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Radio controlled
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"ON THE WING..."

Photography features Bill and Bunny Kuhlman, *RCSD's* monthly "On The Wing..." columnists. Their monthly column is dedicated to flying wings and, this month, Bill takes us behind the scenes with B² in an in-depth, special interview with Bill Kuhlman, included in this issue.

R/C Soaring Digest (RCSD) is a reader-written monthly publication for the R/C sailplane enthusiast and has been published since January, 1984. It is dedicated to sharing technical and educational information. All material contributed must be exclusive and original and not infringe upon the copyrights of others. It is the policy of *RCSD* to provide accurate information. Please let us know of any error that significantly affects the meaning of a story. Because we encourage new ideas, the content of all articles, model designs, press & news releases, etc. are the opinion of the author and may not necessarily reflect those of *RCSD*. We encourage anyone who wishes to obtain additional information to contact the author. *RCSD* was founded by Jim Gray, lecturer and technical consultant. He can be reached at: 210 East Chateau Circle, Payson, AZ 85541; (520) 474-5015, <jimpeg@netzone.com>.

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The Great Midwest Oc-Tow-Berfest 1999

The back cover features photography from ***The Great Midwest Oc-Tow-Berfest 1999****. A detailed report from Peter George, St. Louis, Missouri, follows:*

"Here are a few shots from last year's Oc-Tow-Berfest. The event drew pilots from 12 states who aerotowed many beautiful scale models for four days. The 1/3 scale Fox model is from the Ripo kit and is owned by Robin Lehman from New York. Robin is the person most responsible for the growth in popularity of large scale sailplanes and aerotowing in North America. During the event, Robin performed the aerobatic routine that he flew at last year's Acro-Cup aerobatic championships for scale gliders, which was held in Germany.

"Well over 150 aerotows were completed with no crashes! It takes two to tow, which means that there were over 300 flights completed and everyone went home with their models in one piece. Three pilots went home with pilots choice awards. Joe Naber of St. Charles, Missouri took home the trophy for Best Vintage model with his 1/4 scale ASK-8 from a Flair kit. Landon Grindstaff of Ashville, North Carolina won the trophy for Best Modern with his 1/3 scale DG-600 built from a Rosenthal fuselage and flying surfaces made from scratch. Rusty Rood of Pensacola, Florida was awarded the trophy for Best Towplane flying his trusty Telemaster powered with a Walker 3.2. Everyone went home with attendance prizes and great memories.

"This year, Oc-Tow-Berfest 2000 is scheduled for September 29 through October 1. Sponsored by the Midwest Air Wing R/C club, the event will be held just across the Mississippi River from St. Louis, Missouri at the club's field in South Roxana, Illinois. The venue is perfect for aerotowing with plenty of room and an abundance of thermal activity. Like last year, the field will be open for early arrivals on Thursday. Flying begins after the 9 A.M. pilots meeting.

"Please post this info. on the event calendar. It would be great if you could include a few photos and some or all of the above copy in an upcoming issue of *RCSD*. The publicity would be greatly appreciated."

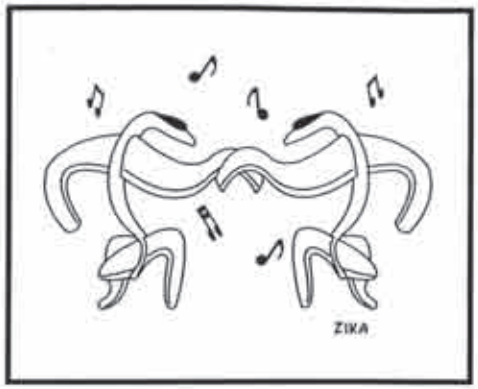
And, so we did, Peter! Thanks for the update!

In a separate e-mail, Peter also said, "If you can only publish one (photo), I hope that it is of Robin's model. If it wasn't for him, our event and others like it would probably never have happened."

Thanks for the reminder, Peter. Robin has, indeed, done a great deal for our hobby. Sometimes we kinda take things for granted, and it is important that we give credit where credit is due!

Our very special thanks to Robin Lehman for his ***time***, ***energy***, and ***devotion*** to our wonderful hobby. And, especially, for ***sharing*** his expertise with ***all of us***!

Happy Flying!
Judy & Jerry Slates



Jer's Workbench

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Bowlus Baby Albatross - Part III

This month, I want to share a letter from Bob Harold in Wisconsin.

"Your series of articles on the construction of a Bowlus Baby Albatross in *RCSD* is going to generate a lot of interest. I built mine from Col. Thacker's plans in 1996. Dave Garwood had a nice picture of it on launch at the 1997 NATS that appeared in *Model Aviation*. That picture created a number of requests for information on plans, etc.

"I have attached a summary of the tips and comments that I have sent to several modelers. It may be of interest to you. My biggest eye opener was that since the Baby Albatross was built as a homebuilt kit, everyone was different.

"Feel free to use anything that might be of interest to you.

"I just got back from a ceremony at Arvin, California where the old glider site used in 1940 was designated as the 10th historic gliding site. Old timers spoke at the banquet and most of the flying activity involved the Baby Albatross. I had a chance to meet Ruth Bowlus. Henry Stiglmeier told the story of "Soaring In A Thundercloud" that is printed in Frank Zaic's "Model Glider Design."

Lots of Lift,
Bob Harold

Thanks, Bob! Having read your excellent summary, I wanted to share it with all the readers. And, with that, readers, Bob's summary follows!

MODELING THE BOWLUS BABY ALBATROSS Updated May 2000

by Bob Harold

The plans are available from Bill Northrop's Plans Service, 2019 Doral Court, Henderson, NV 89014. Phone (702) 896-2162, FAX (702) 897-7775.

The 1975 plans were published in *Model Builder* magazine and are based on a prototype Baby Bowlus and not the production design. I made many modifications to the plans so my model would match an existing one. There are at least three full scale Baby Albatrosses that are flying and one more in a museum. I wanted to enter mine in scale contests, so I had to build to match the pictures of the particular Baby Albatross that I had selected.

A short kit for the Baby Albatross is available from Ray Hayes of Sky Bench Aerotech, P.O. Box 316, Washington, MI 48094, Phone/FAX (810) 781-7018.

