfoils. Table 1 contains some values for the camber and thickness of these sections. Figure 2 shows lift and drag plots vs. angle of attack under reasonable flight speed conditions for the SA 7035 (Reynolds number $\sim 200,000$). Note that over a 7 or 8 degree range of angle of attack, C_l increases relatively linearly for all of these sections with the slope $\sim 2\pi/\text{radian}$. Over that same range, C_d changes quite a bit. For the SA 7035, it is relatively flat and has a minimum value of ~ 0.01 . Also note that as the lift coefficient rolls off, the drag coefficient increases rapidly.

I'll point out another feature of interest that I've found useful over the years. Note that the intercept of the lift curve is $C_l(0) \sim -0.26$ for the SA 7035. For many well-behaved airfoils, I've noticed that:

$$C_l(0) \sim 10 \times \text{Max Camber}$$

For the SA 7035, the max camber = 0.026 and the observed $C_l(0) \sim -0.26$.

Now let's look at a rather different Airfoil: the Goe 417a (Figure 1 and Figure 3). This section is not selected for its utility as a soaring airfoil, but it helps illustrate several important points.

As a first comment, notice that the slope of

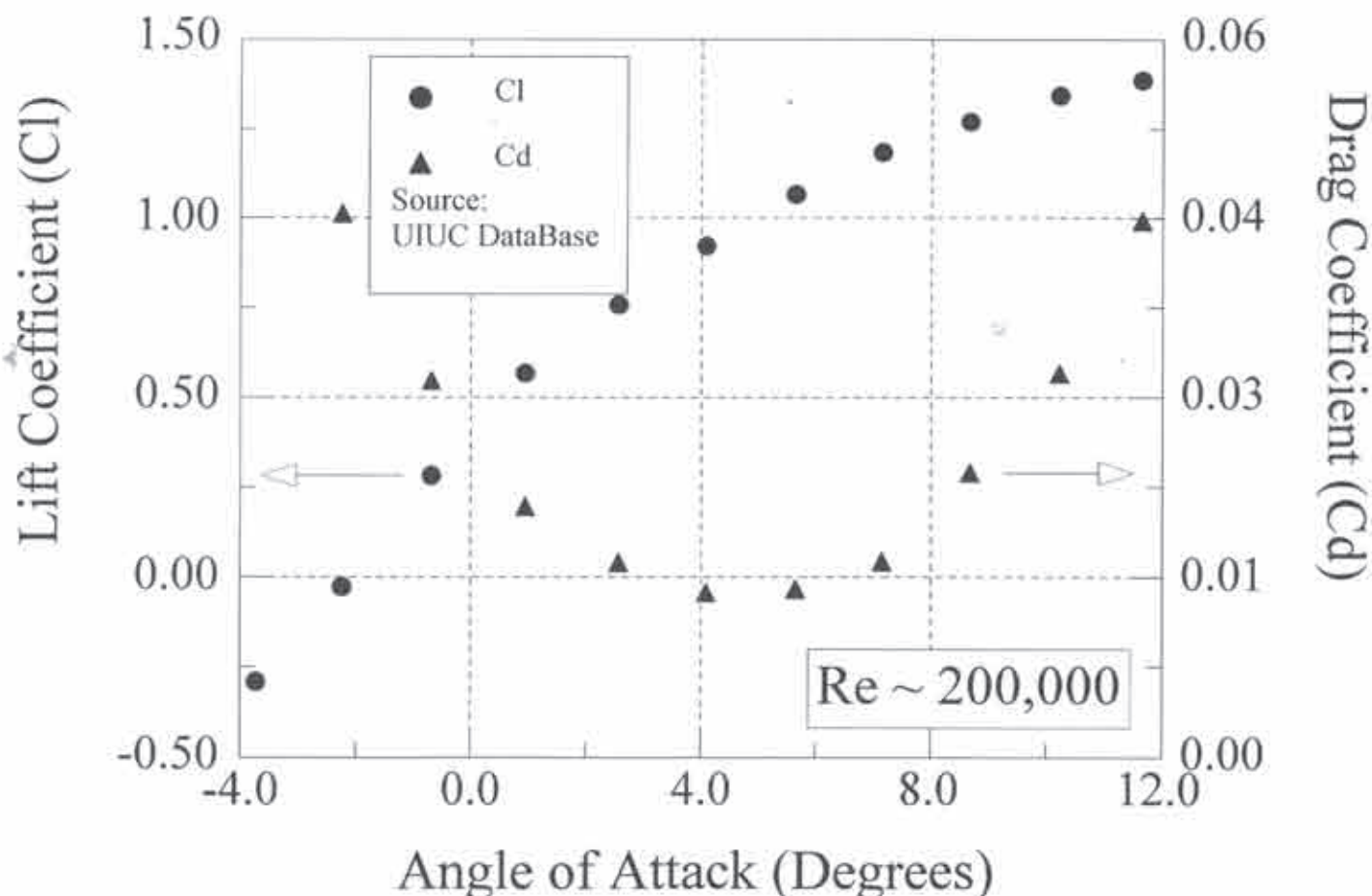
the lift curve is still roughly constant up to ~ 8 degrees and exhibits a slope near $2\pi/\text{radian}$. Also note that the maximum lift coefficient ~ 0.52 . This is consistent with ODROT (Old Dave's Rule Of Thumb) noted above.

But ponder for a minute that really lousy drag coefficient. At its lowest point it merely approaches the much thicker (by 3X) SA 7035. At the same time, the range of angle of attack over which low drag is achieved is unacceptably small. The width of this region is loosely called the "drag bucket" by many modelers. For the Goe 417a this should probably be termed a "drag funnel".

Before the guys in Gottingen get too upset, the Goe 417a was never intended for sailplane work but was designed as a turbine blade airfoil. Thus its performance was intended to maximize efficiency over a relatively small angle of attack range. So why use this example? Several reasons:

- The slope and intercept estimates for C_l are shown to be quite robust for very different approaches to the airfoil application,
- The drag coefficient is shown to be much more sensitive to airfoil design changes than simply thickness. In particular, the minimum drag achieved by the Goe 417a has no noticeable response to airfoil thickness as compared to the SA 7035.

Figure 3: Lift and Drag Coefficients, Goe 417a



The point about drag and thickness is a particular pet peeve for me. The "thin is low drag" argument crops up over the years and I have a hard time giving it a lot of credibility. I don't know how many times I've heard someone take a good performing 9% thick section and skinny it down to 7% and claims that it's "better".

So here was a case where a well-designed 9.2% Airfoil clearly beats a 3.2% thick section. Not all comparisons are this clear-cut but, if you're going to mess around with thinning, de-cambering, etc., then, to paraphrase Jerry McGuire, "Show me the DATA!"

The last one for this month is the moment coefficient. Although we tend to think of lift as a force acting at a single point, it's actually a distribution of forces acting over the entire surface of a wing. To get the total force, you add up the small contributions from all over the surface. Mathematically this can be done as an algebraic sum or, in the limit a very small steps around the wing, a surface integral. The definitions of C_l and C_d noted at the beginning of this column results from that approach.

What we've left out is the fact that the lift is distributed over the surface and thus each small contribution to the total lift is acting at some distance from the point where we start to add them up. This generates a twisting force (or torque) about that reference point. If we add up all the little torques generated by summing up (or integrating) over the wing surface, this

twisting force (torque) is called the pitching moment.

Let's express the total lift force as:

$$LIFT = \text{Sum (lift)}$$

where the sum is over the entire wing surface and (lift) is the local lifting force at each surface location. The pitching moment can then be thought of as:

$$\text{Pitching Moment} = \text{Sum (lift * distance)}$$

where (distance) is now the distance from a reference point to each point on the surface where the (lift) is generated.

With this picture in mind, the pitching moment can be expressed in the form of a coefficient just like C_l and C_d :

$$PM = \rho \cdot V^2 \cdot A \cdot C_m / 2$$

Now that we've got a working definition for the pitching moment, let's clarify this "reference point" that's been left somewhat vague. Since the pitching moment represents a torque, that twisting force will change depending on where we are on the wing. In addition, if you change the angle of attack you change the lift distribution and thus the torque as well.

To make this whole thing easier to deal with, engineers figured out that there was a place on the wing where the moment coefficient would be relatively constant for any angle of attack. This point is referred to as the aerodynamic center and for most wing sections is close to 25% of the chord.

Please keep in mind that the aerodynamic center is NOT the point where the lifting

force is concentrated. That's the center of pressure which we'll discuss next time. The aerodynamic center is the point at which C_m for the wing section is essentially independent of the angle of attack.

Next time we'll discuss how to use these coefficients to estimate trim and stability but for now let's think about a few things that affect C_m . Clearly, a large value for C_m means there's a lot of torque acting on the wing. This means that larger tail volume values are needed to stabilize a sailplane with a high pitching moment airfoil. It also means, as we'll see next time, a large center of pressure travel for a high C_m (pitch instability - this is also indicated by the negative sign usually associated with C_m).

We can imagine that a large lift coefficient for an airfoil could produce a large C_m . Generally this is true and we usually find a higher camber will increase C_m . If we compare the Goe 417a and the SA 7035 moment coefficients, we find this trend to be correct (Figure 5 - where we've stuck with the negative axis convention for C_m plots). The fact that C_m for the Goe 417a is not constant indicates either that the chosen location for the measurement (25% chord) is not the true aerodynamic center OR this section suffers from unusual flow separation problems.

