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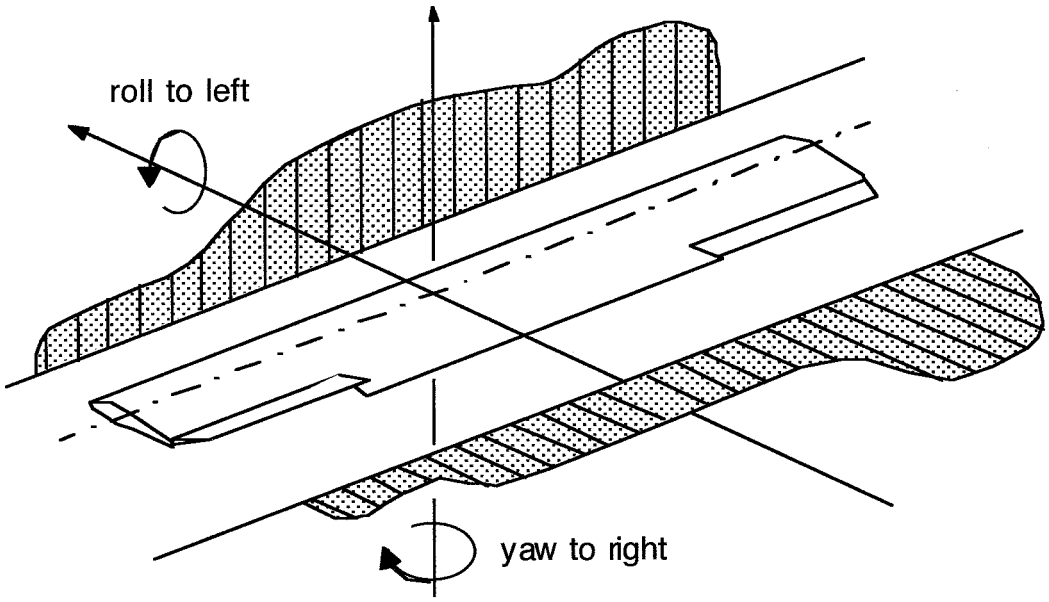
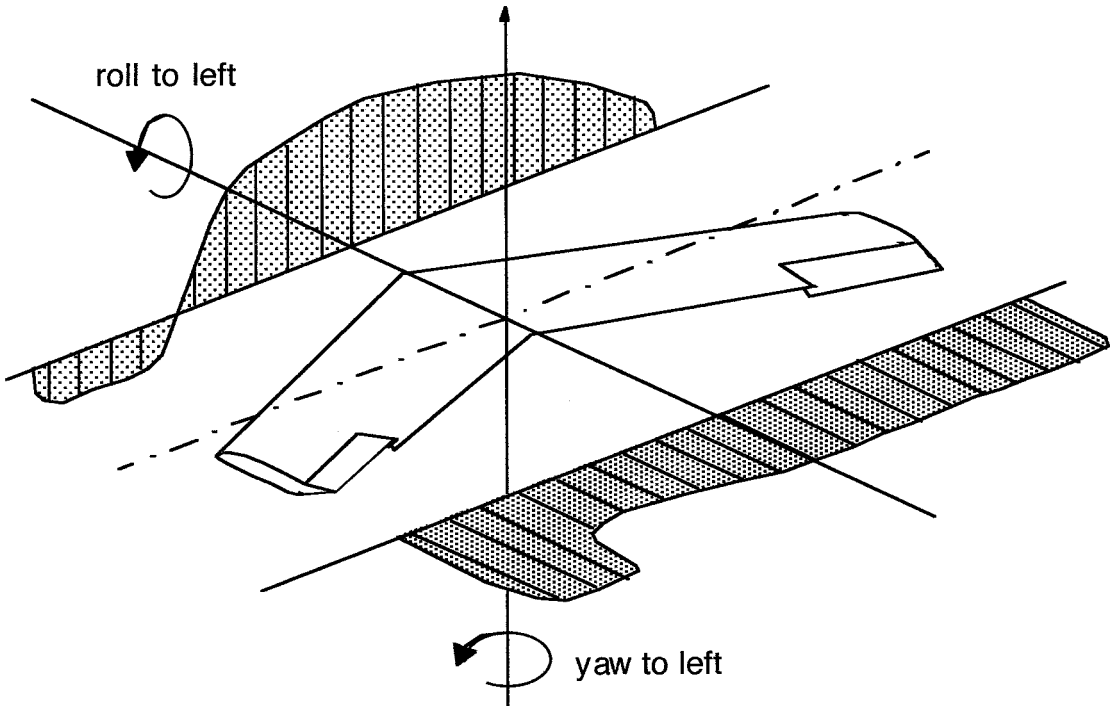
R/C Radio controlled SOARING DIGEST

THE JOURNAL FOR R/C SOARING ENTHUSIASTS





R/C Radio controlled SOARING DIGEST

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ABOUT *RCSD*

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

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Bookshelf Listings - A listing of recently published books of interest to aeromodelers.
Complete RCSD Index, 1984-2001

The Soaring Site

The *RCSD* Team

We've found over the years that sailplane folks are special. Really, special! And, some go well beyond the whole 9 yards to prove it.

It's been a tough year trying to catch up, but we're almost there! Special thanks go to each of you for your patience and understanding. You're special in our books.

And, special thanks go to our dedicated team of writers for putting up with our computer and printing problems. They never lost a beat! And, unfortunately, most never knew what was going to happen next! Frankly, neither did I!

Through all this, our web weavers, Bill & Bunny Kuhlman, did an exceptional job of maintaining the *RCSD* web pages, in addition to preparing their monthly column for *RCSD*, responding quickly with tidbits of information regarding computer related stuff as problems cropped up, and established PayPal capability for those readers that preferred to renew on-line.

Lee Murray performed the tedious updates of the *RCSD* index, and provided much needed technical assistence behind the scenes.

One of the things that never ceases to amaze us is the fact that all of us are in different states across the U.S.A., in some cases the world. Yet, we're only a click of the mouse away when coordinating each issue of *RCSD*.

And, it's that click, when we need help, that amazes us the most.

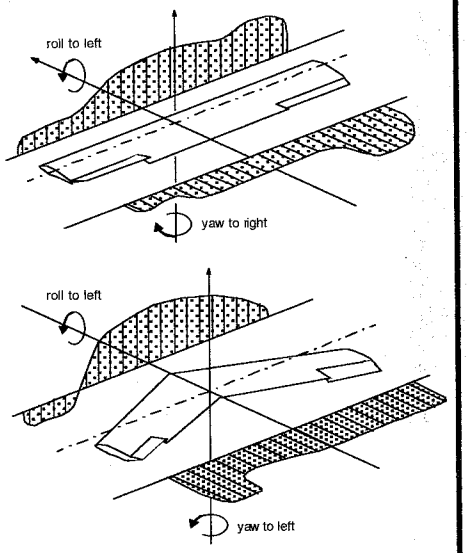
A special thanks is in order to Adele Register up Oklahoma way. She's not only putting up with Dave Register, but she's running his errands, as well, having put a CD disk in the mail to us this last week! And, why isn't Dave running those sorts of sailplane-related errands?

Seems that Dave finally scheduled surgery for a torn tendon. He's still behind the scenes helping out with technical questions, and the like, but it may yet be awhile before he feels up to writing, again. While he's recuperating, we have it on the best authority, Dave's, of course, that he's plotting his return of "Tech Topics." For those of you that missed him at the flying field, or from the pages of *RCSD*, now you know why, and can always cheer him up by e-mailing him at RegDave@aol.com.

Once again, our thanks to each and every one of you for your support this past year. As Dave said, "It's all just part of the whole 2002 thing!"

Do you really think so, Dave? Does that mean that 2003 will break the spell?

Happy Flying!
Judy Slates



FLYING WING DESIGN & ANALYSIS

This month, our "On The Wing..." columnists, Bill & Bunny Kuhlman continue the discussion on *Twist Distributions for Swept Wings*, with Part 3.

They continue with an in-depth analysis, combining graphic detail, of which figure 9 is shown on the cover of this issue.

SCHEDULE OF SPECIAL EVENTS

February 1-2, 2003
Southwest Classic — Phoenix, AZ

Please send in your scheduled 2003 events as they become available!

Beautiful in full color, all cover photographs are available for downloading from the *RCSD* main web page.

on the Wing B²

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Twist Distributions for Swept Wings, Part 3

In Part 1 we defined and provided examples of lift distributions. Part 2 examined stalling patterns of various planforms and introduced the notion that sweep angle and coefficient of lift can affect the angle of attack of outboard wing segments. Three consistent themes have been underlying the discussion thus far: (1) achieve and hopefully surpass the low induced drag exemplified by the elliptical lift distribution without creating untoward stall characteristics, (2) reduce adverse yaw created by aileron deflection without adversely affecting the aircraft in pitch, and (3) maintain an acceptable weight to strength ratio. In Part 3 we will describe a method of achieving the second goal.

Sweep and twist

Figure 1 (reprint of Figure 8, Part 2) shows the increasing upwash which affects outboard segments of a swept untwisted wing as it produces lift. Although exaggerated in the diagram, the overall tendency is clear and does appear in practice.

While there are several ways of reducing the tendency for the wing tip to stall, like careful consideration of airfoils or addition of wing fences, there are advantages to imparting some twist to the wing in the form of washout (leading edge down).