A short kit for the Baby Albatross is available from Klarich Custom Kits, 2301 Sonata Drive, Rancho Cordova, CA 95670, phone (916) 635-4588, and fax (916) 635-3080.

I have lots of small detail comments about the Thacker plans. The best one is the one from Ray Hayes - use micro servos on the spoilers. My mind set was string and eyelet's for spoiler actuation and it was the biggest pain on assembly. Now the spoilers are controlled by separate HS-80 servos in the wings.

I have HS-85 servos out in the wings at the ailerons. There is room for the extended servo leads and connectors to squeeze down between the boom and the top of the pod planking, with a little cutting.

I believe that the short kit from Ray Hayes uses conventional all balsa trailing edges. I followed the plans and used 1/16 in. wire. If you plan on a wire TE, add plywood tips & balsa pieces to anchor the wire TE and tips. I added 1/8 balsa at top of rudder so wire could be well anchored. The stab tips had a similar piece of 1/8 balsa.

The plans say to epoxy the wire TE to the ribs and, if they come loose, just CA them. I drilled a 1/32" hole near the TE of the plywood ribs and tied the wire to the ribs using Kevlar thread or fine copper wire depending on the angle of the wire to the rib. Epoxy the thread or wire and the wire TE will stay in place.

The plans show 1/64" plywood shear webs glued to the face of the spars. I have had bad luck with thin plywood and CA. I used 1/8" balsa shear webs, vertical grain, glued in between the top and bottom spars with white glue. The 1/16 in. plywood ribs give the wing extra strength. My model crashed several times in 1999 before I realized there was a bad battery switch connection. The wings held together well. The ribs at the inner end of the aileron warp from the covering tension, so they perhaps should be thickened to 3/32.

The wing D section was covered first with 1/32 birch plywood. Balsarite was applied to the wing ***and*** to the fitted piece of paper backed mahogany veneer (about .012" veneer and .015" paper). The average builder might want to just apply mahogany stain to the birch plywood on the wing and avoid all the fitting of the mahogany skin.

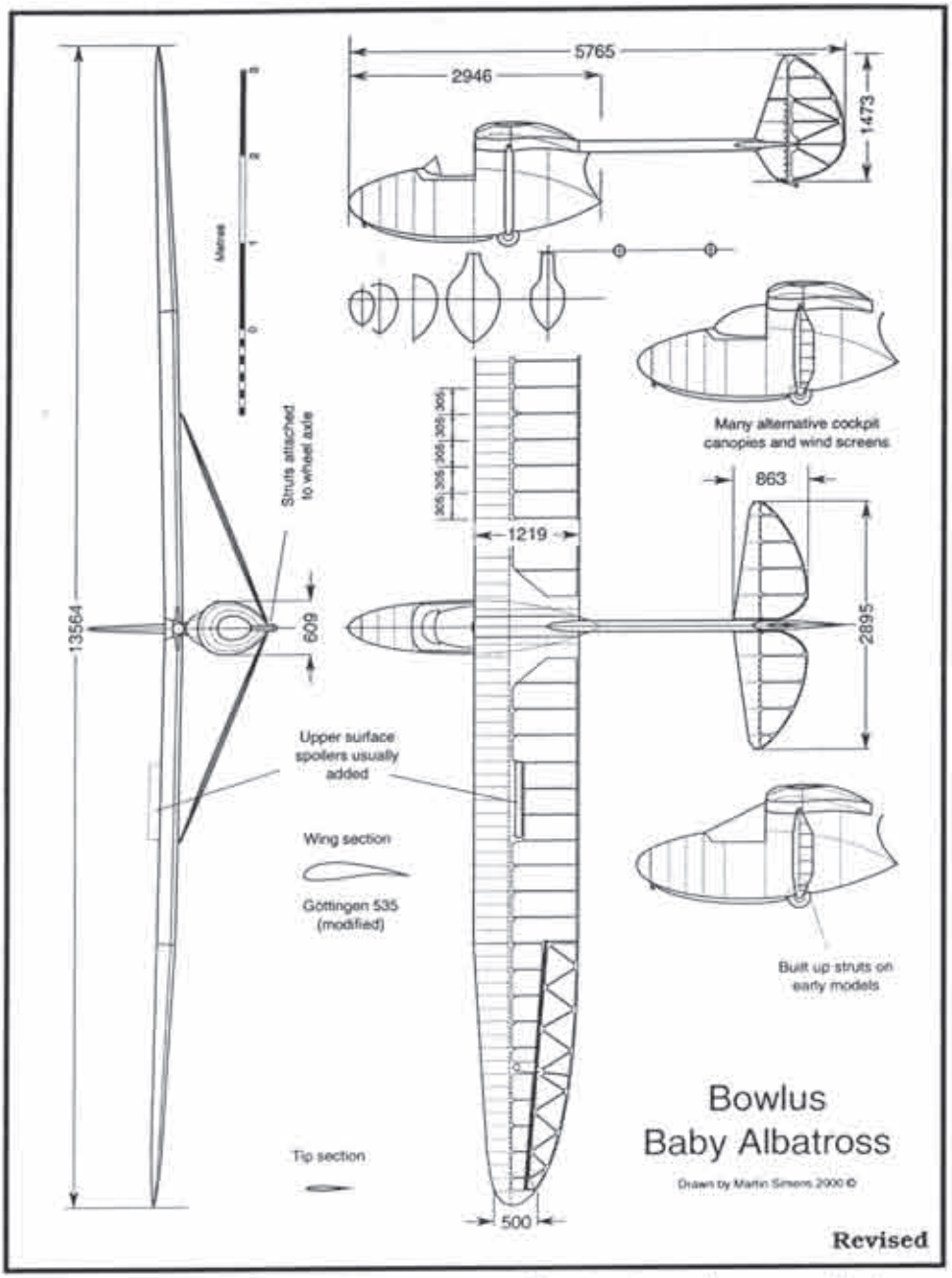
During pod construction the wheel axle hole must be drilled through first and then, as planking is added, one side must be kept open to align the drill to drill out the new planking, glass cloth, and final planking. One side was always open so the opposite side could be drilled out again. Mount the three servos in the pod at the angle shown before the pod is completely planked. The planked pod is sanded smooth, glassed, and then covered with shelf contact paper, paint or veneer.