One final comment this month - remember that the torque on the airfoil is a product of the lift distribution and the distance from the aerodynamic center. Normally we think

Figure 4: Lift and Drag Coefficients, ESA

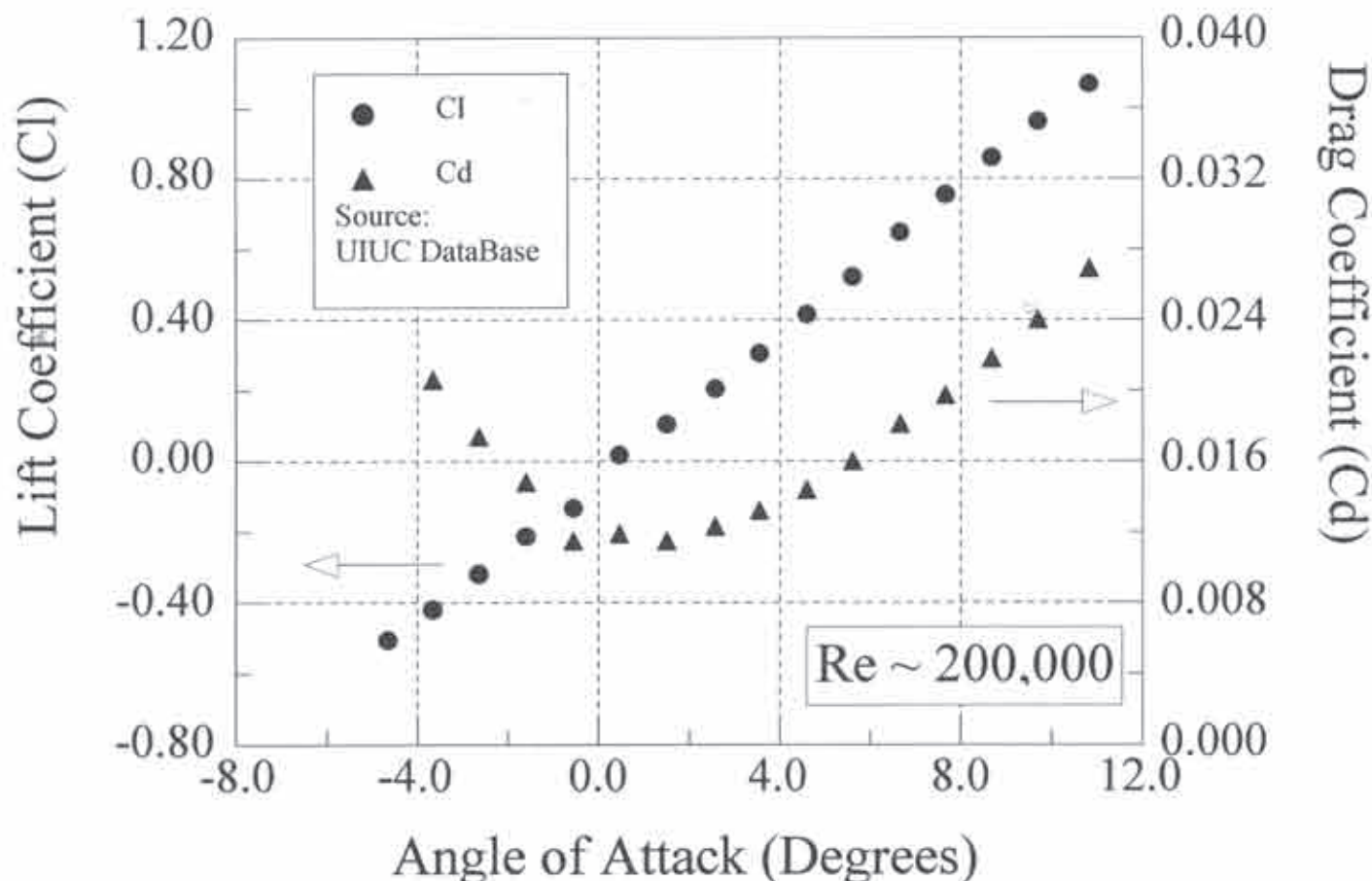
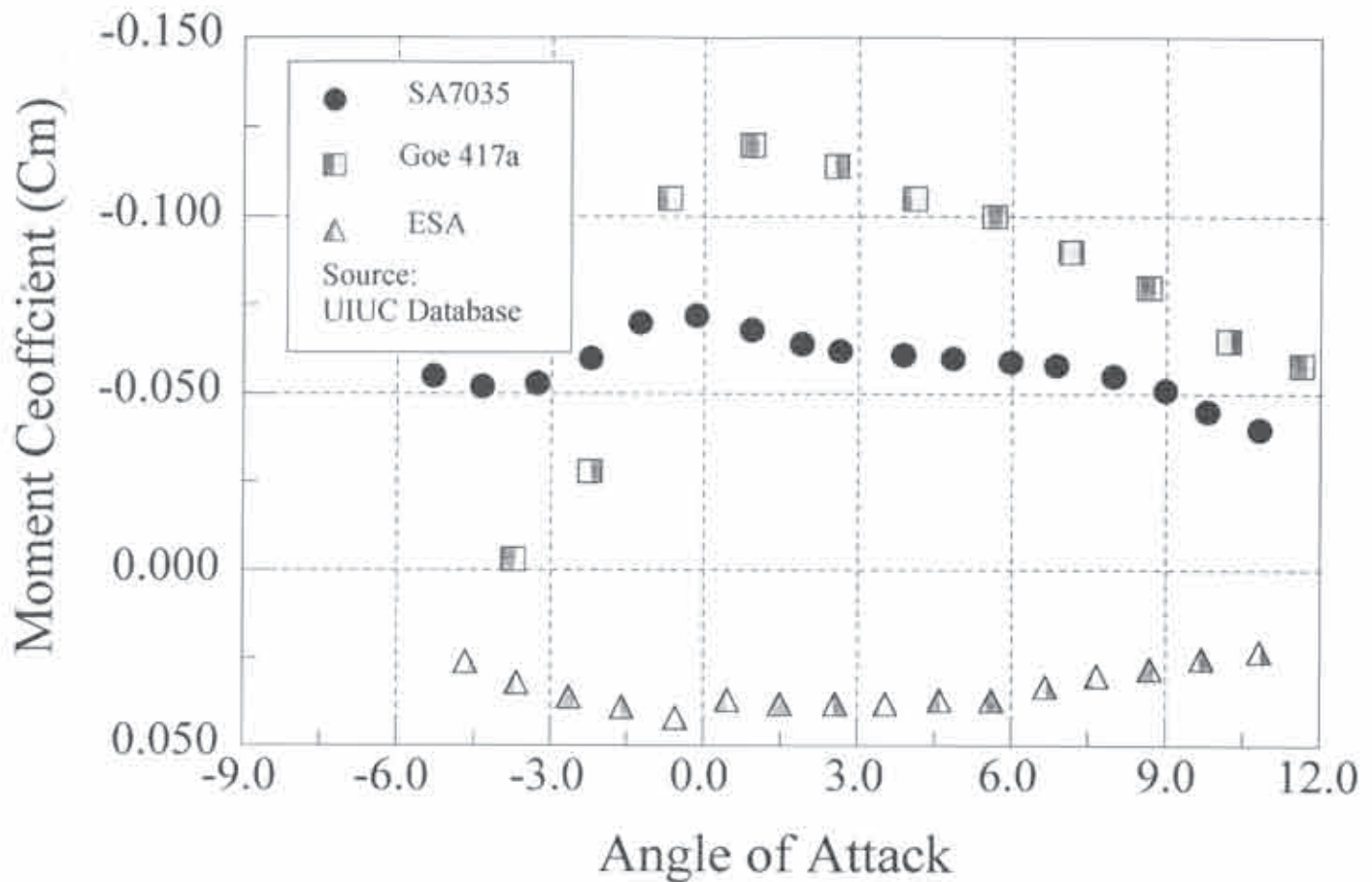


Figure 5: Moment Coefficients, SA 7035, Goe 417a, ESA



of lift as pointing "up" but what if some of it pointed "down"? What if we could put some "down" lift somewhere on the wing so that the TOTAL lift was "up" but the product of the "up" lift and its distance from the aerodynamic center was canceled by the product of the "down" lift and its distance from the aerodynamic center?

A way to do that would be to have a lot of camber near the center of the wing while reflexing the trailing edge. If we did this right, we could even reverse the sign of C_m and make the wing section pitch stable. An example of a section where this principle is put to work is also shown in the Figure 1 (ESA). This reflex Airfoil is from Bill Evan's Simitar series and is reported in UIUC, Volume 3.

Where would you use a high lift, pitch stable airfoil like this? Well, flip over a few pages and read the "On the Wing" column by Bill and Bunny Kuhlman. Pitch control in tail-less aircraft is a tough design challenge. Pitching moment control by selection of the lift distribution is one of the ways to handle this problem.

Okay. Now put all the theory stuff away for a while and go fly! Next time we'll figure out how to put this information to work.