Figure 2 illustrates the case where the wing is twisted such that each wing segment has the same angle of attack as related to the oncoming air flow. Since the increasing upwash ahead of the wing is directly proportional to the amount of lift produced by inboard wing segments, this illustration is obviously accurate for only one aircraft velocity and attitude. The general concept is, however, very important.

Vectors

Mass, length, pressure and time can be defined by single real numbers. The length of a spar for a two meter sailplane, as an example, may be 39 inches. As there is a unit of measurement, inches in this case, the spar length is a scalar quantity. The number which provides the magnitude, 39, is considered a scalar.

Force, on the other hand, has both a magnitude and a direction, and is therefore classified as a vector quantity. A five pound brick resting on a table in a gravitational field may be represented as shown in Figure 3A and 3B. If another five pound brick is placed on the first brick, the situation can be depicted as in Figure 3C. Note that the arrowhead always indicates the direction of the force, while the length of the line indicates the magnitude of the force.

Figure 4 provides an illustration of the vectors involved in sustained, constant velocity flight. The upper illustration depicts a powered aircraft in straight and level flight. The weight of the aircraft, W, is counteracted by the generated lift, L. The drag, D, is counteracted by the generated thrust, T. There is a single vector, R_1, which can represent the combined lift and drag forces, and a single vector R_2 which can represent the combined thrust and weight vectors.

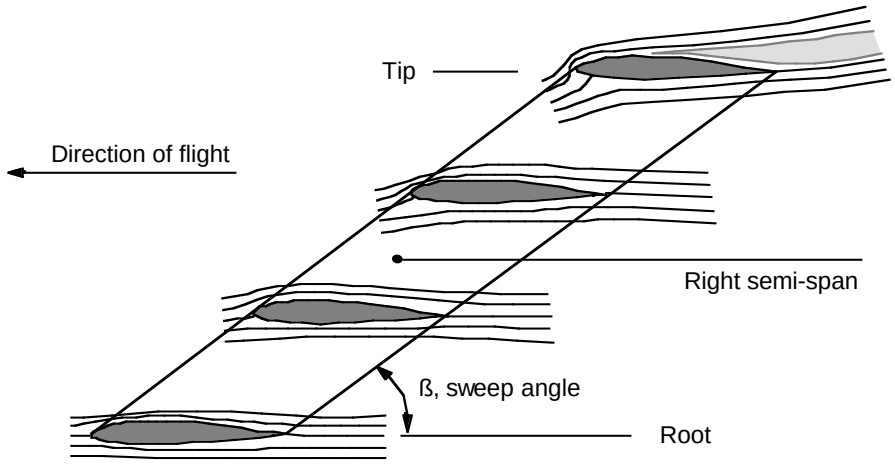

Figure 1. Movement of the stagnation point along the span of a swept back wing, exaggerated.

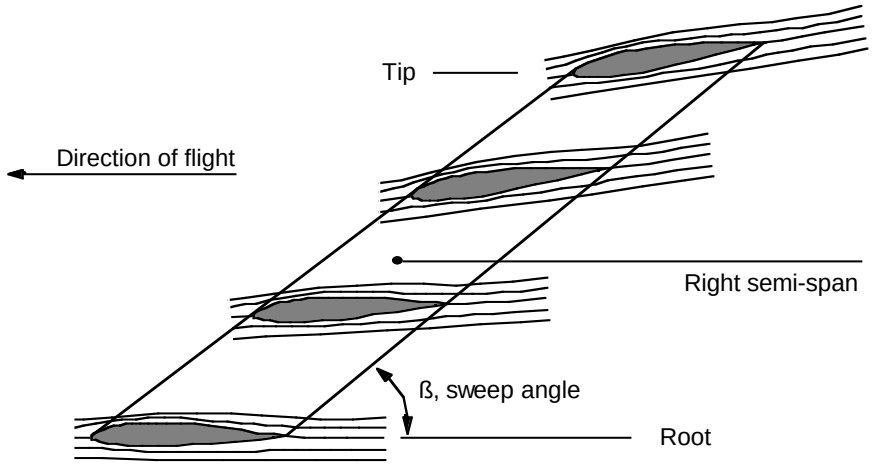

Figure 2. Alignment of wing sections to local flow by means of geometric twist, exaggerated.

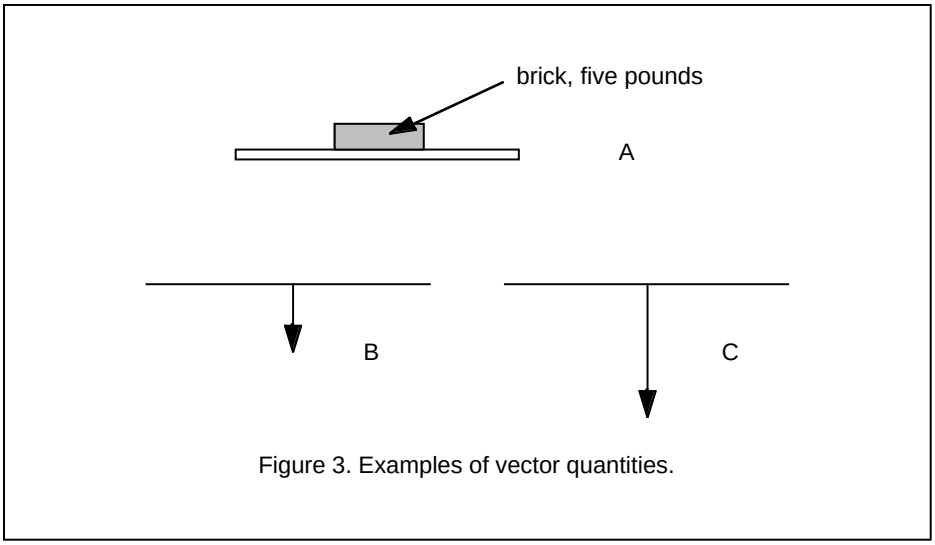

Figure 3. Examples of vector quantities.

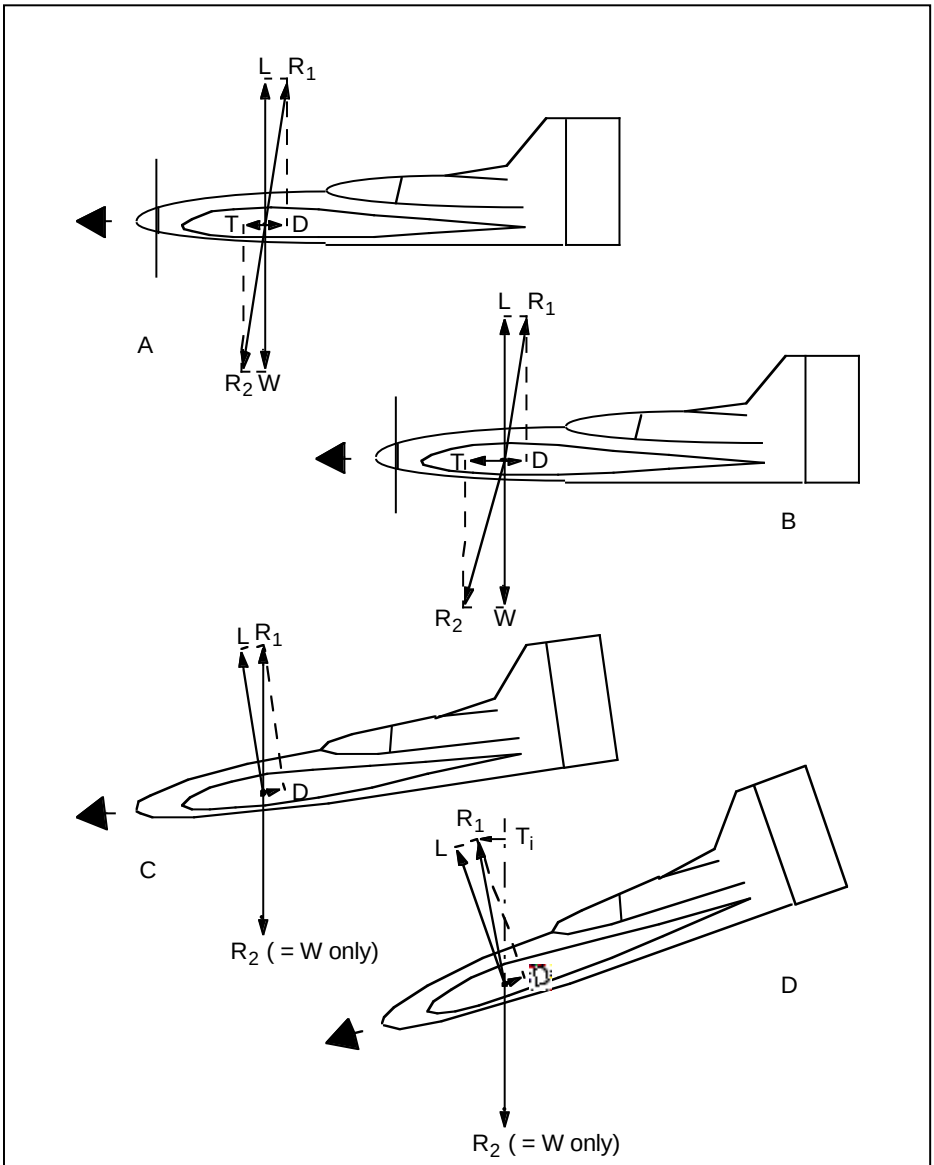

Figure 4. Force vectors on powered and unpowered aircraft which are otherwise identical.