I used 1/32 mahogany veneer on the pod. I dusted each piece with baking soda, put CA on the pod and then held the piece down with all my fingers for a count of 50 until the CA fired. Earlier I tried Balsarite on just ***one*** surface but apparently the 1/32 veneer was too good an insulator and the Balsarite did not get hot enough to hold. There are 65 to 70 separate pieces to cover the pod. If I did it over I would try Balsarite on ***both*** surfaces since this worked well on the wing with a thinner veneer. The way I did it requires chiseling off any piece that I had to replace due to sanding through. Balsarite can just be reheated to remove a piece. Another mistake I made was to use too heavy a coat for the first several applications of water base varathane, and this warped some of the veneer. The answer is to use *very* light coats at first until it is sealed.

The wing struts are constructed with music wire, kevlar thread, and hardwood inside 1/2 in. wide K&S airfoil shaped tubing. I made strut brackets from steel, bent into a square U shape. I screwed the U brackets to the pod and to the wing for strut attachment instead of just beveling the struts and adding a screw as shown on the plans. The struts contain 1/8" music wire, notched, inlayed and tied to hardwood inserts 3" long. Kevlar thread binds the notched MW to the wood and also goes around the wooden tongue that extends past the end of the strut. I covered everything with epoxy and squeezed the assembly into the aluminum strut, after determining the exact screw center to center distance for the struts. An aluminum strap caps the wooden tongue and is screwed through the strut and hardwood. A screw goes through a hole in the tongue, the holes in the U bracket, when assembling.

Errors in plans - Lower notches are missing in Former G, aileron tip rib W12-A is short, plans say to cover pod with 1/8 balsa strips but instruction sheet says use spruce for the lower two inches. The plans were drawn up by the staff of *Model Builder* magazine, from the completed model and from some very rough drawings, so some internal details are missing. The plans show an oval cross section of the pod but pictures show that it should be egg shaped with the small end down. The sub rudder is 5/8" ahead of where it should be for the version that I modeled, Jim Stoia's NC 17641. The outline of the rudder and stab do not quite match the three view that I used, that of Jeff Byard's NX-1266N. The plans leave much unsaid, so the builder should be innovative.

The full scale Baby Albatross and some models of it have had problems with a twitchy stab. This area needs special care to account for close-coupled wires, overbalanced stabulators, and crowded cable. Special care is needed when drilling holes in the boom. I used press fit gray foam to hold control rod tubing in place at three locations in the boom. The critical stabulator control was with heavy stranded cable. The limited space in the sub-rudder is challenging since the stabulator must operate freely without any binding. The two stabulator wires are very close together and there is a lot of surface area ahead of the front wire. I moved the sub-rudder back 1/2" to match the plane I was model-



ing so there was even less room than shown. The stabulator would be more stable with the two wires spaced farther apart. I used a nylon bellcrank with 1" arms. You could make up a bellcrank with longer arms by laminating plywood. I took special care with all aspects of the stabulators. I have had no trouble except flutter one time when I was too aggressive on the winch.

Start browsing through the hardware stores and look in the bath and plumbing sections for an aluminum shower curtain rod 1" Dia., 1/32" wall. If you have no luck then look at aluminum extension handles for brushes. The tubing is around somewhere, but you have to find it. I found a 6' piece of shower rod. After carefully drilling the holes, the stabulator, rudder and wing did not have good alignment with each other. The boom is 33" long so I had a second piece. Each hole was carefully marked, drilled undersize, checked with small music wire and a square with the other holes. If okay then the holes were progressively drilled larger and checked each time. I still had to glue in an aluminum sleeve and file out one hole over again to correct a misalignment.

Wing hooks - Two pair were not enough, I added 4 more pairs for a total of six hooks on each wing root. Small rubber bands go over the top of the boom instead of through it. I used wheel collars on the wing rods to give solid support against the boom instead of having the wing root pushing on the top of the pod planking.

The center wing cowl that covers the center gap is made from two layers of 1/64 plywood epoxied together with a layer of glass cloth in between, while against the upper wing contour over Saran wrap. This is covered with two pieces of aluminum cut from an aluminum can CA'd together to get the chord length. The aluminum is too smooth for a good epoxy bond with the plywood. Use 3M77 instead of epoxy. I am still looking for the best way to attach the front of the wing cowl. I have tried hooks into the rubber bands, and Velcro without success. In 1997 and 1998 I taped the front end of the cowl to the wings. For 1999, I ran two .020" wires from the front of the cowl, under the LE of the wing back 1.5 in. to small screw heads. This will give way in a crash and not tear anything.

When I launched the Baby Albatross at the '97 NATS, the launch height was not enough for me to complete all 9 maneuvers in one flight. Since then, the two side tow hooks were moved back 1/4 in., to directly under the front of the wing leading edge. Now it climbs high on launch. It also ROG's after a very short roll. An ROG launch is safer than a hand launch. There is no easy way to hold and throw the BBA with only two hands.

I have a wheel brake that initially was on the same channel as the spoilers. I had to make an override gimmick on the brake servo linkage to avoid servo over travel problems.

Are you going to enter your Baby Albatross in a future scale contest or do you just want to fly it for sport? The answer makes a big difference. If you are going to fly only sport then build it and enjoy flying it. However if you plan on entering it in a scale contest then here is the rule to follow:

DO NOT START BUILDING UNTIL YOU HAVE FINISHED COLLECTING ALL OF THE SCALE DOCUMENTATION AND HAVE SETTLED ON A THREE VIEW DRAWING.