Table 1: Summary Properties SA 7035, Goe 417a, ESA Airfoils

Airfoil	MaxCam	Position	MaxThick	Position	Cm	Cl(0)
SA 7035	0.0255	0.404	0.092	0.290	-0.062	0.56
Goe 417a	0.059	0.386	0.032	0.024	-0.104	0.56
ESA	0.020	0.125	0.1072	0.286	***	***

C_m and $Cl(0)$ calculated from camber line theory.

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We'll start off this column with a BIG thank you to Lee Murray for the interview and description that follows my opening comments here. Many of you may have seen the advertisements in other model magazines for Dymond Modelsport of Oshkosh, Wisconsin. Dymond Modelsport's advertising is heavy with interesting electric models and Lee's interview of the owner, Helmut Goestl, helps explain the strong interest in electrics. Having recently purchased a Fieseler Storch Park Flyer from Dymond Modelsports - more on this kit in next month's column - I was interested in what Helmut had to say. So, let's turn it over to Lee Murray!

Dymond Modelsport USA

by Lee Murray
Appleton, Wisconsin

The Silent Flight Group of the Valley Aero Modelers visited Dymond Modelsport USA in Oshkosh, Wisconsin recently. Dymond is a German based company with more than 25 years in business. It has stores in Austria, England, France, Italy and now the USA. I saw the largest collections of ARF Electric models and ARF sailplanes I have ever seen, or ever expect to see. Most of the models I saw were from Czech Republic and German manufacturers.

Although the company is big, when you give them a call you will find a human and not an electronic voice saying "push 1 for service". Dymond manufactures their own

speed controllers and has lots of props, motors, gear drives, batteries and radios at what seems to be very reasonable prices. The owner of the US store, Helmut Goestl, is very knowledgeable and has helped several of our members determine which models and power systems will be best for them. He has plans to provide on line information on his web page and in his advertisements as to what power systems are recommended for each electric model.

While in the store, I saw customers getting help with their power systems that didn't seem to be working well (problem related to installation details). The listing of products is very extensive. The table I prepared from their price list covers about half the inventory. Other items not covered in the table include smaller items such as hardware, covering, paints, radios, servos, etc.

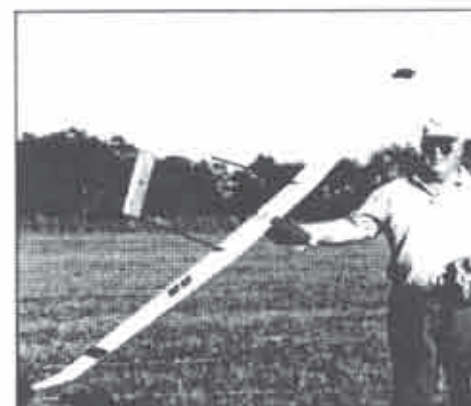
Quoting their web page www.rc-dymond.com:

"We specialize in Electric Flight, but also deal in Glow Engines from the time when noise was not a nuisance but a fun life style. With airfields closing down because of noise, we learned to stretch the limits of Electric Flying and it is loads of fun to hear the sizzling sound of an Electric "Hotliner" doing all kinds of aerobatics. We are aware that there is a lot of product out there and that is sometimes difficult to choose the right item. On paper they all look impressive."

"The ARF Airplanes are fully built up with iron-on covering professionally applied. Internal installations such as push rods and servo trays are already in place. Our PLUG & PLAY sign on the airplanes mean that only basic assembly without sanding or gluing is required."



Helmut Goestl, Dymond & Dymond store front.



DYMOND PRODUCTS

Classification	#	Price Range	
		Minimum	Maximum
Young Eagles Projects	11	\$2.00	\$40.00
Slow Flyers - Park Flyers	8	\$64.00	\$84.00
Electric Gliders	16	\$109.00	\$219.00
"Fast, Aerobatic, Elec. Gliders"	4	\$190.00	\$300.00
Hand Launch Gliders	4	\$190.00	\$170.00
Thermal High Perf. Gliders	8	\$130.00	\$250.00
Scale Gliders	10	\$150.00	\$1000.00
Pylon Racers	3	\$190.00	\$230.00
Delta Planforms	7	\$70.00	\$160.00
Electric Sport Scale	10	\$100.00	\$100.00
Specialty Electric Kits	15	\$99.00	\$250.00
Gas Powered ARF/ARC	15	\$99.00	\$250.00
Large Scale Gas Power	8	\$200.00	\$490.00
Extreme & 3D Airplane	5	\$99.00	\$290.00
Helicopters	3	\$199.00	\$230.00
Total:	127		
Can Ferrite Motors	13	\$10.00	\$40.00
Can Motor & Propeller Sets	3	\$16.00	\$20.00
Cobalt Samarium Motors	6	\$70.00	\$280.00
Brushless Motors	12	\$180.00	\$500.00
Geared Electric Motors	14	\$25.00	\$120.00
Geardrives w/ Motor & Prop	9	\$17.00	\$50.00
Total:	57		
"Propellers, Total Number"	98		

DYMOND devotes countless hours to test flying and modifications. This is necessary to develop models which fly as well as they look. Airfoils, incidence and geometry have to be changed over and over, then put together into a sturdy and appealing airframe. DYMOND takes pride in finding new approaches for ease of assembly, frequently creating new ideas in the industry.

"DYMOND has in-house service and spare parts for most airplanes. Our service department will give their best advice and help to get you back in the sky as fast as possible. Even custom made solutions are possible, but may need a little extra time."

One of the members of our group recently purchased a high performance 1.7 M electric ARF sailplane from Dymond. It's called the "Last Down Electric". He installed a geared Astroflight 02 brushless motor in it and flies it with 500 ma batteries. I saw it climb out at ~40 deg (it was at altitude in thirty seconds) and fly for over 20 minutes. I had the opportunity to fly this model recently and a couple of thoughts ran through my mind as I guided it about the sky. *It flies like a hand-launch glider, only better, and it stays "in the groove". I'm impressed!*

Dymond Modelsport, USA moved from Park Falls, Wisconsin to Oshkosh about a year ago for a bigger walk-in market. When you check out the web page you might see some reference to their former location.

Dymond Modelsport USA Ltd.
683 N. Main St.
Oshkosh, WI 54901
(920) 303-1100

I envy Lee's easy access to Dymond's shop in Oshkosh! Mark.

EISS SEPTEMBER SOARING/ELECTRIC CONTEST

This past September, my better half, Cheryl, and I took a long weekend trip to Iowa and visited the Iowa Aviation Museum in Greenfield, Iowa. I'm interested in doing a model of the Curtis Robin and they have the 3rd Robin ever built on display there, as well as a number of other interesting aircraft. The curator is Lee Ann and she was very friendly and allowed me access to the space around the Robin for photos. If you're ever near Greenfield (look at a map!), be sure to take the time and stop in.

From Greenfield, we headed over to the Eastern Iowa Soaring Society contest near Blakesburg, Iowa. The EISS holds a very good contest every September on the flying field for the Airpower Museum. The Airpower Museum has a wide variety of civilian aircraft on display or even flying. A beautiful blue and cream colored Interstate Cadet was flying around the field when we arrived on site. On Saturday, the EISS included an All Up Last Down (AULD) event to help round out the day's contest flying. Two models in particular captured my interest and are worth taking a look at. Paul Haley flew the largest model in AULD. It was a Weston Designs inspired model with a 16 foot span which used a WA001 airfoil. With an average wing chord of only 8.5 inches, the aspect ratio was

high! Weighing in at 9.75 pounds, Paul's model used an Aveox F27LMR brushless motor and 18 - 3000mah NiMH cells. A very graceful model in the air, with the wings lightly flapping in the thermals and turbulence, Paul's model finished a very credible 2nd just behind the winner, Jim Porter. Jim's model is a scratch built one as well and is loosely based on the SunRiser, a German duration model design. This model has a pod and twin boom arrangement with an inverted V-Tail for pitch and roll control - an efficient layout for this type of model. Jim took the small motor/large gearing approach to powering his model and had an AstroFlight 020 brushless motor connected to AstroFlight's SuperGear box, turning a Graupner 11"x8"

CAM folder. Jim's model spanned 100 inches, weighs in at 3.31 pounds, and uses 2 packs of 8 - Sanyo 1700AUL nicads wired in parallel. Jim could use both packs for climb out and then use a single pack at a time to extend the model's duration. Both models flew very well and made the most out of some pretty tough air.

That's it for this month's column. Next time around we'll take a detailed look at the Fieseler Storch Park Flyer available from Dymond Modelsport and take a first look at HobbyFlite's electric flying wing. 'Til then, go fly or get to building!



2000 MONTAGUE CROSS COUNTRY CHALLENGE

Location -	Siskiyou County Airport, Montague, CA
Date -	June 9 th - Practice and LSF Task Days June 10 th & 11 th - Contest Days
Time -	Pilots meeting at 9am, flying begins at 10am
Task -	Saturday - Free Distance within a prescribed course Sunday - Speed Task, 2 hour minimum, 3 hour maximum
Classes -	Open, Electric, Sailair
Rules -	All sailplane pilots must be AMA members. The team will decide who and how long each pilot flies the sailplane. Sailplanes must be winch launched. There will be unlimited attempts allowed, no relauching on course. Each sailplane must be identified with the last 3 numbers of the team captain's AMA number. The numbers must be 3" high and placed both sides of the vertical fin.
Prizes -	Plaques will be given to 3 members of the top 3 finishing teams in each class.
Entering -	Entry fee is \$65 per team, each team will receive 3 event T-Shirts, and 3 tickets to a Saturday night BBQ. All entries must be received by May 9 th , 2000. There will be a limit of 20 teams, so don't delay.
Lodging -	Camping is available on-site, no services available. Motels are available in Yreka, approximately 12 miles away.
Info -	For additional info please call Dean, Scott, or Randy at (541)899-8215 days, or Dean (541)899-7034 evenings, or e-mail us at dgair@edsnet.net



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

Fun Flying Little Electrics!