These two resultant vectors are calculated by constructing a parallelogram using the two known vectors. R_1 and R_2 are of equal magnitude and opposite direction in this case, and the aircraft is therefore flying at a constant velocity. If thrust is increased, as shown in Figure 4B, the T vector length increases, indicating increased thrust, thus changing the shape of the parallelogram. R_2 becomes longer and rotates forward. The drag force D then increases as the aircraft velocity increases. Once drag and thrust are equal, the aircraft velocity will once again be constant.

The lower illustrations in Figure 4 depict the case of a powerless aircraft of the same design. It is in gliding flight. In Figure 4C the aircraft is moving forward at a constant velocity and slight downward angle. There is no engine to generate thrust so the weight W alone forms R_2. Now consider the flight path and note that the lift vector is ninety degrees to the air flow and the drag vector is parallel to the air flow. (This is the same as seen in the previously described powered example.) The resultant vector, R_1, is of exactly the same magnitude as R_2 and in the opposite direction, so the aircraft is flying at constant velocity.

If the nose of the glider is pointed more downward, as in Figure 4D, the flight path rotates in relation to the weight vector. The lift and drag vectors continue being perpendicular and parallel to the air flow, respectively, and so they rotate as well. R_1, the resultant of the lift and drag vectors, rotates forward as one would intuitively expect. There is now an "induced thrust," T_i, which will accelerate the aircraft until the drag force increases to exactly counter it. When R_1 equals the weight (R_2), the aircraft will once again be traveling at a constant velocity.

Induced thrust

We've used the term "induced thrust" in the previous paragraph, and there are some readers who may not believe that such a thing exists, despite having a knowledge of "induced drag." Perhaps one of the best examples of "induced thrust" is the action of a winglet. A very large number of aerodynamics texts describe winglets in detail, so we will not do so here. What we want to bring into focus is the production of induced thrust by the winglet.

The upper illustration of Figure 5 shows a wing from the rear, with the winglet structure defined by phantom lines. The air flow is shown traveling outboard along the bottom surface of the wing and inboard across the upper surface. The velocity of this movement is generally greater near the wing tip as shown by the lengths of the lines.

The air flow outboard of the wing tip is very close to circular, but remember, the free stream velocity is added to this circular motion, so the resultant air flow meets the winglet at an angle. The lift and drag vectors are shown in the lower illustration. Note the now familiar rotation of the resultant in reference to the winglet MAC/4 axis. (MAC/4 is the 25% chord point of the mean aerodynamic chord and is the origin for the winglet lift and drag vectors, just as for any wing segment. The MAC/4 axis and the yaw axis are in parallel planes in the presented examples.) The vector T_i is the induced thrust generated by the winglet.

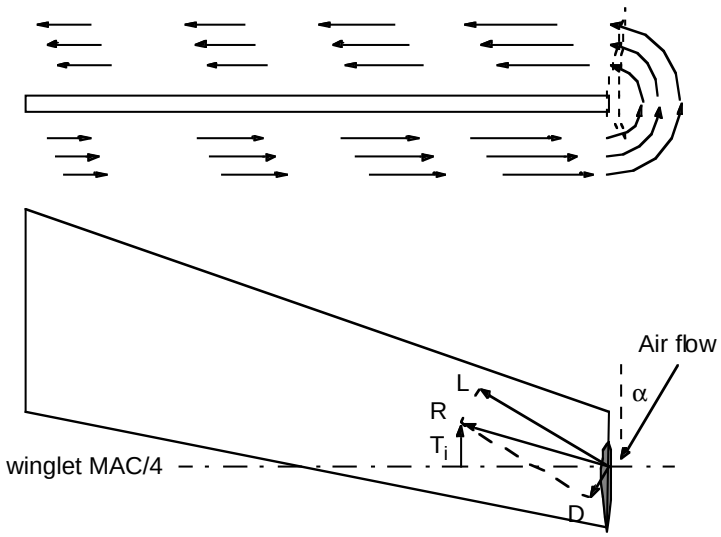

Figure 5. Induced thrust, T_i, generated by winglet.

We can extend the notion of "induced thrust" from a winglet to the outer segment of a lifting swept wing. Consider Figure 6A. In this case, an airfoil is generating some lift while the air flow is precisely horizontal. This is a situation identical to that when an airfoil with a zero lift angle of some negative value is set in a wind tunnel at zero degrees angle of incidence to the air flow. Note that the lift vector is vertical (ninety degrees to the air flow) and the drag vector is parallel to the air flow. The resultant is rotated at an angle behind the vertical quarter chord axis. In the wind tunnel, as the airfoil angle of attack is increased, the lift vector remains perpendicular to the air flow, the drag vector remains parallel to air flow, and the axis remains vertical, perpendicular to the air flow.

In Figure 6B, the air flow is coming from below at an angle of five degrees. The lift and drag vectors have rotated to match the air flow, and the resultant coincides with the vertical MAC/4 axis. Figure 6C shows the case where the air flow is coming up at an angle of ten degrees. The lift and drag vectors (and the resultant, of course) have rotated forward of the axis.

Figure 6D shows two situations which take place at an air flow angle of 15 degrees. We've shown a single lift

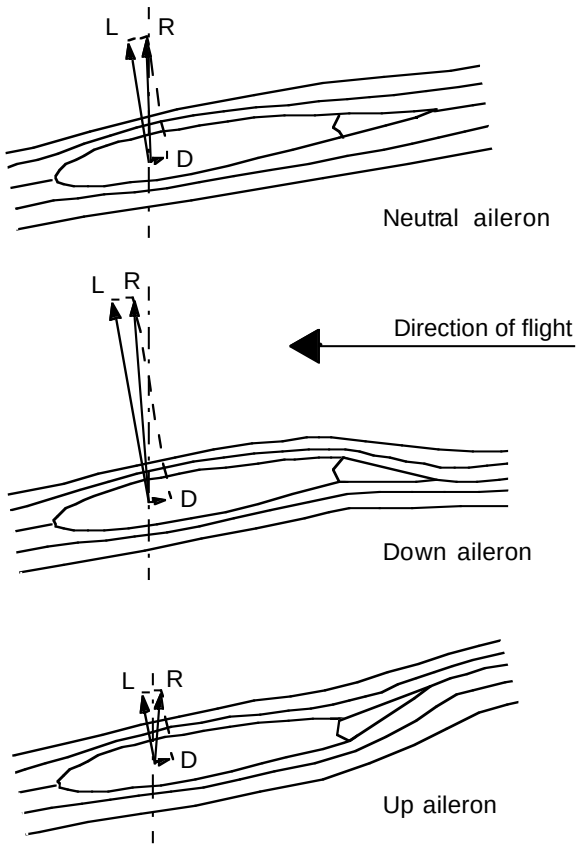

Figure 7. Generalized representation of the direction and strength of forces when the outboard aileron of a twisted swept wing is deflected.