I first thought that all of the Bowlus Baby Albatross were the same as the plane shown on the plans. The Baby Albatross was sold as a homebuilt kit and each builder did things a little differently. I have studied pictures of four of them and they are all distinctly different. The plans are for one particular ship and it does not truly represent some others. I had the pod underway when I noticed it did not match the pod of the Baby Albatross that I was modeling. There is a variation where the pod meets the boom at the trailing edge of the wing. There are variations between Col. Bob Thacker's Baby Albatross and the production versions. Bob Thacker's plans were of the third prototype, and not of later production Baby Albatrosses. The plans are for N-25605, which is serial No.14. N-25605 is the Baby Albatross that is in the Seattle Museum of Flight. In order to model a production ship, I had to make a number of changes to the plans. Thacker's plans show the leading edge of the wing about 1/2" ahead of the headrest. Production versions had the wing leading edge flush with the head backrest. I added a former to move the headrest ahead by 3/4 in., to be even with the wing leading edge. The scallop between the pod stinger and the boom was cut back an inch deeper to match the plane I was modeling. I thinned the pod cross section at the last former, Former H. The cross section of the pod is not oval as shown on the plans but is egg shaped with

the narrow end at the bottom. There were also some minor differences in tail contour and in the relative axial locations of the stab, rudder and sub-rudder.

Do not make the common mistake of building the plane and then trying to document what you built. If the tip of the rudder of your plane does not have the same shape as on the three-view drawing, then it may result in points off on the static scoring. At the 1991 NATS, one judge thought my vintage scale model Reiher 2 wing tip and aileron shape did not match the three-view drawing. My three-view of the Reiher had both the Reiher 1 and Reiher 2 wing tips shown and I should have crossed out the Reiher 1. Changing the three-view to match you plane is the same as cheating, so don't be tempted. In my BBA search, I collected pictures and three-views from the Vintage Sailplane Association, from Bob Banka's Scale Model Research, and from Martin Simons great book, "Vintage Sailplanes". Today, I believe there are only these four complete BBAs in existence:

1. The #3 prototype N25605 as shown on Col. Bob Thacker's plans
2. Wayne Spani's N4627V with pictures from VSA and from SMR
3. Jeff Byard's NX-1266n with pictures from SMR
4. Jim Stoia's N17614 with pictures from Jim Stoia

Three are flying and the first is in a museum. There is also a two place BBA in the National Soaring Museum at Harris Hill, Elmira, NY. None of them are the same. I spent a lot of time scaling photographs.

Obtaining Documentation

Here are some steps you can take to obtain documentation:

- Join the Vintage Sailplane Association. They are a non profit organization and you have to be a member before you can buy the $20 BBA information packet. You could write for more information. VSA, 13312 Scotsmore Way, Herndon VA 22071. The dues are only $15. Their publication is the *Bungee Cord*. The 3-view in the documentation kit from VSA is of the early version, not the production version.
- Buy a copy of the latest catalog ($8.00) from Scale Model Research: Bob Banka's *Aircraft Documentation and Resource Guide* (Scale Model Research, 3114 Yukon Ave., Costa Mesa, CA 92626). The web site is http://www.imt.net/~ims/scale.html. I obtained a 3-view of NX-1266N from Scale Model Research, and it does not match N17614. Buy the current catalog from Scale Model Research. Each year the catalog lists packs of pictures and three-views that are available. The catalog also has scale articles written by people who know what they are talking about, giving tips for a successful scale model. I have copies for three successive years and they are all good.
- Join the International Scale Soaring Association. For more information about the ISSA, write to ISSA, 37545 Oak Mesa Drive, Yucaipa, CA 92399-9507. Their publication is *The Towline*.
- Buy the book "THE WORLD'S VINTAGE SAILPLANES, 1908-45", by Martin Simons. This great book is full of pictures and stories. The cost is about $60. It is published in Australia by Kookaburra Technical Publications Pty Ltd, Melbourne. It is available through the VSA. It has two pictures of Number N 25605 and a three view. (For more info. contact Raul Blacksten, P.O. Box 307, Maywood, CA 90270, <raulb@earthlink.net>.)
- Buy the book "SCALE MODEL GLIDERS", by Cliff Charlesworth. Published by Traplet, UK, it's full of building and flying hints and other good information. It contains a three view of the BBA.
- Obtain pictures of some or all of the four Baby Albatrosses and decide which one is the one you want to model.
- Scale models are static judged on Outline, Color, Markings, and workmanship. Flying is judged on five mandatory maneuvers and five optional maneuvers. Realism in flight is one category. Obtain a copy of the AMA Rule Book and study event 517.

What follows is a copy of the scale documentation write up that I used for my BBA when I entered the model in RC Sport Scale, Sailplanes at the 97, 98 and 99 NATS. I have never seen another scale write up, so mine probably has a lot of room for improvement.

BOWLUS BABY ALBATROSS

1. INTRODUCTION

The Bowlus Baby Albatross was a home built sailplane kit introduced in 1938. About 90 kits were sold and about 50 were completed and flown. The pod and boom is distinctive.

The most complete source of information on the Baby Albatross came from a three-part article in the *Bungee Cord*, titled "Where Have All the Babys Gone? The Bowlus BA-100 Baby Albatross," the results of a thirty year collection of information by Jeff Byard. The BA-100 kits were originally sold without any provision for a **windshield** or canopy. This detail was left to the individual builders and a variety of different windshields and cockpit covers were adapted to the "Babies." None of the Babies came from the factory with **spoilers**. Their owners eventually fit many BA-100s with a wide variety of spoilers. The wheel was fitted with a **brake**. While test flying Serial No. 110, Stanley W. Smith was landing towards the hangar when the brake failed causing him to crash into the hangar.

The model documentation search was consolidated to information on four ships, all different:

#1 N25605

This was the number 3 prototype. Col. Bob Thacker built a 122" wing span model, and the plans were published in *Model Builder* magazine, 1975. This version has some differences from the later production design of the Baby Albatross. The wing is set more forward, the curve from the pod stinger to the boom is shallow, and the tail shape is slightly different compared to production versions of the Baby Albatross.

#2 N4627V

This restored ship is owned by Wayne Spani. Photographs are available from Vintage Sailplane Assn. and from Scale Model Research. This ship has spoilers and the pod is painted.

#3 NX-1266N

This restored ship is owned by Jeff Byard. Photographs are available from Scale Model Research. This ship has built up airfoil wing struts.

#4 NC17641, Serial No. 174

This restored ship is owned by Jim Stoia. Photographs are available from Jim Stoia. This is the Baby Albatross that is modeled.