This fall I really had a great time flying my little electric park/slow flyers. I had many enjoyable hours flying these delightful little airplanes right in the middle of town! Weather permitting, and whenever I could, I would zip out to the local school yard or park and have a flight.

You Can Fly Them Almost Anywhere!

A huge advantage of these tiny, unobtrusive powered R/C models, is the fact that they look quite unobtrusive and nobody will complain where you fly them. They make no noise at all and people who've never seen an R/C airplane really enjoy watching them fly! I also noticed that whenever a kid sees one, the reaction invariably is, "I what one!"

An Easy way to get into RC!

Everywhere I went, I met new enthusiastic folks. Without really trying to, three or four new R/C pilots have joined the ranks! It seems that the accessibility and the ease with which these little airplanes fly really gets people interested! Perhaps the slow/park flyers might be the best way to get new folks into flying R/C aircraft.

The "Snowball" Effect

The future of our hobby lies in the hands of our youngsters. Given the limited experience I've had with slow fliers, I get the very strong impression that this area of our wonderful hobby will grow very fast in the next few years. And in just a few months of pure enjoyment of these delightful little aircraft, I have begun to notice a "snowball" effect. What I mean by this is that the couple of people I've gotten into R/C through the slow fliers, have also introduced others to this wonderful world of miniature aircraft, as one flight generally leads to another and I have no doubt that some of these folks will go on to fly gliders and larger powered aircraft.

Quick and Easy Lessons

I can go out, give a lesson and be home in less than an hour. Perhaps best of all, kids seem to like how these electrics look and fly. It's easy to get the little folks involved. There's no big, scary motor up front you have to fuel and start. No rigging, no cleaning messy fuel, no scary prop to avoid, no noise and perhaps best of all, you don't have to spend hours to get a flight in... Just park and fly!



Aero-Tow Experience

Mark Foster
Southern California

After many years of flying my scale models, mostly on the slopes of Southern California, aero-towing has become a solid part of my favorite pastime. Yes, it's hard to beat a steady 6 mph westerly breeze at Torrey Pines, capable of sustaining any size model almost indefinitely... Actually, the intention I have for aero-towing is not to surpass what I'm already enjoying on the slope. Rather, I'd like to supplement a good time with more good times.

Over the last several years, I would aero-tow a few times a year, treating the activity more like a novelty... Now, with the recent acquisition of a stellar tow plane (John Derstine's Flybaby), I'm looking at the months starting from October and moving into spring as aero-tow season.

One of the most important items for aero-towing simply is the tow plane. Obvious, huh? There's been a lot of talk (reference articles by Robin in RCSD, etc.) about tow plane capacity and function, and I would not know how to challenge or support the conventional wisdom. My knowledge of power might fill a thimble. Laudatory comments have to go out to John Derstine and Robin Lehman for spending time figuring out what kind of powered aircraft will pull my favorite soaring machines to altitude. All that said, it's important to make sure your tow plane can pull up your fleet of sailplanes and that means, for me, towing models that weigh mostly between 18 and 25 lb. Tow planes that



are sweating and breathing heavy don't make for a very pretty sight.

Secondly, on the tow plane importance list for me, and I know this doesn't apply to a lot of people, I prefer to enjoy the appearance of the tow plane. Great Grand Dad's Ugly Stick might do the trick. However, I'm a scale enthusiast and I want to visually enjoy the towing experience. Watching the Flybaby pull up my big ships (Lately, I've been towing my 1/3 Schueeler ASH-26, a perfect combo with the Flybaby.) is a real treat in scale replication.

Lastly, I would like to compliment the ISSA (International Scale Soaring Association) for increasing aerotowing in the Southern California area. The ISSA event venue features aerotowing as its primary method of launch at most of its activities. As demonstrated by the excellent turnout at the Victorville event just last month, aerotowing is firmly embedded into big scale soaring throughout the region.

Getting the Kids into it!

Just a few outings in the local school yard have caused quite a stir! Every time I go out to fly, I get a very interested and enthusiastic audience. I have no doubt that I won't be the only one flying in the school yard next spring!

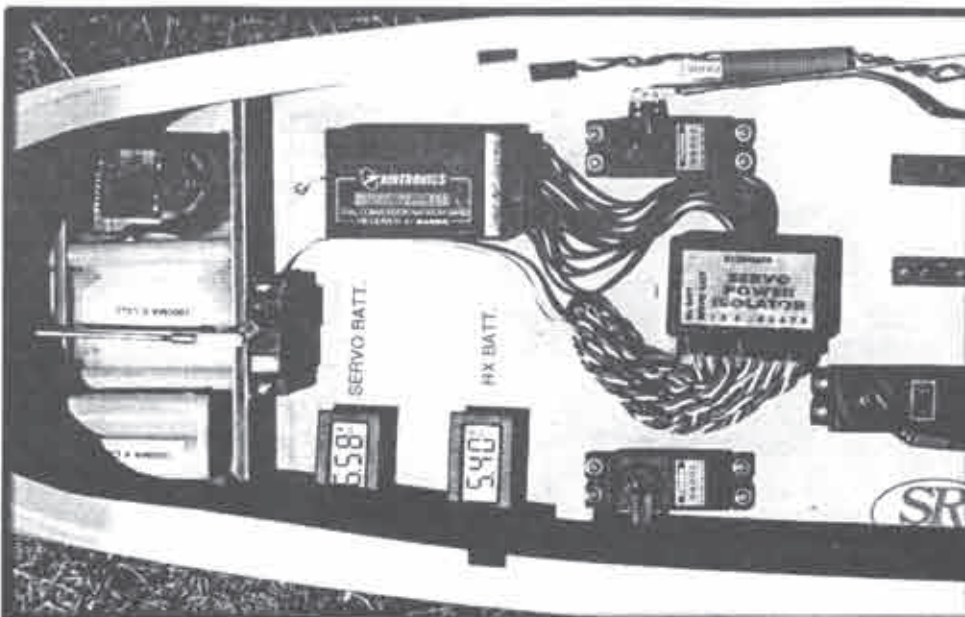
Quick and Easy

Another benefit of these little aircraft, is that they can be put together in an evening or two and don't require any special building skills. This has huge benefits for those with small attention spans. In but a couple of hours, a little electric can hatch

from box to completed, ready-to-go slow flyer!

Everyone Likes Them!

I've also noticed, that when someone flies one of these little delights at a scale fly-in, invariably several pilots go and buy themselves one to fly at home. These other pilots with their new electrics will also fly them in parking lots, school yards and parks, and will in turn interest still other new folks... And so on. It's a real affection infection! In a year or two, look for these little silent purring birds to be airborne everywhere all over the country!



Ventus 2c Radio Set-Up

by Hans Wiederkehr

My Ventus 2c has two voltmeters inside. I use one to monitor my 2800/5 cell servo pack and the other to monitor my 1000ma Rx pack. With this configuration, I can fly for over 6 hours with confidence. My reason for buying them was two fold. I did not want my 25 lb. sailplane to come crashing down and hurt anyone because of an undetected bad cell, and I did not want to spend so much money without incorporating these safety devices. I also make a servo isolator which is also in my sailplane. This device enables me to separate the

servo pack from the Rx pack.

Advantages?

- 1) You can use a huge 5 cell pack for all your servos without worrying about burning up the Rx (most Rxs are rated for 6 volts). 5 cell packs = faster response time and greater power in your servos.
- 2) The isolator eliminates all stray RF interference by separating the amps running through the long servo leads at you Rx.
- 3) Eliminates the need for two Rxs. I run 14 servos flawlessly with this device.



Hard-Core Scale Buffs Are Not Immune

I've noticed a new trend with many hard-core scale enthusiasts I fly with. At the end of the day, out come the electrics for a relaxing flight or two. These little birds are so different then what we fly most of the time, that the one compliments the other.

Look For Prices to Drop!

The biggest and only drawback that I can see, is that right now Park/Slow Flyers are quite expensive. When you add up the price of the airplane, the BEC (motor/battery controller), electric motor, geared drive, propeller, charger, and radio, you're talking between \$250 to \$300 investment to get airborne. As the movement catches on, look for the prices to drop! He who sells the cheapest and best, will sell the most and so perhaps in a year or two, we will be able to get airborne with a little electric slow flyer for as little as \$100.

Thermal-Catching lessons!

The other day when I was out flying one of these little birds, I had the throttle set so that it was flying a foot or two off the ground. While doing this, I noticed there was a little bit of lift in one very small area of the field. I circle around that spot without giving any more throttle. Guess what? Up I went, catching the lightest of lift, the beginnings of a thermal! As you

might expect, as I got higher, the lift got stronger. It occurred to me that these little aircraft might be a great learning tool for those of us who wish to catch thermals near the ground. They will be a great tool for learning how to "read" the lift for hand-launched gliders.