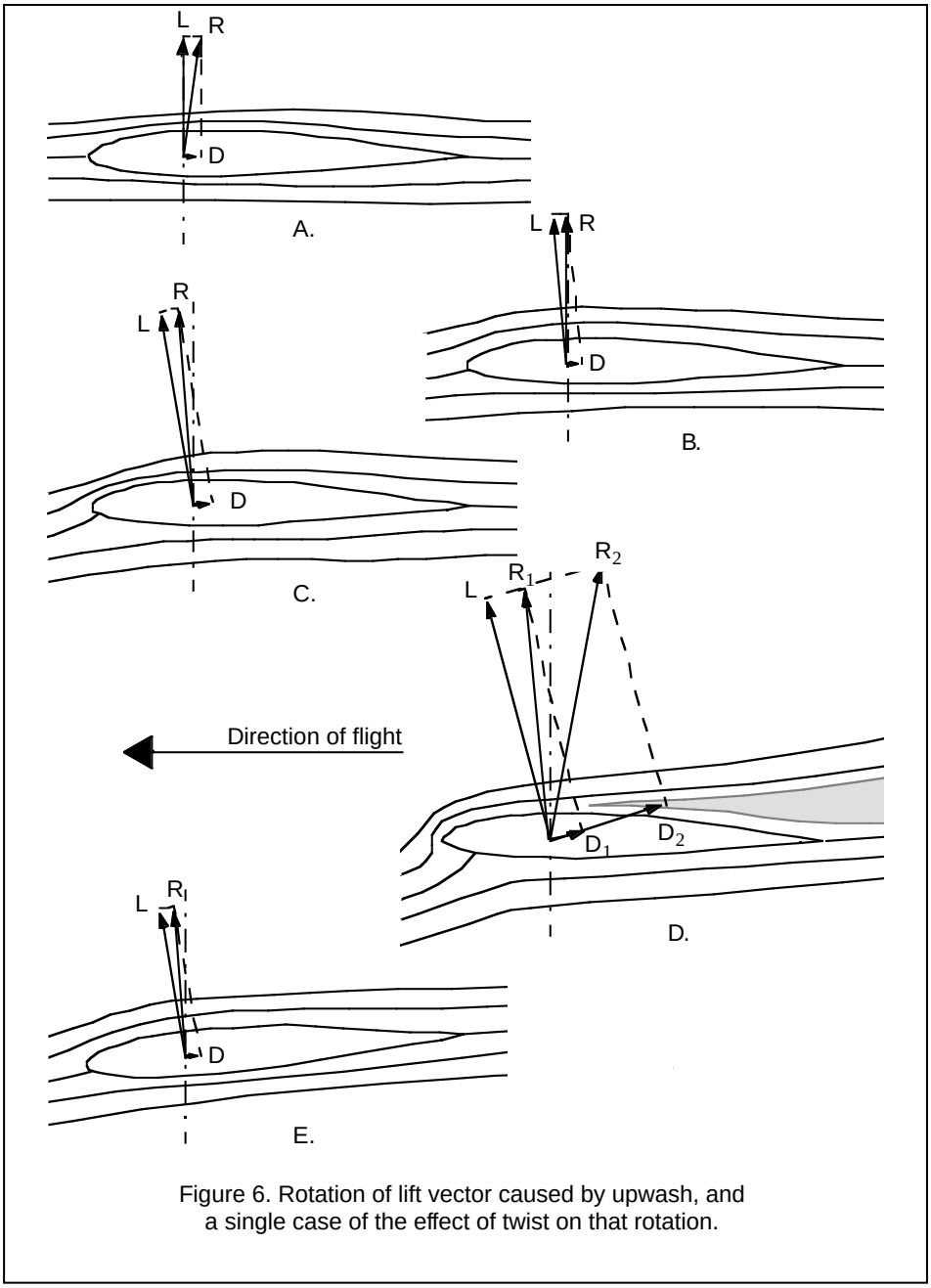

Figure 6. Rotation of lift vector caused by upwash, and a single case of the effect of twist on that rotation.

vector and two drag vectors. If the drag is low, the resultant (R_1) remains well ahead of the axis. If the drag is excessive, however, the resultant (R_2) rotates behind the axis. This is an important concept to keep in mind.

The case of the outer segment of a twisted swept wing is shown in Figure 6E. The air flow is coming up at an angle of ten degrees and the airfoil is set at an angle of incidence of minus five degrees. As the wing section "sees" an angle of attack of five degrees, the lift is of the same magnitude as in Case 6B, but the resultant is rotated to a direction nearly identical to that of Case 6C.

It may be helpful to consider the outer portion of a swept back wing to be a "flattened" winglet, as the effects of the two are essentially identical.

Induced thrust and aileron deflection

And now the part you've been waiting for... Take a look at Figure 7. This illustration is of the outer segment of a twisted swept back wing with aileron installed.

When the aileron is in neutral position, the resultant vector is directly over the projected yaw axis.

When the aileron is deflected downward, the lift is increased substantially. The resultant is rotated forward of the axis. This induced thrust actually pushes the wing forward.

When the aileron is deflected upward, the lift vector decreases in magnitude, reducing the induced thrust. (If the aileron deflection is large enough, the lift vector changes direction.) The resultant of the lift and drag vectors rotates behind the axis, pulling the wing backward.

In an aileron induced turn, adverse yaw in a swept wing planform can be reduced or eliminated entirely by means of manipulating the lift and drag vectors of the outer portion of the wing through appropriate wing twist.

When the wing tips are lifting downward, aileron deflection acts to reduce adverse yaw. This case can be envisioned by inverting the vector diagram for a (normal) upward lifting wing. We've done the inverting and placed the results in Figure 8.

Reducing adverse yaw

Figure 9 examines the case of the unswept wing with an elliptical lift distribution with aileron deflection for a left turn. (This diagram is a reprint of Figure 5 from Part 1.) The aileron deflection increases the drag of the wing semi-span having the downward deflected aileron and decreases the drag of the wing semi-span having the aileron deflected upward. This causes a roll to the left and a yaw to the right. This adverse yaw requires a compensating rudder deflection.

Figure 9 also examines the case of the swept wing which utilizes a lift distribution which is not elliptical but which does allow for coordinated turns by eliminating adverse yaw through induced thrust. The wing semi-span with the upward deflected aileron generates more drag than the wing semi-span with the downward deflected aileron. The wing rolls and yaws to the left. In this case no compensating rudder deflection is required.

Swept wings without a vertical surface, like many of the Horten designs, can use wing twist in conjunction with sweep to produce coordinated turns, particularly at low speed (high C_L), as when thermalling. There may be some disadvantages to this methodology when flying at high speed (low C_L),

but the detrimental effects can be controlled by careful design of the ailerons, including their location, size, and deflection angles.

Coming in Part 4

The next installment will devote some space to the relationships between aileron configurations, wing lift distributions, and adverse and proverse yaw. And now that we have a method of reducing or eliminating adverse yaw, we can back up a bit and take a look at what wing sweep, increased upwash and wing twist can do for the first of those three points we keep mentioning, our quest to reduce induced drag.

Ideas for future columns are always welcome. *RCSD* readers can contact us by mail at P.O. Box 975, Olalla WA 98359-0975, or by e-mail at <bsquared@appleisp.net>.

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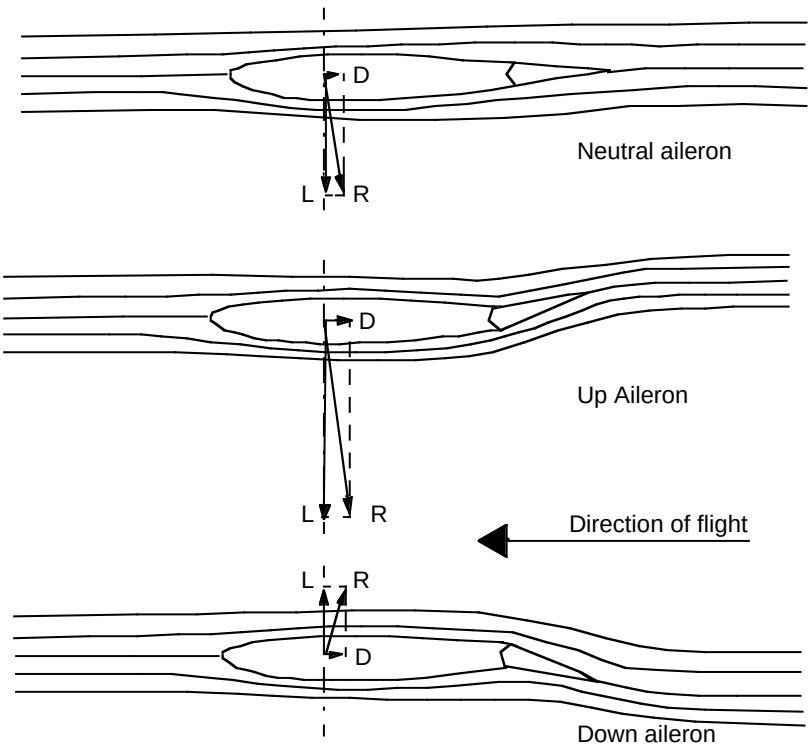

Figure 8. Generalized representation of the direction and strength of forces when the outboard aileron of a downward lifting wing segment is deflected.

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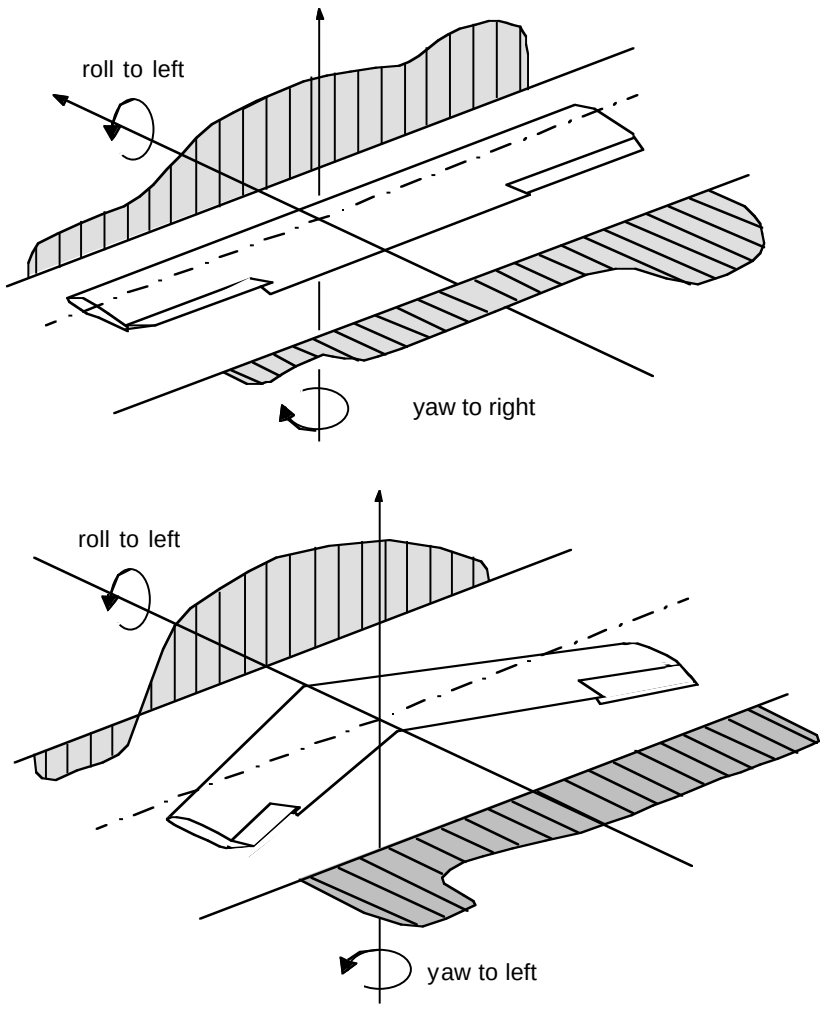

Figure 9. Lift and drag profiles for an untwisted rectangular wing with aileron deflection for left bank, no differential (upper), and for a twisted swept wing with washout, no differential (lower).