The 122" wing span model was built from Thacker's plans, modified to agree with Stoia's N17641. The scale is 2-3/4" = 1'. The wing was first sheeted with birch plywood back to the spar, and then covered with mahogany veneer, extending around the leading edge to match the full scale Baby Albatross. The ailerons and tail have wire trailing edges to match the full scale ship. The pod is covered with mahogany. The wheel has a brake. The model has spoilers per N4627V. The outline, color and markings are per the photographs of NC17641.

DECLARATION

The prototype was designed to be a floater and was not intended for aerobatics.

The model has three scale operations: (1) spoilers, (2) wheel brake, and (3) aerotow release.

The model was built from modified plans of N25605.

I declare the following parts of my entry were purchased or supplied and not made by the contestant:

Signed

_____

Wheel and hub

Stars and registration number decals on rudder

Aluminum tubing for boom

K&S Aluminum airfoil wing struts as part of strut assembly

2. OUTLINE

The three-view of NX-1266N is the closest to NC17641 of three available three-view

drawings. Photographs of the full scale NC17641 are included to supplement the three-view drawing where there are significant variations.

N17641 has the following ***differences from the three-view outline drawing of NX-1266N:***

Steel airfoil wing struts instead of ribbed built up wing struts

Windshield size and shape

No extended tail skid

Different scallop curve from stinger of pod to termination at boom behind wing trailing edge

Four ribs in each stab half, not three (Pictures of NX-1266N show four ribs, not three.)

NX-1266N and NC17641 do not have spoilers. Spoilers of N4627V are shown in the photographs.

3. COLOR

All wood surfaces are clear finished mahogany. The rudder is finished with red and white stripes, with a ring of white stars over a blue background. The fin and sub-rudder are mahogany, like the leading edges of the wing and stabulator. The pod is trimmed in yellow. The fabric is clear finished glider cloth.

4. MARKINGS

The Registration No. NC17641 is on the rudder. The wing does not have registration numbers because that is not a present FAA requirement. Originally, the CAA required large numbers on top and bottom of the wing in addition to small numbers on the tail. The characteristic Baby Albatross rudder markings consist of a circle of white stars on a blue background, and red and white stripes. The pod is trimmed in yellow.

— End of Scale Documentation —

The Baby Albatross was the inspiration for the Frank Zaic's Thermic series of tow-line gliders. I still have a 50-year-old pod and boom Thermic 100 that has a short tail just like the Baby Albatross. The reason that the boom is short is that in 1938 the available aluminum tubing had a maximum length of 12 ft.

If you get stuck on some part or just wonder how I did it, then give me a call or send me a note. I took all winter to build my Baby Albatross and some of the problems had to rattle around in my head for a while before I figured out what to do, such as attaching the covering to the wire trailing edge.

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HAVE SAILPLANE, WILL TRAVEL!

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This column is dedicated to soaring vacations. This month, Tom Nagel takes us on a walk through the U.S. Air Force Museum.

A Trip to the U.S. Air Force Museum

It was cold and gloomy; perhaps because it was Earth Day the weather gods had decreed there would be no sailplane flying. So Andrew and I drove over to Wright Patterson Air Force Base near Dayton to re-visit the US Air Force Museum.

Andrew wanted to compare the P-61 Black Widow to the plastic model he had just finished. I wanted to check the U-2 to see if I had gotten the fuse shape right on the Rick Powers foamie I was building.

On this visit, Andrew and I were keeping two lists:

(a) The Butt-Ugliest Airplanes Ever Built, and

(b) Sailplane Related Aircraft.

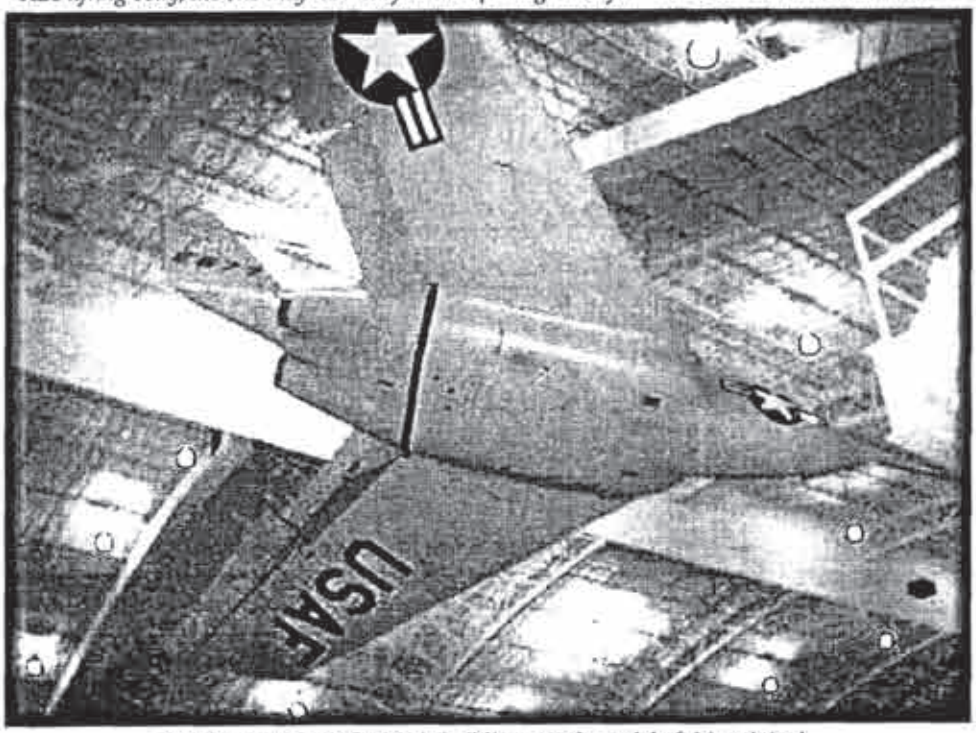
First, the Butt-Ugly

Andrew is 11. This is his favorite category.