Tools For Hand-Launch Competition

Hand-launched gliders catch the lowest thermals all, and if you wish to practice trying to spot a thermal, one of these little electrics is a super way to "sniff around" to see where a thermal might be starting. Using little electric RC airplane as a learning tool, you contest guys out there will really be able to hone your skills!

Light Air Slope Soaring

We've all experienced that trip to the local hill when the wind didn't quite cooperate. It was an absolutely superb day in every other way, but the wind was so light you didn't dare fly. The electric slow flyer will stay up in the lightest of lift, and best of all when the lift dies, the motor will bring you home! The slow flyer will be just the thing to bring along in the car just in case you run into one of these beautiful but marginal slope days.

Electrics Save the Slope Day!

On the same subject, I had the pleasure of visiting Wasserkuppe in Germany this last

summer, on just such a light air day. It was an absolutely superb blue sky day with very light and fickle winds. The result was that glider after glider were tossed off the hill whenever a breath of favorable air came by. Almost all of these had to land down below on the "Sugarfeld". The Sugarfeld is a nice landing spot perhaps a mile away and 600 feet lower, were you can land if you must. Landing down below is bad for the ego. It's really not the thing to do, and is to be avoided if at all possible. An immediate consequence is that you'll lose your precious parking place, when you drive your car down to retrieve your glider.

It's a Sweet Spot!

The Sugarfeld does give pilots the opportunity to search for a thermal for five to ten minutes before they must land down below. Without this very precious landing spot, the Wasserkuppe would be a very gutsy place to fly on marginal days. I heard lots of explanations as to how the name "Sugarfeld" originated, but it seemed to me that the "Sugarfeld" really got its name because it's a real sweet spot to land if you don't catch a thermal and stay up!

An Electric Motor Really Helps!

Back to the subject at hand, I couldn't help but notice that those with electric motors up front flew whenever they wanted, while those with "pure" sailplanes, either were extremely lucky or suffered the indignity of the landing down below. Obviously, those pilots with electrics had the opportunity to learn more about the fickle winds. They often flew their gliders way below the hill. Some of the time they could coax the airplane back up to the top without using power. If they got in trouble however - no problem! On went the electric motor and up came the glider. No sweat!

Some of these birds were scale and had the electric motor up front, while others flew with an "up and go". Either way they got in a lot of flying while the rest of us sat around watching...

For those of you who slope, a bit of extra electric power sure can't hurt! Waiting around all day in vain for the wind to materialize certainly gave the rest of us itchy fingers. Those with a motor flew whenever they wanted, while the rest of us waited, waited and waited....

This one experience sold me on electrics for slope soaring forever!

New Friends, New Adventures

My recent adventures with electrics have opened up for me a whole new universe of R/C flying. Electrics have led me in many new directions. Who said an old dog can't learn new tricks? "Wuff, wuff, grrrrrrr..."

I've found pure fun with my park flyers and slow flyers! I can get my "flying fix" in and spend only half an hour doing it! But these little birds have also introduced me to much, much more! They've taught me a thing or two about thermals. They'll also save the day on the slope! But perhaps most important of all, the slow flyers and park flyers just might be the best and most practical way yet to introduce new folks to our wonderful world of R/C aircraft!



HAVE SAILPLANE, WILL TRAVEL!

Tom H. Nagel
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This column is dedicated to soaring vacations. This month, we'll take a look at a cool web site where the wandering sailplane enthusiast can find some excellent maps of potential soaring locations they can drool over.

TopoZone.Com A New Resource for Slope Soaring and More

In early January, just after the Y2K bug fizzled on the millennial bug zapper, a sailplane flyer by the name of Scobie Puchler posted an article on the Radio Controlled Sailplane Exchange about a new web site that makes US Geological Survey topographic maps available on the internet. That site is TopoZone.Com, owned by Maps Ala Carte, Inc. of Groton, Massachusetts. It is run by Bill Everett, President and CEO, and Ed McNierney, founder and chief mapmaker. Shortly after its launch, TopoZone.com was named the #1 Geography Site on the web. It deserves the distinction.

Up until now, topographic map information was not readily available on the net. I know. I just about wore out AltaVista looking for it. And suddenly it was all there!

There have been road-mapping sites available on the web for some time, and they can be very useful in finding your way to unfamiliar flying sites. Some of the ones I have used are Map Quest and About.Com. These sites show landmarks, roads and political boundaries, as well as waterways — but not surface relief. They don't show slopes.

Microsoft Corporation put up TerraServer.Com, a giant database of aerial and satellite photos. Terra Server is fun, if you have a fast internet connection, but it has its problems. The coverage is spotty, even in North America. The search interface as you move from maps to photos does not give you many useful landmarks, making it hard to tell where to click. The image captions are cryptic in many cases. Because the database is so enormous, Terra Server is slow. Plus it does not show contour lines, route numbers or place names. You have to infer slopes from the

photographic shading, and compare the aerial photos to maps to figure out what you are looking at.

TopoZone.Com, on the other hand, has coverage of the entire United States (except for Alaska and they are working on that) and a slick, text based search interface. It is fast and free and easy to use, for those of us with Windows 95 or Windows 98 and Netscape 4.08 or better as a browser. And the end product is a USGS Topo Map on your computer screen.

One of TopoZone's limitations is a bug in Microsoft Internet Explorer that may, in some cases, keep it from printing maps. Netscape users will be able to print maps just fine, and a fix for the Internet Explorer bug is in the works. I was able to print topos in black and white from a system running Windows 98, MS Internet Explorer and a HP Laserjet 1100 printer.

Here is the compatibility level TopoZone requires: Netscape version 4.05 or above on anything BUT Windows 3.1; Netscape 4.51 or above on Windows 3.1; Internet Explorer 4.01 or above except on the Macintosh.

To search TopoZone, simply type in a place name. This can be a city, a landmark, a mountain or a bay, or even something obscure like "The Lump", a slope flying site along the Blue Ridge Parkway. At your prompt, TopoZone displays a list of results: all of the places it knows of where your search term appears. I used Newark as a test. Our Central Ohio group flies at a little slope in downtown Newark, on Buena Vista Street. I typed in "Newark" and got a list of twenty Newarks to choose from in New Jersey, Newark, Ohio, Iowa, and even a Newark, California. Who would have thought it? Each listing contains the state, county, elevation, name of USGS quadrangle map, latitude and longitude.

I hit the prompt for Newark, Ohio and quickly got a topo map in the default scale of 1:100,000 imaged in the default size (small, which is little less than my screen size). Users have the choice of three different map sizes and four different scales: 1:25,000, 1:50,000, 1:100,000 and 1:200,000. You will notice that each scale is twice that of the next smaller one. At the smaller scale of 1:24,000 individual buildings are shown in less built up areas. At the Newark, Ohio site called Buena Vista, I could see, basically, a road map and hints of the small slope. At 1:50,000 the slope was clearly visible, and the road map had a lot more detail. And at 1:25,000 scale, individual houses along Buena Vista Street were indicated, and ten foot contour lines could be counted on the slope. I was able to determine once and for all that all of us macho Ohio slope dudes were working with a maximum of sixty feet of slope height at Buena Vista.

From there, I quickly checked out some of my other favorite places: Dean's Farm at Malvern, Ohio: 140 feet of slope height. Sleeping Bear Dunes in Michigan was just a couple of clicks away. I zoomed out to Sentinel Butte North Dakota, to see what Al Nephew was raving about. The Lump in



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NEWARK 1:100,000



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Click anywhere on the map to recenter the map on that point.

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NEWARK, OHIO 1:25,000

North Carolina was a gimme.

And then I was off to look at topos of some farms where I go deer hunting. And the cottage at Lake Erie. And Gordy's back yard. Then one of my law partners had me looking for drainage patterns for agricultural runoff, for an environmental law case he is working on. I lost most of the rest of the day wandering around in the TopoZone.

If you are a sloper, or a hunter, or a river canoeist, or a back packer, or any of a hundred other things, you will find a use for TopoZone. You can settle arguments about how much slope you have to work with. You can print a map to give directions to new visitors. You can scout vast areas for likely slope flying sites. You can print off nice graphics for your magazine articles. Somebody should collect on one web site the 1:25,000 scale topos of all the slope sites we talk about in RCSDigest and on the RCSEExchange. Maybe somebody can even find a place do some slope racing near Muncie. (But I doubt it.)

Enjoy this fast, friendly, functional, environmentally conscious and socially responsible web site! And remember to recycle your electrons!

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

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LSF Level 5 Achievement

by Edwin Wilson
Louisville, Kentucky

In the last Louisville Area Soaring Society (LASS) newsletter, I wrote about my failed attempt to complete my last LSF task, a non-stop eight-hour flight. It was my story about how after 6 hours and 15 minutes, into my 8-hour flight at Brookville Dam, the receiver in the plane chose that moment to die and the Paragon wound up in the lake. That same weekend six other pilots did complete their 8-hour flights at Brookville Dam. Rob Glover from Alabama was one of those pilots. Rob completed his eight-hour flight to finish all his Level 5 requirements, and thus became the 100th person in the world to complete the required task needed to achieve Level 5 status.