HAVE SAILPLANE, WILL TRAVEL!

The U-2 begins its plummet from the "M" Mound.

By Tom H. Nagel
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As Close To Normal As I've Ever Been or Roiling on the River

Herewith another tale of woe and intrigue as the Heath-Nagel clan reports back from its travels to scenic and exotic Iowa. That's right HSWT fans: after all ten of the participating Heath-Nagel clan honchos put their heads together, using the latest 21st century technology and the magic of the internet, the best we could come up with for the 2002 Mass Migration was Iowa. And you know what? It wasn't so bad. I even got to fly, for about 15 seconds, more or less.

This was a bittersweet reunion, the first clan gathering since the passing of our patriarch William T. Heath. Last summer's trip to Ludington was his last vacation, and I think that the morning he and I spent flying a Zagi THL over the dunes at Manistee State Park was just about his last outing; he was hospitalized shortly after we returned from vacation and died in early September. It has taken me a while to start writing again.

Brother-in-law Mike Heath found the place: McGregor Iowa, a tiny Victorian river town, right across the Mississippi from Prairie du Chien, Wisconsin, and just a little south of the Minnesota state line. And Greg Smith of slopeflyer.com clued me in on one of the two flying sites I visited on this trip.

We had four folks traveling from Ohio, and ten clan members, eight boats, and five cars in all when we assembled in southern Wisconsin for the final assault on McGregor, Iowa. It looked a lot like The Beverly Hillbillies Go Kayaking as we rolled across the mile long bridge and causeway, over the upper Mississippi and into McGregor. As it turns out, that was pretty much appropriate. McGregor Iowa looks a

M slope in Platteville, Wisconsin.

Vista from the top of the M Mound in Platteville.

One of the many unique shops in downtown McGregor Iowa: River Junction, a store entirely devoted to clothing and supplies for Civil War re-enacters. Upstairs is the McGregor branch of the well known law firm Dewey, Cheatam & Howe.

lot like West Virginia, as if someone had poured a few million dollars into the New River Gorge and yuppified it, adding B&B's, boutiques and antique stores. Lots of people had canoes and kayaks on their cars. Others were hauling power boats of every description. The only thing missing was whitewater. Instead there were two broad navigation channels and a maze of bayous and small channels.

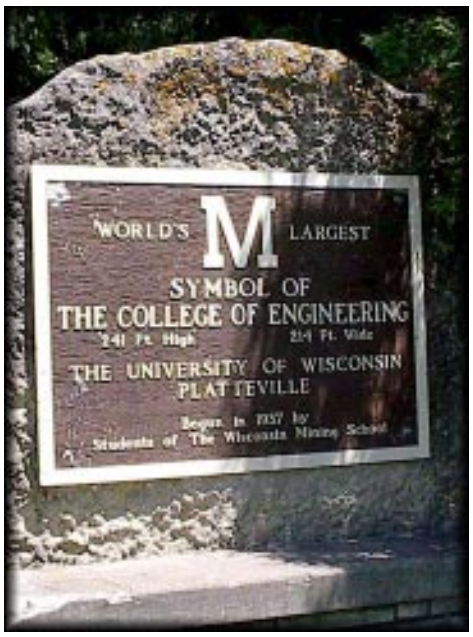
Steep limestone bluffs line both sides of the valley. The railroad runs through the middle of town, houses are crowded together between the bluffs and the river, and the not-so-big muddy is convoluted with oxbows and back waters and wetlands that make up the Upper Mississippi River National Wildlife and Fish Refuge, a 260 mile long network of natural areas in Wisconsin, Illinois, Iowa and Minnesota.

The first soaring connection came when we checked into the Little Switzerland Bed and Breakfast. The host gave us a copy of the official State of Iowa Transportation Map, which has a picture on the cover of Carl Bates of nearby Clear Lake, Iowa, who, in 1898 at age 14, built and flew the first man-carrying glider in Iowa. The region's checkered aviation history also includes the crash and death of Buddy Holley and the Big Bopper. And now I was in town with an RC sailplane.

We had arrived under a clearing sky, as a day long drizzle ended. As soon as we got checked in at the B&B, Mike and the kids decided to take canoes and kayaks out on the river. It felt a little late and a little windy to me, so after we set the voyageurs on their way, I collected the wife and grandma, and we drove up to Pike's Peak State Park for a look at the valley, and the next soaring connection. Pike's Peak State Park is named after Lt. Zebulon Pike, who came up the river in 1805 to survey the Mississippi, and suggested a fort be located there. He later named some hilltop in Colorado, too, I think. But anyway, the spot he picked in Iowa is the highest bluff overlooking the Mississippi, a good 500+ feet above the junction of the Wisconsin River with the Father of the Waters. The Iowa DNR has thoughtfully built a large triangular concrete observation deck that juts out over the heavily wooded gorge, looking east over the valley.

It was late afternoon. Winds were out of the east at 15 to 20 mph. American Bald Eagles were sloping up and down the river along the bluffs. There wasn't a park ranger in sight. And my sailplane and transmitter were back in town. I settled for watching eagles and wishing I was flying with them. However, it was clear that this overlook has great sloping potential. Landing, however, would be something else.

Because of logistic considerations on this trip, the only plane I had brought



Commemorative plaque at the base of the M Mound in Platteville, Wisconsin.

View of the Mississippi from the overlook at Pike's Peak State Park, Iowa. Flying here is easy. Landing is hard.

along was my trusty RPVI U-2, a chunky all EPP six footer with a fast RG-15 airfoil. It breaks down and travels well, almost indestructible in a bundle not too much bigger than a loaf of French bread. I looked at the Pikes Peak overlook a couple of more times during the week. There was plenty of wind, and the U-2 would have undoubtedly flown well in the same lift being used by the eagles, hawks and buzzards. But landing the heavy and fast flying U-2 in tight quarters among a flock of tourists just looked too risky. A Zagi, MOG or Red Herring, or anything that could be landed softly in the bushes would do just fine. I'd brought the wrong plane.

Nancy rides the carp at Prairie du Chien, Wisconsin.

Here's a couple of interesting things about Pike's Peak State Park: it is the only place I know where you can see one of the smallest bird in North America, the Ruby Throated Hummingbird, within about 50 yards of one of the biggest, the American Bald Eagle. Pikes Peak hosts flocks of both hummingbirds and eagles. And bats – boxes of little brown bat, and bathrooms full of bats, too. The bats have taken over the eaves of the park's bathrooms. There is lots of flying going on at Pikes Peak, day and night. Just not me.

Also at Pike's Peak is an RV campground and a very nice short loop trail that features dozens of Indian mounds, including a couple of unusual effigy mounds in the shape of bears and birds.

During the week we found a nice bar and restaurant called Mulligans, across the river in Prairie du Chien. That town is the oldest one in Wisconsin, and was founded in 1673 by Pere Jacques Marquette and Lois Jolliet who came down the Wisconsin River and became the first Europeans to see the Mississippi River. (I think they were probably lost, on their way home from Ludington, but I'm not sure about that.) Marquette, with his typical Gallic sense of humor, named the town after Fox Indian chief whose name translated into French as "dog." The town became known as Prairie of the Dog, or Prairie du Chien. Today the town hosts the mid-summer Prairie Dog Blues Festival. Other attractions include the site of the Battle of Prairie du Chien from the war of 1812, the only battle fought in Wisconsin, an immense Cabela's Outlet Store (good source for monofilament winch line), and the annual Carparee, a sort of Carp Rodeo. The town also boasts the world's largest hand carved wooden carp,

This column is dedicated to soaring vacations. 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

right outside a shop that sells "Fresh Smoked Carp." Sounds like an oxymoron to me.

We spent the week in the usual Heath-Nagel manner, kayaking and boating and hiking and sampling the local brews, of which Lake Louie Lager is a definite keeper. And most importantly we spent it not flying. I was getting serious sailplane withdrawal symptoms, a classic case of GPS. But I had a backup plan!

Greg Smith had sent me information about the Platteville Mound, a mile long geological oddity planted in the middle of Wisconsin cow country. It was right on our route home. So as the Heath-Nagel clan made its way back toward Monroe, Wisconsin, the Nagel branch of the clan diverted off into suburban Platteville to check out the mound. The Platteville Mound is not hard to find. You can see it from 15 miles away on a clear day, a long wooded ridge running north and south, and standing a couple of hundred feet above the rolling farmland of southern Wisconsin. The south end is cleared of trees, and has cell phone towers on the top. A giant white "M" is emblazoned upon the cleared slope. You can't miss it, as they say.