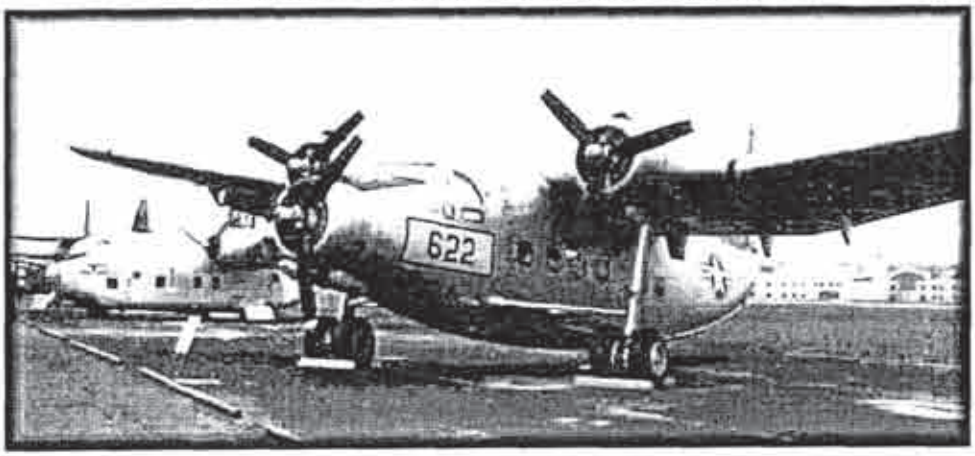
1. The Loening OA-1A amphibian. This one is so ugly the digital camera refused to form an image.
2. The Martin B-10 bomber, the original Blue Meanie, bulbous and awkward looking.
3. The XF85 Goblin parasite fighter, designed to be carried and dropped from B-36 bombers. It looks like a silver pumpkin with control surfaces and flew pretty much the same way. Aerial refueling made this goblin go away.
4. The Grumman A-12 Duck. Truly an ugly duckling.
5. And my personal favorite for over-all ugly, the Northrop YC-125B "Raider", an awful looking tri-motor with fixed, stilt-like landing gear, a pot belly, lumps all over its wings, and a ladder up the side of the fuselage, just in case there wasn't enough drag already.

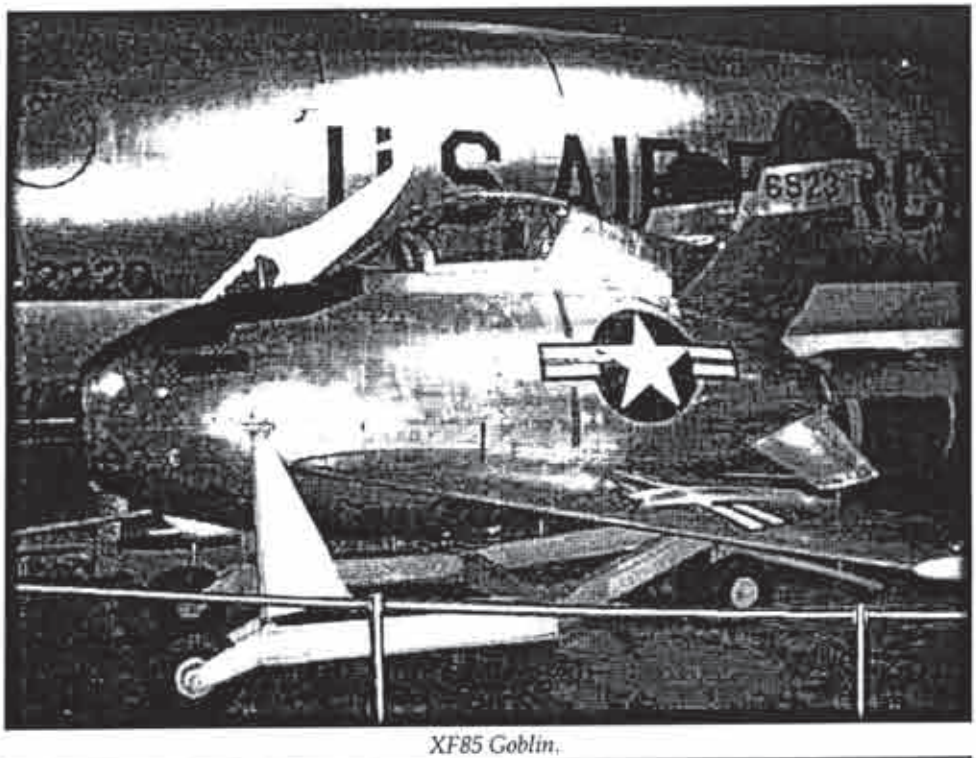
Northrop YC125B "Raider".

X24 lifting body, the one they rebuilt after the opening shots for "The Six Million Dollar Man".

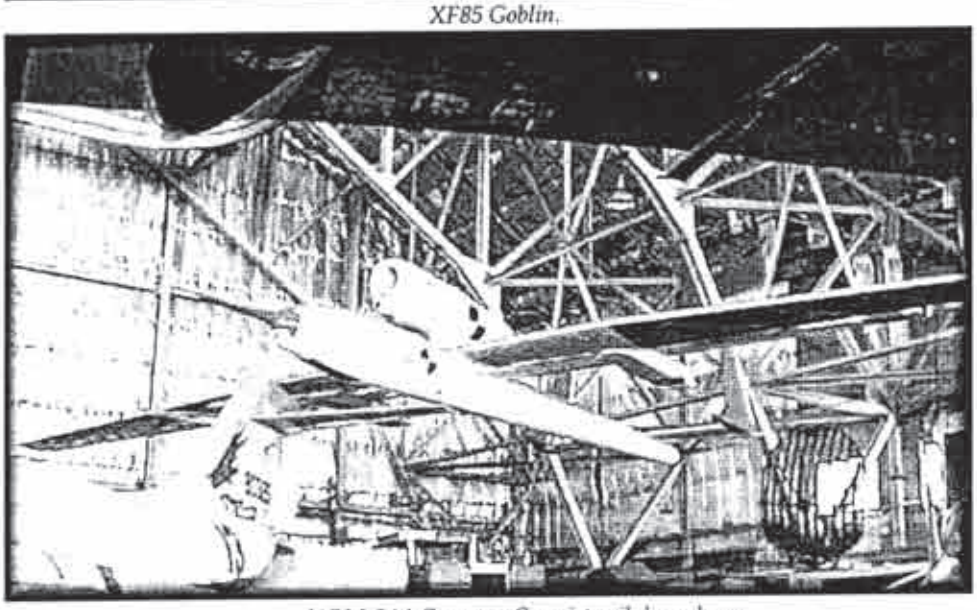


X-4 Bantam. Steve Savoie is building a scale model of this original.