I was disappointed I did not complete my

8-hour flight in October, but I took solace it was not something I did, but rather a mechanical problem. After 18 years waiting to complete my Level 5 task, I found I was more determined than ever before to complete this one task. I always knew I could do it. I just needed the right combination of weather and witnesses. With new determination, I started a daily relationship with the Weather Channel. Meantime I pulled out my 18-year-old Sagitta 1100 to prepare it for another attempt. I just hoped the weather would cooperate and give me another chance before the end of the year.

Ironically, this Sagitta was scratch built during the winter of 81-82. This is the same year I completed all the requirements for Level 5 status with the exception of the eight-hour slope flight. Most of my Level 5 contest wins were done with this plane. Michael, my son, has used this same plane to win Mid-South and Nat's trophies. More recently, I brought it out of semi retirement in time to fly it at the 99 Nat's, where I placed third in three-function class.

The week of November 15 started out with a large weather high sitting in the great planes, but what caught my interest was an even larger high right behind it. I watched the isobars between the two highs compact together and they were projected to move directly to the east. The weather was going to give me the opportunity I needed. Now I had to try and figure out what day it would pass through our area. By Wednesday I was pretty sure my window of weather opportunity was going to be on Friday, only. Rats! A work day. Could I find witnesses?

I had been foiled years earlier when I could not get enough qualified witnesses to legalize an eight-hour attempt. I got nervous thinking this might happen again. After several fruitless phone calls and e-mails, I finally got in touch with Don Harris who lives near Columbus, Ohio. I

have known Don for many years now, and he is one of only two people to complete the entire LSF task requirements, TWICE! Don said he would be glad to be a witness and would make some phone calls to see if he could find a second person to be a witness. An hour later I was set as Don had found another witness and they would meet me at the Brookville MacDonalds Friday morning.

On the road at 5:00 AM, I met Don and Bruce Herder from Dayton, Ohio at MacDonalds. Arriving at the dam a little later I wondered, "Where was the predicted wind that had been forecast?" I went ahead and began assembling the Sagitta. By 8:15, I was ready to launch. There still was not enough wind, but I launched to check the trim both in the plane and in my stomach. Down the dam face and back it flew, only to land near the launch spot. This was repeated again. Where's the wind?

A few minutes later, I finally felt a small puff of wind and launched again. This time the Sagitta went down the dam and returned with no loss of altitude. We turned and did it again, and again, and again. The plane was flying at eye level and it wouldn't go any higher. I trimmed the plane for minimum sink and milked every puff of air I could get. A half-hour passed and the wind picked up slightly. I was doing a little better, but the wind dropped off every once in a while. I could not relax. I only had so much daylight to finish in. It was already too late to land and start over; darkness would catch me before I could finish. This is it. Do it or else.

An hour later the Sagitta is now trimmed to best LD and not minimum sink mode. The



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5TH ANNUAL

G.N.A.T.S. AEROTOW 2000

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July 29-30, 2000

To be held in Central Niagara Peninsula,
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(Approx. 30 Miles West of Buffalo/Ft. Erie)

Co-sponsor: Canadian Model Aerotow Society
Emphasis will be on fun and aerotowing.
Tow planes and experienced pilots will be available to tow you to altitude. Bring your 3 meter (118") or larger sailplanes, fitted w/ ailerons and tow release, and join the fast growing aerotow movement. Scale Motorgliders will be welcome at this event as will non-scale large sailplanes fitted with tow releases.

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For information package & map contact:

Phil Landray, (905) 468-3923
Linden@niagara.com
Gerry Knight, (905) 934-7451
Lou Kleiman, (905) 688-4092
Mistral@niagara.com




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Association**

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Mississippi Valley Soaring Association
Proudly Hosts the
Gateway Soaring Open 2000

May 6th and 7th, 2000
Emerald View Sod Farm
O'Fallon Missouri

The Mississippi Valley Soaring Association invites you to join us for the Gateway Soaring Open 2000 contest on our beautiful home field just west of St. Louis, Missouri.

This year's event will include a 3 Function Class flown to the rules established by the League of Silent Flight (LSF). Each round flown will be within a time window (typically one (1) hour, but adjusted to the number of entries) which will allow everyone to fly in two classes if they wish.

Each day will be a separate, sanctioned contest which can be applied to your LSF requirements. There will also be trophies and prizes for the overall weekend combined scores in each class.

Entries for the event will be limited to 50 per class with a maximum of 4 entries per transmitter frequency. It would be very helpful if you would pre-register for the event. Registration will be allowed at the field but may be limited due to the 50 entry limit or assigned frequencies being filled. Should you have any questions regarding the event, please don't hesitate to contact:

Mark Nankivil
314/781-9175, nankmcc@QuixNet.net
or
Alden Shipp
217/223-3052, alden@adams.net

A Registration Packet containing a site map and hotel information will be mailed to you as confirmation that we have received your registration form and payment of entry fees. There are a number of hotels available in the immediate area from which to choose. Practice/Sport Flying will be available at the field on Friday for those of you who arrive early. Food will again be available on site thanks to the Boy Scouts, as well as other fast food options within just a few minutes of the field, so you won't starve!

Please pass the word on to others who have not attended previous contests and for those of you who have attended in the past, we look forward to seeing you again. It's fun to fly with friends!

Good Health and Good Lift!!

Bob Keeler, MVSA President
Alden Shipp, Contest Director
Mark Nankivil, Event Coordinator

Highlander EPP

Wing Span: 78"
Wing Area: 590 sq. in.
Airfoil: 507037
Weight: 34-39 oz.
Length: 42 in.
Radio: 2 Channel
Hardware Included

It's an EPP construction and proven balsa wood spar setup make this plane virtually indestructible. This is the ideal setup for a trainer sailplane as well as satisfying even the most seasoned pilot.

\$74.99 plus \$7.00 shipping
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Mid-South Soaring Championships Update
MSSC Hotel Information

from Ed Wilson
(502) 239-3150
ewilson1@bellsouth.net

This is the second time LASS is to host a major contest. With all the work that goes into organizing an event the size of the Mid-South Soaring Championships, nothing has been harder to get tied down than a place for all the contestants to stay. There are plenty of hotels within 10-minute drive of the flying site. But I have refused to ask people to pay \$90 or more dollars a night to stay in these hotels. Last time the Wilson Inn provided some reasonable rates, but it has since been bought out and renovated into luxury suites.

We thought we had a perfect place with a brand new hotel being built, but just this last week we were informed they wanted only weekly renters.


With this in mind we have moved the event headquarters an additional two miles east on I-64. Use the following

information to make your reservations. I suggest you don't delay.

Best Western Hotel
1301 Kentucky Mills Rd.
(I-64 at Blankenbaker Exit (#17) - behind Sam's Warehouse)
Louisville, KY 40299
502-267-8100
1-800-528-1234
Must use code words "MSSC 2000".
Rates are \$67 + tax
Includes breakfast.
In room coffee, microwave.
Children 17 and younger stay free with parents.
Ask for AARP and AAA discounts.

Extended StayAmerica has a few rooms and are located across the street from the old Wilson Inn at 9801 Bunsen Way. Their studio rooms are \$66.30 a night. Call them direct at 1-502-499-6215 or 1-800-398-7829.

For everything you need to know about contest quality hand launch and two meter sailplanes



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VISA

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Good Health and Good Lift!!

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 Alden Shipp, Contest Director
 Mark Nankivil, Event Coordinator

Gateway Soaring Open 2000

May 6th and 7th, 2000
Emerald View Sod Farm
O'Fallon Missouri

Pilot's Meeting at 9am SHARP each day

AWARDS: Expert – 1st thru 5th Place each day
Sportsman – 1st thru 3rd Place each day
3 Function – 1st thru 3rd Place each day

ENTRY FEES: Expert & Sportsman - \$20.00/day or \$33.00 for both days
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Event Coordinator:

Mark Nankivil
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St. Louis, MO 63143
nankmc@QuixNet.net

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Amount Enclosed - _____ Days Flying – Saturday () Sunday ()

Classes to be flown – Expert () Sportsman () 3 Function ()

Frequency - 1st Choice – Expert () Sportsman () 3 Function ()

2nd Choice – Expert () Sportsman () 3 Function ()



Rowing LS-3, 4.5 meters, soaring at Windsor Flying Field. Photography by Ian Lynall, Princeton, New Jersey.

Circling in Thermals With Large Size R/C Scale Sailplanes

By Joe En-Huel
Lawrenceville, New Jersey

Introduction (Keeping Yaw String in the Center)

When I fly a full-size contemporary sailplane circling in thermals, my instructor advises me to go by the yaw string as an aid to tell if the turns are coordinated well. To keep the yaw string in the center is the key to circle efficiently. Otherwise, if the string points to the right, this means the plane slips to the left. To correct this, I need to kick the left rudder pedal (so the plane would yaw to the left) and meanwhile move the aileron stick to the right (opposite aileron - to counteract rudder-induced roll). Vice versa if the yaw string points to the left. During thermal turns, I still apply rudder input to keep the plane yaws in the same direction of circles and, meanwhile, give a light touch with aileron and elevator input to maintain the desirable bank angle and air speed. Once I locate the thermal core, I often need to tighten the circles, and the bank angle is as much as 40 degrees.