Greg told me that there is an access road up to the top, running between the house and out buildings on a local farm. I figured that the farmer might not be ready for The Beverly Hillbillies Go Kayaking, so we drove around to the little park at the base of the giant M instead. There is a loooong set of wooden stairs to the top of the slope, and a marker explaining that this is the world's largest capital M, created out of white washed rocks in the 1930's by engineering students at the University of Wisconsin. What the marker doesn't explain (but is painfully evident) is that the Wisconsin engineering students were holding the blueprint upside down when they laid out the giant letter.

We hiked up the wooden steps, stopping to rest and gasp from time to time, and found there was a light west wind blowing. The slope faces west, and it was time to break out the U-2 again. Rew heaved the plane for me, and it became immediately clear that the winds were way too light for the U-2, which (to paraphrase Monty Python) did no soar so much as it plummeted. It dove and stalled and wobbled down the face of the giant M, glided across the road, over or under the phone lines (not sure which) and across the front lawn of the house across the street, where it disappeared under the lilac bushes with a thump.

We hurried down the stairs again to apologize to the home owners. No one was home. Rew called out to me: "Hey Dad, the U-2 has done what it does best." It had bounced, popped off both wings, and wound up unharmed under the bushes. No harm, no foul, no flying: a typical HSWT saga.

If you pass through Platteville, Wisconsin, and west or southwest wind is blowing, check out the M Mound. Also take a look at the local mining museum, and of course the Lake Louie Lager. Directions to the Giant M Mound can be found on Greg Smith's slope locator site, www.slopeflyer.com or you can look just east of Platteville, Wisconsin on www.topozone.com.

It was time to head home. We headed down through Illinois, listening to a great little jazz and blues station owned by the Illinois State University, WGLT. We stopped to eat at a Cracker Barrel just off the interstate. It turned out we were in the twin cities of Bloomington and Normal Illinois. Under close questioning the waitress admitted that we were actually just inside Bloomington city limits, and that Normal was two streets over.

And that, dear reader, is as close to Normal as anyone in my family has ever been.

Travel well, fly safely, and write if you get lift.

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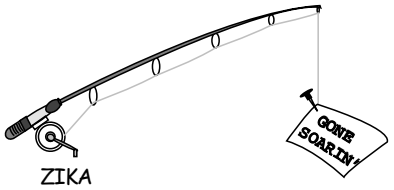

BMFA F3J News

Uncle Sydney's Gossip Column – 16

by SydneyLenssen, England
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Dateline: 15 August 2002

FINNISH YEAR OF THE SPEAR

Finland's World F3J Championship in Lappeenranta was "the spearing champs." If you missed the 100 landing and/or didn't fly 9.50 plus each round, then no fly-off for you. The margin between top qualifier Juraj Adamek from Slovakia at 7,994.65 - nine flights, one dropped - and 12th equal place of Canada's Graeme Clark and Germany's Reinhard Vallant at 7,962.33 is the equivalent of dropping 22 seconds over eight rounds, less if you lose any landing points.

The fly-off was even tighter. New World Champion Arend Borst beat 1998's WC Joe Wurts into second place by 0.7 points out of 3,000 – four rounds with one dropped. That is as near as you can get to 0.7 seconds in the 15 minute fly-offs! And how he did it. For instance, Arend from Canada tied with Australia's Carl Strautins in the fourth slot, each with 14 minutes 56.2 seconds plus 100 spot landing. Zoom off halfway up the launch line, or you're gone!

Despite such tiny margins, F3J WC 2002 was exciting and unpredictable with victims and heroes each round. What made it a spearing contest was the ground at Lappeenranta's airport, hard bituminous gravel and rock lumps with little protective soil or grass, presumably scrapings from each year's frosted runway. Anything other than spearing the nose risked a random slide out of the metre circle.

During the Wild Man's Trophy before the champs began, both Joe and Arend landed on the actual spot itself, made of ply, and as a result slid into the 95s. To prevent that, the Canadian team to acclaim replaced all spots with softer material which the nose could pierce.

But it's a sad outcome of such tight winning margins that today's F3J models must be built to take dunked arrivals, some of them fast. Scaled up to full size equivalent, each and every pilot would be killed outright and the glider severely damaged, if not written off.

How to make the winning margins bigger is the problem taxing F3J, and in particular FAI jury members Sandy Pimenoff, Tomas Bartovsky and Nick Neve. Wider point differences are needed because today's timekeepers need to time flights to two decimal places of a second to get a result. The arithmetic and percentages are easy enough to calculate. The reality is that we are basing results on margins, which are less than any normal timekeeper's ability to start his stopwatch exactly as the glider leaves the towline.

For many flyers, the essential attraction of F3J is simplicity: launch, thermal away, then land with precision, time and place. Easy! But with World and Euro champs, and increasingly at Eurotour events, the competition becomes "launch and landing" - getting off the line quick, never mind the height, and land with a prod milliseconds before the beep.

Thermalling for the top flyers is taken as read, hardly surprising when Alex Hoekstra reckons his Twisters can do 10 minutes in still air with a good launch. Joe Wurts and at least a dozen others seem to find lift or enough shifting air to maintain height whatever the conditions. At Lappeenranta more than 90% of flights flew out slots.

Some top pilots are happy with ever-tighter contests. Karl Hinsch reckons that summer Eurotour events have gone that way, and he enjoys competition with no margin for error. He's not alone amongst Europe's top pilots, Jan Kohout and Michel Wagner think the same.

Change discussions on and off the field centered on shorter towlines, down to say 100 or 75 metres. That is no answer, it just means developing ever faster launches, lighter, maybe smaller models. It will not take a year to match current launch heights.

The Japanese suggested that the contest director should set the slot time at six, ten or fifteen minutes at the start of each round, according to the prevailing conditions. If the air makes for easy thermalling, then set the shorter time. If it's grotty, force everyone to scratch for fifteen. That approach could sort out the men from the boys. It puts an onus on the CD, and it's interesting to speculate on its effect. But it's unlikely to command wide enough support to get CIAM to change rules.

Best solution to date, which would upgrade thermal skills – the missing ingredient - is to force pilots to leave any thermal lift they have found part way through the slot and find some more. One method would be to set up sight lines as in F3B, 300 to 500 metres from either end of the launch corridor, with judges sighting along two planes at 90 degrees to the launch line. In the first half of the slot, pilots would be required to cross one sight line, left or right, and in the second half of the slot, cross the other. The reward could be say 250 points for crossing both.

Such an additional task would require more helpers and perhaps a larger flying site. How to identify each glider has not been solved yet. But it would bring new spice. Any other ideas?

For F3J WC 2002, the stake (or non-stake) was forgotten. Admittedly at Lappeenranta airport, it was easy to ensure that the anchor pin was rock solid, so much so that the change in the direction of the flight line was a major operation. But it was done a couple of times, thanks to Czech pressure, for they had had a horrible accident with cross wind launching.

The only rule spat was over reflights. It is impossible for the contest director or his deputy on the line to witness every "interference with flight," so it is often left to the timekeeper. One pilot claimed his zoom was impeded when one of his towers almost tripped over a stake left in the ground. His spotter and team manager claimed a reflight immediately, but that was denied by the timekeeper, one of a band of excellent volunteers who did a great job most of the time. So the flyer relaunched.

The contest director ruled out a subsequent claim for a reflight, because the flyer had gone on. So the team appealed to the jury, who then deliberated for a long time before ruling that a reflight should have been given. They had taken so long that the reflight came at the end of the next

round. That yielded more appeals from other teams who have lost out in similar events.

In its wisdom the jury produced a matrix of what constitutes grounds for a reflight. They should not have tried, for that produced even more confusion and highlighted conflicts in the current rules.

My bet is that CIAM will eventually not allow reflights, full stop, during launch or in the slot. If flyers choose to fly close and are impeded, then that is a risk they have chosen to take. Bad luck to those who gamble and fail. That will discourage flocking in the same tight patch of lift. It will mean more launch risk if you zoom close to a less experienced pilot.

Juries should take heed: don't try to clarify the rulebook during the event - a sure recipe for trouble. Be the high and mighty gods who rule without fear or favour!

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Let me not crow, but July's gossip column gave Arend Borst as hot tip to win F3J WC 2002. Behold, he did – only just. A popular winner, modest in the nicest way, he is always ready to share his experiences and tips. Everyone was pleased for Canada, hosts for the 2004 world champs just outside Calgary. The team performed well above everybody's expectation in second place. With two in the flyoff, Canada matched the might of the Swedes, German and Czech teams. Well done.

I am confident they will do equally well in organising F3J WC 2004 as the best of all champs so far, so start saving for that transatlantic voyage.

My "long odds bet," Denmark's Jesper Jensen, footed the flyoff table after placing 7th in the preliminary rounds, a worthy performance, as indeed it was for anyone to reach the finals. Finland's neighbour Sweden did well with Pasi Vaisanen in 3rd place and Soren Svantesson in 12th place.

Happiest two guys on the airfield were the Lammleins, Tobias the new junior world champ and his father Stephan, German junior team manager. Toby has been on the winners' rostrum three times before, and desperately wanted the No.1 spot.

His mother, holidaying about 100 km away, stayed away from Lappeenranta during the week, frightened that she would increase the tension. But she was there to share Saturday's last two flyoff rounds. He could not be beaten after the third round of the flyoffs, when he flew out in the first and only slot that morning in mostly dead still air. Even so, with spotter Philip Kolb, he found enough buoyancy to keep his Sharon up for the full 15 minutes, a true champ winning performance.