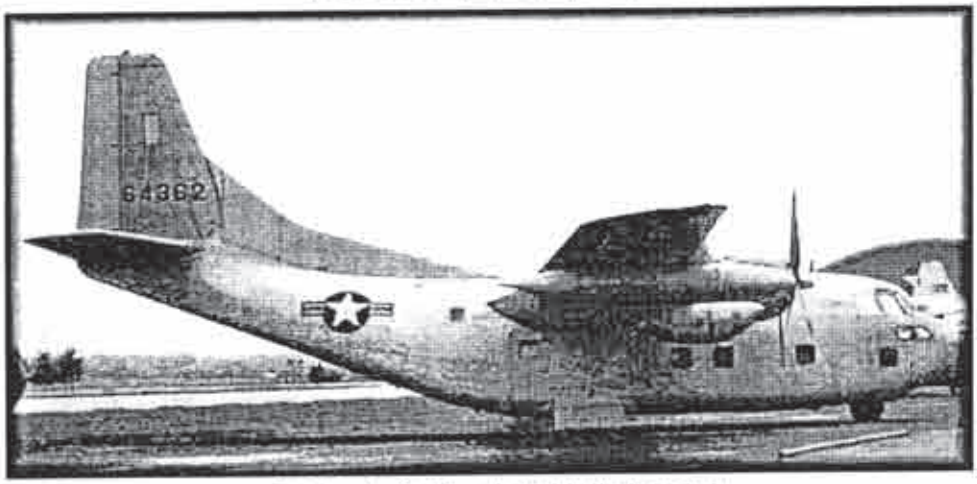




XF85 Goblin.



YQM-94A Compass Cope jet sailplane drone.



Patches, the C-123 with 1000 bullet holes in it.

OK, Now on to Sailplane Related Aircraft

1. The U-2A. Who would have thought that a sailplane-like jet would evolve from the F-104 Starfighter? But that is just what happened. The Museum's U-2A is an early model, painted flat black, and hung up high near the ceiling of the modern flight gallery, and thus hard to inspect or photograph. A plastic Revell model in the gift shop, however, revealed that I had gotten the nose and inlet area all wrong.
2. The C-123 Provider. Did you know that the C-123 started life late in WW-II as a design for an advanced cargo glider? Engines were an afterthought. The museum's example, "Patches", is a Vietnam War Vet, and gets its name from the metal patches over more than 1000 bullet and shrapnel holes it picked in combat.
3. The X24B Lifting Body. This is what the USAF used as a supersonic glider before the Space Shuttle program. It looks like a good subject for a PSS sloper, if you have a slope with 200 mph winds.
4. The Northrop X-4 Bantam trans-sonic flying wing. *RCSD* columnist Steve Savoie is doing a PSS model of this design. Testing showed that flying wings do not do well in the trans-sonic range. Sloping should work better.
5. YQM-94A "Compass Cope". A pilotless project from the early 70's, this jet powered RPV with a 90 foot wingspan took off and landed from regular runways, and had a duration aloft of more than 24 hours. Several LSF-V guys got their start working on this project, I hear.
6. The Culver PQ-14B. Not a glider, but a neat looking RC drone from WW-II.
7. The Dehaviland Mosquito. Once again, this famous British light bomber was not a sailplane, but it was built like a giant, cross country Gnome from spruce and balsa and was an early version of stealth technology, being mostly transparent to the radar of the day.
8. The WACO CG-4A "Hadrian" Cargo Glider. My guess is this plane was named after Hadrian's Wall in England, because in combat conditions the landings felt like the plane had been flown into a wall. Built by the thousands as a disposable aircraft, the WACO hangs in a dark area of the WW-II gallery. To see a photo, check out the museum's web site: wpafb.af.mil/museum/. The WACO glider was built in Troy, Ohio, not far from the museum and not far from where DJAerotech's Don Stackhouse and Joe Hahn build gliders today. It must be something in the water.
9. Schweizer TG-3. Did you know that this model was used by the Air Corps in WW-II to train cargo glider pilots? Maybe that is why I have never been able to thermal a TG-3.

10. When it came time to head home, I couldn't resist striking a presidential pose on the steps of Air Force One. This plane is practically a national landmark with jet engines, having served all presidents from Kennedy to Clinton. It was recently put on display at the museum.

This is the plane that took President Kennedy to Dallas, and flew President Johnson back to Washington. This is the plane that flew Kissinger to Paris for secret talks to end the Vietnam war, and the plane that flew Dick Nixon to China. It is the plane that carried Nixon out of Washington to exile in San Clemente.

Gerald Ford fell down these very steps, and Jimmy Carter was attacked by a crazed stewardess while on board. Ronald Reagan slept on board, even during meals.

President Bush recycled meals onto Japanese visitors. And Bill Clinton, in retaliation for Carter, attacked the stewardess. You have got to feel a sense of history when you stand on these steps.

Flying at the US Air Force Museum

There is an aeromodeling club on base, the WRAMS, but you have to work at the base to be in the club. The RC flyers use the old taxiway; the free flight folks use the old inactive runway. Some of DJ Aerotech's new designs get tested by WRAM club members on the museum grounds. Although you can't fly at the museum, there is a pretty good west facing slope site nearby at the dam at Buck Creek State Park, near Springfield. And the Dayton sailplane club, the DARTS, fly from a field near WPAFB in Yellow Springs, Ohio. They hold monthly contests on the 3rd Sunday of each month, and welcome visitors. Check out <www.dma.org/DARTS/>.

Directions to the Museum

The US Air Force Museum is located in Fairborn, Ohio, a Dayton suburb, just off I-675 or US Route 4, a couple of miles south of I-70. Abundant signage leads you to the entrance. It is about an hour's drive from AMA headquarters at Muncie, and would make a great side trip from the NATS.