For our hobby - flying R/C scale sailplanes (contemporary design) with high aspect ratio wings and relatively high 2-D wing loading - in order to circle well in thermals is somewhat demanding, because the pilot can only fly the plane from the ground. Luckily, thermals are often quite big and strong at altitude where a scale sailplane might thermal well regardless whether circles are coordinated well or not. However, thermals near ground level are often weaker and smaller where tight circles are often needed to keep the plane up. How to circle the scale sailplane might become a subject worth discussing.

It is also important the scale sailplane be tuned/trimmed properly - i.e., the control surfaces have as little play as possible when in neutral; optimum aileron differential is incorporated; the CG location is on

the mark and the plane should fly slow, straight and level by itself such that presence of thermals can be detected.

Flying with One Stick or Two-Stick Control

Perhaps it is a matter of preference as to whether to use one stick (rudder/aileron coupled) or two-stick (rudder/aileron independently) when circling large size scale sailplanes in thermals. I have tried both ways of flying with 4 to 6.75 meters span planes. Plus, feedback from other pilots is discussed below.

One Stick Control

In general, when the rudder is coupled with aileron, scale sailplanes will be easier to fly for just gliding around. However, I found the scale sailplane tends to sideslip in tight thermal circles (at low altitude where I can tell). To bail out of this, I reduce the bank angle (the plane would yaw in the opposite direction of the circles due to coupling) resulting in larger radius of circles. Then, I tighten the circles by increasing the bank angle to keep the plane in the thermal core but the plane tends to slip again. In other words, the plane tends to be in and out of sideslips in tight circles. With one stick control, the scale sailplane circles are somewhat "non-scale-like".

In wintertime on calm/sunny days or twilight hours on fair weather days during the regular soaring season, thermals are often widespread and weak. The wide spread thermals often do not rise to great height. Under this condition, making large and gentle thermal turns often can keep the scale sailplane up and one stick control will do the work fine. Otherwise, when thermals are localized, tight circles are often needed and one stick control might not work well in order to circle the scale sailplane gracefully.

It is noted that some scale sailplanes such as the ASK-18 could thermal well with only aileron input, with or without rudder. This is perhaps due to its generous dihedral and high wing design.

Two-Stick Control

Second option is to fly with two-stick. As soon as a thermal is encountered at low altitude, I initiate a turn with aileron and rudder into the thermal. Once circles are established, I lightly hold the rudder input (say to the left) to keep the plane yaws to the same direction of circles (say clockwise as observed from ground) and maintain the desirable bank angle and air speed. With

two-stick control, tight circles often can be done more gracefully. In general, the tighter the circles, more positive rudder input, higher air speed and higher bank angle are needed. It is noted the sink rate of the plane increases quickly as the bank angle increases in circles.

Scale sailplanes with extremely high aspect ratio wings (such as Nimbus, ASW-22, ASH-25 and SB-10) often require large positive rudder input (and on/off with opposite aileron) in tight thermal turns. The EMS Nimbus-4 incorporates design of "winglet-aileron" coupled with rudder to enhance the ability to do very tight circles. R/C pilots report these super ships are the best to thermal in the lightest lifts. Larger scale sailplanes carry more energy and tend to be easier to perform tight thermal turns (retain energy better or more efficient - so to speak).

Some pilots fly their scale sailplanes with rudder/aileron coupled (about 25 percent mixing) even during tight circles, provided that positive rudder is applied independently to minimize sideslips. It is best to give minimum control input, so the scale sailplane can fly "by itself" in circles.

Flat Thermal Turns

There are theories about making flat thermal turns because soaring birds rarely bank their wings over 20 degrees. I have tried this theory with my scale sailplanes but none of them worked well. The planes often become very draggy and difficult to fly. Flat thermal turns perhaps work better for competition gliders and rudder/elevator control gliders with lower 2-D wing loading and lower aspect ratio wings.

Conclusion and Acknowledgment

To circle a scale sailplane in thermals with one stick or two-stick control is a matter of personal preference. However, to perform graceful tight circles and to get the best performance, it is desirable to use two-stick control. Pilots found larger size scale sailplanes are more efficient for flat field thermalling at any altitude.

Without scientific measurements, it is debatable whether scale sailplanes would "thermal better" with one or two-stick control. I have witnessed excellent pilots milking the lightest thermals near ground level, using either one stick or two-stick control, with beautiful scale sailplanes.

The feedback from veteran pilots and my good friends Dan Troxell, Mike Popescu and John Derstine is greatly appreciated. ■



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May 6-7
MVSA Gateway Soaring Open 2000
Mark Nankivil, (314) 781-9175
Nankmc@QuixNet.net
Alden Shipp, (217) 223-3052
alden@adams.net
O'Fallon, MO

May 6-7
International Slope Race
Gavin Botha, (408) 270-1471
gbotha@arc.nasa.gov
Davenport, CA

May 19-21
Midwest Slope Challenge
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mwsc@alltel.net, www.alltel.net/~mwsc
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June 7-10
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June 9-11
Montague Cross Country Challenge
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ewilson1@bellsouth.net
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June 24-25
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www.svss.org
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July 1-2
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linden@niagara.com
Gerry Knight, (905) 934-7451
Lou Kleiman, (905) 688-4092
Mistral@niagara.com
Ontario, Canada

August 3-6
International Electric Flight Festival
Ron Scharck, (858) 454-4900
Scharck@aol.com
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August 6-12
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Scharck@aol.com
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1/4.2 FiberClassics Nimbus 4 - 6.28 meter span (246"), wing profile E 68-66, ca. 18 lbs.
1/3.6 Roedelmodell DG 800 - 4.15 meter span (163"), wing profile E 207, ca. 11 lbs.
1/3.75 Roedelmodell Fox MDM-1 - 3.8 meter span (149"), wing profile RG 12, ca. 15 lbs.
1/2.77 Pribek ASW 19 - 5.4 meter span (212"), wing profile Ritz 3 mod., ca. 20 lbs.
Please call for additional info: (212) 879-1634.



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Dear Scratch Builder,

Many of you have asked for fuselages that we have not been in a position to provide, as most of you know, until now. But, we're back, at least for a limited time.

The thermal/slope, epoxy fiberglass fuselages shown below, are the first of our Viking line, and include suggested specifications (wing span/airfoil/radio channels). We **will not** carry an inventory, but rather custom make each fuselage as the orders are received. We want to do things right, so delivery time varies, and can take up to a month or longer, depending on what you want.

Jer

Thermal or Slope

Epoxy Fiberglass Fuselages	Price	S&H
Aeolus III (60"/NACA 63A010/3)		
43" fuse, plans	\$75.00	\$15.00
Condor 3m (bolt-on wing mount/up to 10" chord)		
52 1/4" fuse, nose cone	\$90.00	\$15.00
Contestant (148"/E205/3-4/10.5" chord)		
60" fuse, canopy, tray	\$90.00	\$15.00
Elf 2m (bolt-on wing mount/up to 10" chord)		
44 3/8" fuse, nose cone	\$80.00	\$15.00
Oden (100-130"/S3021/As Req./10.25" chord)		
51" fuse, canopy	\$85.00	\$15.00
Raven 3m (119"/Mod. E193/As Req./10.75" chord)		
51" fuse, plans	\$90.00	\$15.00
Stiletto II (100-136"/Any/As Req./10" max. chord/bolt-on wing)		
49" fuse	\$85.00	\$15.00
Stiletto RG-15 (100-136"/RG-15/As Req./plug-in wing)		
49" fuse	\$85.00	\$15.00
Stiletto S-3021 (100-136"/S-3021/As Req./9.5" Chord/plug-in wing)		
49" fuse	\$85.00	\$15.00
Stiletto S-7037 (100-136"/S-7037/As Req./9.5" Chord/plug-in wing)		
49" fuse	\$85.00	\$15.00
Stiletto HQ 25/9 (100-114"/HQ25/9/As Req./10" root cord/plug-in wing)		
49" fuse	\$85.00	\$15.00
Zen (100"/None/Var.)		
51" fuse, hatch	\$85.00	\$15.00



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Fuselage designed to take a heat shrink battery pack in the nose, with a standard size receiver, on/off switch, and 3 standard size servos in tandem. Fuselage designed by Bernard Henwood. Recommended for thermal or slope, intermediate to expert.

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All fuselages are Kevlar™ reinforced.

R/C Soaring Resources

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

Contacts & Soaring Groups - U.S.A.

Alabama - North Alabama Silent Flyers (NASF), Ron Swinehart, (256) 722-4311, <ron.swinehart@imco.com>, or Rob Glover at AMA365@aol.com, http://shl.ro.com/~samfara/

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

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

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

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

Arizona - Southern Arizona Glider & Electric (Tucson area), Philip Brister (contact), (520) 394-2121, pbrister@juno.com. SAGE welcomes all level of flyers!

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

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

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

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

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

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

California - Soaring Union of Los Angeles, John Bruce, 908 W 245th St., Harbor City, CA 90710, (310) 534-0948, <rcflyinman@aol.com>.