Hand it to the German Junior team, winners again, for the third time. Which country can wrest that title away? With more than 30 juniors flying regularly in the German League, some of them filling the top slots in the senior league, F3J has an assured future there.

One bet that I did lose was with Australian correspondent Ian Roach who objected to my low expectations for Australia. I bet him subsequently that UK's Simon Jackson would beat his favourite, Carl Strautins, and I now owe him. Mind you, Carl had both mum and dad loyally supporting prowess in Lappeenranta, and they enjoyed themselves.

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The UK team performance? My view of events: eight of us flew in the Wild Man's Trophy on the Saturday, which gave lessons on where to go – behind the hanger dodging the pines – if you missed the main lift. The site had thermals galore most of the week, with only the odd early and late slot providing challenges. But the hanger proved valid most of the week.

British results look modest on paper and again disappointing, to no one more than the three flyers themselves and their helpers. They hide especially the bitter personal disappointments and disillusion for Mike Raybone and Simon Jackson plus Phil.

Of the three, Neil Jones did best and to his delight he crept into the top 30! In all fairness, he did not have a slot where he couldn't catch the bunch with the lift, not that that is always easy! If he could have nailed a few more 100s in landing he would have ranked still higher.

Neil kept his cool and was least unnerved. One evening waiting for a late slot around 8:00 pm, the air turned chilly and Neil jogged off to keep himself and more importantly his fingers warm. As newcomer to international events, Neil thrived best.

Mike had the very worst of luck in practice before the champs, piling into the taxiway and destroying his Starlight on launch, still on the line. I say "his" but it wasn't. It was Dave East's Starlight, Mike's reserve, which made it even more of a loss. Then to cap it all, his first contest round was poor with less than 600, sure to be the throwaway.

All very demoralising, and Mike did well to recover reasonable scores in most - not all - of the remaining rounds. So by Monday night, in my mind we had one out, but two still in with a chance.

Simon started well with a 987 and his first Finnish 1000, then a 990 and – tragedy in the 4th slot - a bummer. So Tuesday, again to my mind, gave us two down, one to go.

Let's put this in context: my presumption was that if the UK team all got 9 minutes 50 plus, and 100 or perhaps 95 landing points, then they should reach the flyoff. On that basis, Neil was still in. But by Wednesday, feeling more relaxed and with time to spare, study of the scores showed that I was kidding myself. Some slots had flyers scoring 9 minutes 50 plus spot landing and coming sixth.

My "one down and two to go" was rubbish. Reality was that all three UK flyers were out of the flyoff by the end of the first day, barring catastrophes by lots of others. Plenty of well known favourites – Philip Kolb, Alex Hoekstra, Jan Kohout amongst them – made the odd error landing 10 seconds early or making 65 points on landing, and they were out.

In my opinion, this year's UK team performed as well if not better than any over the past four years, and we had the luxury of six keen and fit towmen. Anticipating the start became second nature with the standard recorded countdown, soon to be

adopted here. On the buzzer the helper simply launches. Landings were not up to 95 or 100.

If pressed to point a weakness, it's a reluctance to hack it in light shifting lift which cost dear in a few slots, and that's not surprising for such weather patterns in England are rare. Top pilots just circle gently and slowly at times when all is almost still, waiting patiently, not going up or down, until a wisp of lift gradually builds. Few UK flyers see it that way. They want and look for stronger lift. Leave the pack, and chances are they are doomed and down. British F3J standards have gone up. Snag is that standards in several other countries have gone up more.

The UK team held together in spirit. We had a great time, spent too much money – not all at local nightclub Doris or McDonald's - and shared in the delights of a closely contested championship set in a very different holiday town.

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Memories of F3J WC 2002: here are a few.

First, best thanks to CD Erkki Arima and his team. He cut most of the crap and got on with it, not always easy with lots of languages and an operational airport. His scoring and computer team was superb.

Other organisational matters went adrift. Where was the WC Programme? The final banquet was a disaster, even prize-winning teams did not get in. At the prize-giving ceremony, wrong anthems were played. Many competitors felt they were overcharged for what they got.

Thanks to all the Turks who helped UK team again and again.

Smallest junior competitor was Jouni Lauren from Finland, and he was unusual in that his spotter was also a junior. (Maybe CIAM should think of making that a rule, by the way!) They had a delightful way of working together, so simple and I have never seen it before. If the spotter advised moving left, he tapped the left shoulder; similarly for right. If he wanted you to come nearer, the tapped the middle of the back, forward he tapped the back of the head. The system seemed to work well and was a delight to watch.

The Japanese team came with hlg's again, as in Corfu, still the simple rudder/elevator, light balsa/foam wing, carbon kevlar fuselage, but this time SALing. What heights they could reach, followed either by super tight thermalling or a display of amazing stunts before coming back to hand. If Shuhei Okamoto who manufactures them for Craft Room in Japan would sell these in UK, he would have a winner. Even Joe Wurts was impressed.

Alex Wunschheim, the German team manager who is also Eurotour's F3K coordinator, had his hlg too, also impressive but far higher tech. The Japanese took out his complete tail in a collision when the two launched together too closely, Philip Kolb having warned that it could happen seconds before.

I enjoyed Larry Jolly's electric ornithopter, which looked for all the world like a real bird of prey. It flew for 7/8 minutes, could climb to good heights, hover and land in the hand just like a falcon. Hope to get more details of that soon.

Joe Wurts is normally a most modest guy, and another delightful chatterbox. From time to time he shows off. During the main contest, he limited that to spins or distance laps on the landing approach when space allowed.

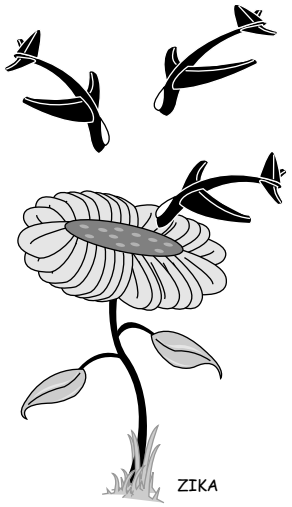
But during the Wild Man's trophy, he thermalled most of one slot inverted. In another round, he put his transmitter down on the ground and lay down behind his spotter, not touching the sticks for all of two minutes. When the model needed a correction, he used his toe. What made it memorable was that in the second flyoff round, he lost his landing bonus and top prize when the model slid and hit his foot.

But there's a purpose to this tale. My lesson from a week of fantastic flying is that the best flyers' models seem to fly themselves for long periods, a minute or more is not unusual. Then the pilot spends his time looking round the skies and reading the air. It takes me all my time to make sure I don't lose sight of the thing.

One more tale, not from Finland but Interglide, the weekend before. My group was short and we had the good fortune to be joined by Australians Carl Strautins and team manager Daniel Haskell. Both Carl and ex-UK junior Andrew Taylor made the flyoff. At the end of the two days, both Aussies taught me ways of saying "cheers".

The Aussies found it remarkable that so many people in Kent were drinking beers between slots. Alcohol and model flying are not mixed down-under. Now that could explain why we don't take the top places these days. I won't be rooting for an early Australian F3J WC!

End of gossip. ■



Jer's Workbench

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"Sailplanes 1945-1965" Written by Martin Simons

A Book Review

Most of you are probably well aware of Martin Simons' works, as he's been involved in gliding, both full size and R/C for more than 50 years. Over the years he has piloted about 150 different types of sailplanes and earned a well deserved Gold C Badge and two Diamonds. He is a first class, accomplished R/C sailplane designer, builder and flier.

Martin has authored many books over the years including Sailplanes 1920-1945, Sailplanes by Schweizer, and Model Aircraft Aerodynamics, three of my favorites. And, in his spare time, he's written many magazine articles for all of us, many of which appeared in past years as a series in *RCSD*.

Martin's newest book, recently released, is "Sailplanes 1945-1965." And, for me, it's not a book best left laying on a coffee table, even though it's beautifully bound, numbering 272 pages. Nope, this is a book destined to be read cover to cover, and more than once. The detailing on the 3-view drawings is absolutely amazing, and is accompanied with B&W or full-color photography and accurate historical tidbits and facts.

Before I provide a bit more detail on the book, itself, I guess I should explain insight gained over the years where Martin's writings are concerned. I feel I need to convey exactly why Martin's 3-view drawings are amazing and what's so important about having accurate tidbits and facts.

Martin carefully researched, and validated the accuracy on each and every plane in this book. He traveled to many countries searching for plans and any information that could be found buried in archives, corresponding with anyone who could assist or provide in the validation of sailplanes designed and built between the years 1945-1965.

No, we were not there while he was writing his book, but we've seen him work creating presentations, drawing 3-views from scratch using a professional graphics design program, following up on leads or modifications for two books, editing, and the like. Boy, is he a stickler for accuracy. (Any student fortunate enough to attend his classes at Adelaide, in Australia, must surely have been suitably impressed!)

You may be wondering why I felt it important to tell you a bit about Martin. It's simple. This is supposed to be a book review, but how does one do a review on something where there's nothing to compare and all the history and findings took painstaking research obtained over many years from sources, some of which can no longer be found?

Simply said, I'm pleased to have the opportunity to read Martin's new release first hand and personally thank him through the pages of *RCSD* for all he's done for not only us *RCSD* readers, but for the history he's managed to preserve for all soaring enthusiasts!

And back to the book...

I traveled from Argentina to Yugoslawien, the first section being about "The Old Tradition," in alphabetical order. I was captivated by stories covering sailplanes like the ever popular Grunau Baby-4 and Schweizer SGs 2-22. Unusual sailplanes rarely heard of include the Scnneider ES 526 Longwing Kookaburra and the PIK 5 Cumulus.

The next section, Part 2, focused on laminar flow, smooth skin. In this section, I read that in 1948, no American designer had produced a sailplane with a glide ratio better than 30:1. However, Dick Johnson and Harland Ross wanted something better. So, using their RJ-5, they spent thousands of hours re-working the RJ-5 and, by 1952, achieved a glide ratio of 40:1.

Part 3 takes us to the subject of glass ships, new materials and new problems. Since glass-reinforced (GRP) structures are relatively new, much had to be learned. These new materials were strong in tension and compression, but were highly elastic; in time, these problems were worked out. Some of the first GRP sailplanes include the Hirth Hi-25 Kria, Braunschweig SB-6, and Glasflugel BS-1.

Well, I found some great information for building my next scale model and, if any of you are looking for this kind of information, Sailplanes 1945-1965 is available in the U.S.A. from:

Raul Blacksten
P.O. Box 307
Maywood, CA 90270
raulb@earthlink.net

Additional ordering information can be found on page 18 of the May 2002 issue of *RCSD*. The cost is $64.95 plus $4 p&h, U.S.A.

For those of you outside the U.S.A., the book is available in German and English versions from Equip Publishers in Königswinter, Germany; or, Aviation Bookshop in London, VGC Sales Department, Midland County Publications.

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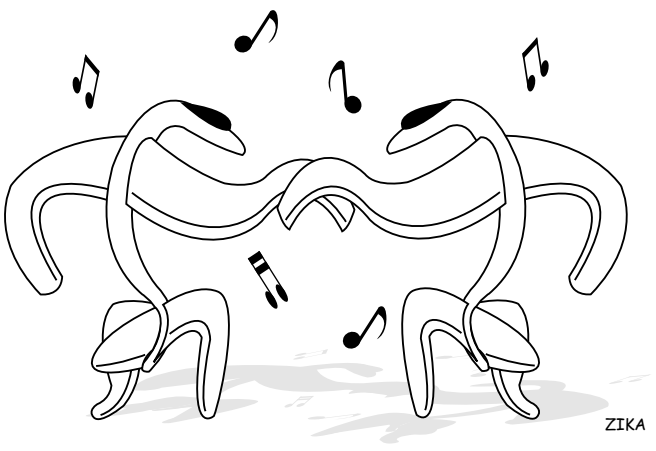

"The Sloper's Resource"

By Greg Smith of slopeflyer.com
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http://www.slopeflyer.com

Prodij 60-inch Racer from Aeromod

Every sloper needs the proper tools to take advantage of the slope experience and while almost any sailplane will fly at the slope, purpose built planes make the experience much better. Having a diverse arsenal at your disposal helps even more as specific planes are better suited to certain conditions than others. I plan to review slope planes from time to time and there is no better time than the present to get to it. So, without further ado, I bring you the Prodij 60-inch slope racer from Aeromod in France.

The Prodij is a sailplane intended for high performance slope flight, racing in the 60" class and for use with the catapults or bungee launch systems. Its small size makes it very handy without conceding too much performance. It is manufactured in France by Aeromod and is available in the US from F3x.com.

The wing is very strong and is made from carbon and glass. The top surface is formed in a mold and the bottom is bagged. It is not quite as pretty as a fully molded wing, but it is much more durable. I've whacked several saplings at one local slope with a postage stamp for an LZ and the Prodij bounces back for more. The ailerons go all the way to the tip and are 30 % of the chord allowing the pilot to significantly alter the airfoil through the use of the ailerons as flaps. The wing sits on top of a small pylon. This lets the ailerons meet in the middle with no interference from the fuse and is important because all the servos are inside the fuse. This setup gives the Prodij a very clean design and allows for effective use of the wing over a wide variety of conditions.

The fuse is a lighter lay-up than some slope ships I have but it is reasonably durable, even more so after a bit of crash damage repair. (Around here we fly at some spots with questionable landing spots or we don't fly!) The slip on nose cone also adds some strength up front. The fuse has fairly prominent seam. Some guys may want to take some time to smooth the fuse and repaint it. It does not bother me so I did not waste time on it.

The tail is a sandwich of balsa, fiberglass and balsa with the glass acting as the hinge. Simple, but strong and effective.

The servos mount to a ply palette and the palette is in turn screwed to the side of the fuse. I mounted mine on the left side of the fuse and there is enough room on the right to Shoo-Goo a 12 inch long piece of 1/2-inch diameter PVC electrical conduit for use as a ballast tube. I can get about 12 oz. with a steel bar and more with lead, although I have not cast the lead piece yet. On this plane 12 oz. is pretty good. The thing is already fast because of the thin airfoil and the clean wing so the weight helps it really cook.

A building note

The recommended silicone hinges for the ailerons are cool, but watch out for a reaction between the silicone you use and the tape that holds the ailerons in place while the silicone is drying. My combo of GE Silicone II and 3M blue painters masking tape was not the hot setup so I had to redo it. There was some reaction between the adhesive on the tape and the silicone. Lay a bead on the proposed masking tape and wait a day to see if the silicone cures properly. (This tip applies to any plane using silicone hinges).

I used this plane for the Unlimited Class at the Midwest Slope Challenge in 2001 and was very impressed with how fast it was in the light conditions. Several people commented on how quickly it accelerated when the nose was pushed down. In fact the acceleration helped me win one of the heats as we both dove for the finish line.

The durability of the plane was also tested at the MWSC in a race where the wind had come up allowing some good height to be gained before the start and as my competition and I dove for the starting line, holding until the last possible second to pull through, about 2 feet off the deck, he bounced off the top of my Prodij slamming me into the ground. I am not sure how fast we were going, but it was fast for sure. Several people thought the plane must have been destroyed. As it turns out just a small hole was punched in the nose cone and the tail boom cracked; easy enough repair and it is stronger now.

I had the Prodij DSing in South Dakota on a recent Slopin' Safari and it kicks butt. I noticed in previous flights that it handles like a larger plane and the same holds true in the DS circuit, especially with the ballast. It covers lots of ground and really retains energy well. I was getting 400-500 foot punchouts after building up the speed!

The Prodij flies a bit differently than most other planes. You can fly it like a conventional 60-inch racer and it will already be as quick or quicker than most. But if you really want to extract the most performance make sure you set up your radio to use the left (throttle) stick to work the trailing edge as flaps. To get the plane to fly in lighter lift and really haul in heavier conditions, you have to be able to add camber or reflex proportionally. I have the flap set at neutral when the left stick is in the middle and am constantly using the left stick to change the wing to maximize what I am doing. This is the way the designer intended the plane to be flown and a significant performance gain can be realized by taking the time to learn the slightly unorthodox style.

The best part about the plane, besides how well it flies and the durability, has to be the price. $215 last time I checked. If you are interested in one, call or e-mail Tom at F3x.com.

I've mentioned this before but the underwhelming response prompted me to mention it again, I am looking for slope stories from your experiences, from years past or days past. We want to know about your homebrew slope planes, construction techniques or thoughts on your new foamie. Especially if you are planning on producing a new slope plane or product for sale! We all want to know about it. *RCSD* is a super resource and in all likelihood the only pure R/C soaring magazine left in existence. Contributing an article from time to time will only strengthen an already great magazine. If you are interested send a note to greg@slopeflyer.com.

Until next time... ■

Classified Advertising Policy

Classified ads are free of charge to subscribers provided the ad is personal in nature and does not refer to a business enterprise. Classified ads that refer to a business enterprise are charged $5.00/ month and are limited to a maximum of 40 words. *RCSD* has neither the facilities or the staff to investigate advertising claims. However, please notify *RCSD* if any misrepresentation occurs. Personal ads are run for one month and are then deleted automatically. If you have items that might be hard to sell, you may run the ad for 2-3 months.

For Sale - Business

PARACHUTES: $12.50 (includes S&H U.S.A.) Send check or money order to Dale King, 1111 Highridge Drive, Wylie, TX 75098; (972) 475-8093.

Reference Material

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

BBS/Internet

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

International Scale Soaring Association

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

web site: www.soaringissa.org

Books by Martin Simons: "World's Vintage Sailplanes, 1908-45", "Slingsby Sailplanes", "German Air Attaché", "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

T.W.I.T.T.

(The Wing Is The Thing)

T.W.I.T.T. is a non-profit organization whose membership seeks to promote the research and development of flying wings and other tailless aircraft by providing a forum for the exchange of ideas and experiences on an international basis. T.W.I.T.T. is affiliated with The Hunsaker Foundation which is dedicated to furthering education and research in a variety of disciplines. Full information package including one back issue of newsletter is $2.50 US ($3.00 foreign). Subscription rates are $20.00 (US) or $30.00 (Foreign) per year for 12 issues.

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

Sailplane Homebuilders Association (SHA)

A Division of the Soaring Society of America

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

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

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

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.

http://www.silentflight.org

The Vintage Sailplane Association

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

Vintage Sailplane Association
1709 Baron Court
Daytona, FL 32124 USA

ESL

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

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

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

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

ESL Web Site: http://www.e-s-l.org

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

NO LANDING! THOSE ARE SHED PARTS...