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

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

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

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

Eastern Soaring League (VA, MD, DE, PA, NJ, NY, CT, RI, MA), Tom Keisling (Pres./Editor), (844) 255-7418, keisling@ect.com; Ben Lawless (Sec./Tres.), Lawless@lilang.at.mil; Anker Berg-Somme (Scorekeeper), (508) 897-1750, anker@lilang.at.mil; Josh Glaab (Contest Coordinator), (757) 850-3971, jlglaab@pinn.net, <http://www.eclipse.net/~mikel/esl/esd.htm>.

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

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

Georgia - North Atlanta Soaring Association, Tim Foster, (770) 446-5938 or Tom Long, (770) 449-1988 (anytime).

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

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

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

Indiana (NE Indiana and NW Ohio) - League Of Flight by Thermal (LOFT), Ft. Wayne, Marc Gellart, (419) 229-3384, <isour2@worldnet.att.net>, <www.rc-aero.com/LOFT>.

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

Iowa - Eastern Iowa Soaring Society (IA, IL, IN, KS, NE, WI), Ed Harris (editor), 2000 NW 84th Ave., Ankeny, IA 50021, (515) 965-5942, <eharris.edwin@mcleodusa.net>, <http://eiss.cnde.iastate.edu>.

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

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

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

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

Louisiana - Capitol of Louisiana Soaring Society (CLASS), Leonard Guthrie (contact), 12464 Fair Hope Way, Baton Rouge, LA 70816, (225) 275-2122, flynguls@aol.com.

Maine - DownEast Soaring Club (New England area), <jamesiii@blazenetme.net>.

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

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

Massachusetts - Charles River Radio Controllers, Dick Williamson (past president), 21 Pendleton Road, Sudbury, MA 01776, (781) 981-7857 (W), <williamson@mit.edu>, <http://www.charlesrivercc.org>.

Michigan - Greater Detroit Soaring & Hiking Society, Greg Nilsen (Sec.), 260 Rosario Ln., White Lake, MI 48386-3464, (248) 698-9714, G.Nilsen62@aol.com.

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

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

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

Missouri - Mississippi Valley Soaring Assoc. (St. Louis area), Peter George, 2127 Arsenal St., St. Louis, MO 63118, (314) 664-6613, Mark Nankivil, nankim@quixnet.net, (314) 781-9175.

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

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

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

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

Nevada - Las Vegas Soaring Club, Ray Dinoble, 10812 Hollow Creek Lane, Las Vegas, NV 89144, (702) 254-7911, <dinoble@juno.com>.

Nevada - Sierra Silent Soarers (Reno/Sparks/Carson City/Minden area), Chris Adams, (775) 345-1660, <chris@scrollsander.com>, <http://www.scrollsander.com/SierraSilentSoarers.htm>.

New Jersey - Vintage Sailplane R/C Association, Richard G. Tanis (President/Founder), 391 Central Ave., Hawthorne, NJ 07006, (201) 427-4773.

New Mexico - Albuquerque Soaring Association (all soaring & electronics), Jim Simpson (contact), 604 San Juan de Rio, Rio Rancho, NM 87124, (505) 891-1336, <jimbones@aol.com>, <http://www.abqsoaring.com>.

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

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

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

New York - (Buffalo/Niagara Falls area) - Clarence Sailplane Society: www.paradox.net/homepages/mtimm/ess.html or Lyn Perry, President (716-655-0775, <perry@ccc.edu>); Jim Roller, Competition Coordinator (716-937-6427; <Rollj@att.net>).

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

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

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

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

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

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

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

Ohio, Kentucky & Indiana - Ohio Valley Soaring Series, Marc Gellart, (419) 229-3384, <isour2@worldnet.att.net>, <www.dma.org/DARTS/ovss/ovss.html>.

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

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

Oregon - Bay Area R/C Fliers, Mike Shaw, <grizzly2@gte.net>, (541) 269-2423.

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

Oregon - Salem Soaring Society, Al Szymanski, CD, (503) 585-0461, <http://home.att.net/~aszys/sss/>.

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

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

Tennessee - Tullahoma (South Central), Coffee Airtolers, Brian Smith, 317 Crestwood Dr., Tullahoma, TN 37388, (931) 393-4876, <bismith@midtnn.net>.

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

Texas - aerotowing, Dallas area, Andrew Jameson, 931 Desco Dr., Dallas, TX 75225, (214) 369-6118, <ajameson@sleepmed.com>, Larry Seiglish, (972) 291-4840.

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

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

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

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

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

West Virginia & Pennsylvania - Tri State Soaring, Chip Vignoli, 2784 Mill St., Aliquippa, PA 15001, (724) 857-0186, <voice@mail4121560-8922.vydnc30a@prodigy.com>.

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

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

T.W.I.T.T.

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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 \$20.00 (US) or \$25.00 (Foreign) per year for 12 issues.

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

Outside U.S.A.

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

Canada - Calgary R/C Soaring Society (Alberta), thermal duration & slope soaring, Chris Gregg (Pres.), (403) 226-1019, cgregg@cadvision.com; Eric Weder (Sec.), (403) 289-8844, eweder@telusplanet.net.

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

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

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

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

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

England (southwest) - Sean Walbank, Woolcombe Hays, Melbury Bub, Dorchester, Dorset, DT20NJ, phone 01935-83316.

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

Japan - Dr. Paul "Sky Pilot" Clark, 2 - 35 Suikoen Cho, Hirakata Shi 573, Osaka Fu, Japan; IAC+(81) 720-41-2934, <pclark@osk33web.ne.jp>
http://www3.osk33web.ne.jp/~pclark/skypilot/

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

RCSD Index/Database

Available from: <http://www.athenet.net/~atkr095/pcsoar.htm>. Or, send 3.5" high density disks & SASE with stamps for 2 oz. Lee Murray, 1300 Bay Ridge Rd., Appleton, WI 54915; (920) 731-4848 after 5:30 pm weekdays or on weekends, <lmurray@athenet.net>.

Reference Material

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

"Ultimate Scale Soaring" video taken at the 1998 Northeast Aerotowing Fly-in, New York, U.S.A. - international flyers & interviews. From Germany: The Akro Cup and The Scale Seglerschlepp. Check or money order, \$24.95 plus \$3.20 S&H (U.S.), payable to John Derstine, RD 3# Box 336, Gillett, PA 16925; (570) 596-4392, <johnders@postoffice.ptd.net>.
S&H foreign: \$6 Canada/Mexico, \$7 Europe, \$8 Asia/Africa, \$8.50 Pacific Rim. VHS format, NTSC standard. PAL format \$40 + applicable shipping.

Books by Martin Simons: "World's Vintage Sailplanes, 1908-45", "Slingsby Sailplanes", "German Air Attache", "Sailplanes by Schweizer". Send inquiries to: Raul Blacksten, P.O. Box 307, Maywood, CA 90270, <raulb@earthlink.net>. To view summary of book info: <http://home.earthlink.net/~raulb>

Seminars & Workshops

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

BBS/Internet

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



Sailplane Homebuilders Association (SHA)

A Division of the Soaring Society of America



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

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

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



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

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

Send for your aspirant form, today:

League of Silent Flight

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



The Vintage Sailplane Association

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

Vintage Sailplane Association
13312 Scotsmore Way
Herndon, VA 22071 USA



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

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

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

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

ESL Web Site: <http://www.eclipse.net/~mikel/esl/esl.htm>

ESL President (99-00): Tom Kiesling (814) 255-7418 or kiesling@ctc.com

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<http://www.davesaircraftworks.com>



ZIKA

Advertising Note

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

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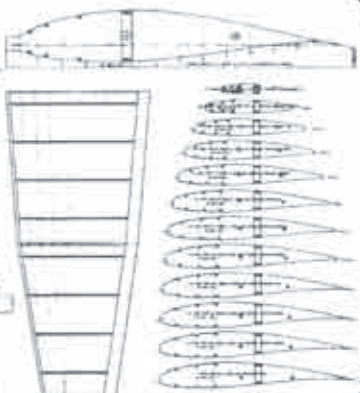
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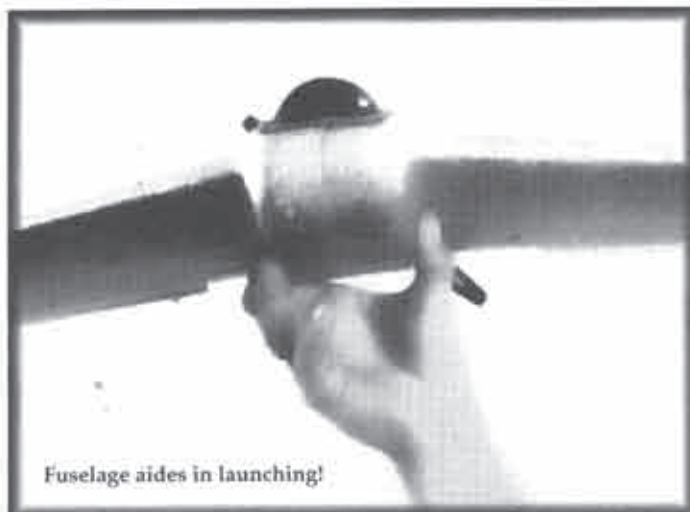
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GORDY'S TRAVELS

Photography by Gordy Stahl
Louisville, Kentucky

(This month, Gordy Stahl reviews the FMA Razor, an electric that bounces!)



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