Parking and Admission are free; there is a charge for the IMAX theater. The large museum gift shop is a great source for scale aircraft three-views and documentation. The on-site cafeteria overlooks the flight line. The museum is open 9 a.m. to 5 p.m. seven days a week, closed only on Thanksgiving, Christmas, New Year's Day, and Curtis LeMay's birthday.

For more information call 937-255-3286 or check the web site <wpafb.af.mil/museum/>.

***

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* ■

CROSS COUNTRY SOARING

Scott Gradwell
Medford, Oregon
rcpilot@cdsnet.net

This month's column is going to be a little bit brief; everything seems to need my attention all at the same time.

The old method of scoring full size contests utilized a team of people, all volunteers, of course. There would be people needed to run the start gate, finish gate, develop turn point photos, and figure out the score. If not enough people could be found, it might effect the ability to hold a contest.

I know you are wondering what this has to do with Cross Country soaring, but hopefully by the end of the column, you will see how it ties together.

GPS Flight Recorders

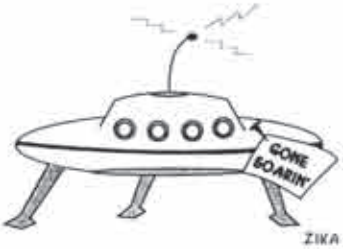
Last year, I was the scorer at a full size sailplane regional contest. It was the first regional contest to be scored completely using GPS flight recorders. After their flights, pilots would bring in their "black box" and I would download and analyze the flight. By the end of the contest I could have this done in about 5 minutes. So, contests went from needing a team of people for hours on end, to needing one person for about an 1 1/2 hours. In addition to utilizing the GPS flight recorders for contests, pilots can use them for badge flights or just use them as a learning tool to look back over their flights and analyze what they did, right or wrong.

So you may be asking, where does R/C Cross Country soaring fit into all of this. Recently, I looked into the latest offerings of hand held GPS receivers. I was really surprised at how small and useful the units have become. This is not a comparison between manufacturers or models, and I don't have an unlimited budget, so I had to choose only one. After looking through what was available and having personal experience with the Garmin 195, I chose the Garmin etrex. The etrex weighs 5.3 oz. with two AA batteries; it is 4.4" x 2.0" x 1.2". It will easily fit in the nose of a X/C sailplane such as the SB/XC. After your flight with this unit, you can hook it up to a PC and download your flight in much the same way full size soaring is done ***and*** you can analyze your flight.

To do this you will need GPS software such as TOPO! and a data cable. TOPO! has a moderately detailed map of the entire use, so you can match up your flight to roads and landmarks. The most amazing part about this unit is the price; with a little research, we were able to find it for $115.

Someday, Cross Country contests may be scored in much the same way full size contests are. You will bring in your GPS unit to the scorer, and they will download and analyze your flight in a few minutes. But in the meantime, you can have a lot of fun seeing what your flight looked like and start making a map of those house thermals; it might be useful to know just around the bend there is usually a nice, strong thermal.

I have no idea what I am going to write about next month, but the one after that will be a report on the Montague Cross Country Challenge. ■



"SHORT CUTS"

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

Back by Popular Demand

Many years ago, I shared a couple of techniques. The first was about the design of my little drilling jig (*RCSD* June 1995) and, the second, my servo melt out tool (*RCSD* April 1996). Having received numerous inquiries recently, we thought that many of you might also have an interest, particularly those of you new to the pages of *RCSD*. So, back by popular demand, both articles are reprinted intact (See page 20 for the servo melt out tool.), with one small change.

In regards to the electric servo melt out tool, contact Vulcan Electric (Kezar Falls, ME 04047) @ 207-625-3231 for your local distributor. They do not sell direct but have a nation wide distribution system.

I enjoy getting feedback such as this. If any of you have any questions, please don't hesitate to ask!

■

My Little Drilling Jig

by Steve Savoie
Bennington, Vermont

That was it, I wasn't going to drill another wing, stab or fuselage without building a drilling jig. In the past, I would put something together at the last minute with oak blocks and brass tubing, often built for one application and then discarded, or consumed through cannibalism for another needed tool. The first thing I had to decide on was a base. Plywood or Formica over particle board (counter top) just won't stand up in a New England basement (moisture and temperature). The only way to use these materials is with a strong back such as angle steel or aluminum. Too much work and expense.

So, I then went to the local home improvement warehouse and came across Melaine shelving material. It's smooth, cleans easy, can be drilled, and all six sides are sealed with a plastic type laminate coating, and the price was right. A few thread inserts (1/4 x 20) and matching countersunk screws were also purchased.

Seventeen aisles latter I came across the select hardwoods. Oaks splits, maple's too hard to work with, cherry just doesn't have a consistent grain, what about poplar? Poplar was selected because it has clear grain, is easy to work with, resists warping well, and was on sale.

The last item needed was some type of guide for the drill bits. Brass tubing is available in the right sizes, but it just didn't seam like the correct way to go. Then it hit me, I recalled seeing press in drill-jig guides in a woodworking catalog by the upstairs throne. These press in bushings have a splined outer surface and are hardened steel. The ones I used (2 per bit) were purchased from Woodworker's Supply. The price wasn't cheap, but have you ever had to put a price on an improperly drilled wing or stab?

The first thing to do was to lay out the jig sides and roughen up the Melaine surface for the epoxy. I then cut the front and back bushing supports and attach them to each other with double faced tape. These two pieces must be assembled, cut and drilled as one to retain parallel. The next decision was how high to drill the holes from the surface the wing would be set on. I decided on 1 1/2" since most wings on their bottom beds are well below this mark and the poplar was 1 x 3.

The holes for the guide bushing must be uniform and accurate, so I had to use a neighbor's drill press along with a set new Forstner bits. These are very accurate, thickly shanked, wood working bits designed for wood, only. A fence was clamped to the drill press table, and the 7 holes were carefully drilled through the two pieces of poplar that were still taped together. Not much tape is needed to secure these pieces to each other. The ends where then trimmed to size, and the two pieces were then separated; a bit too much tape was used, so an old putty knife had to be used to separate the two.

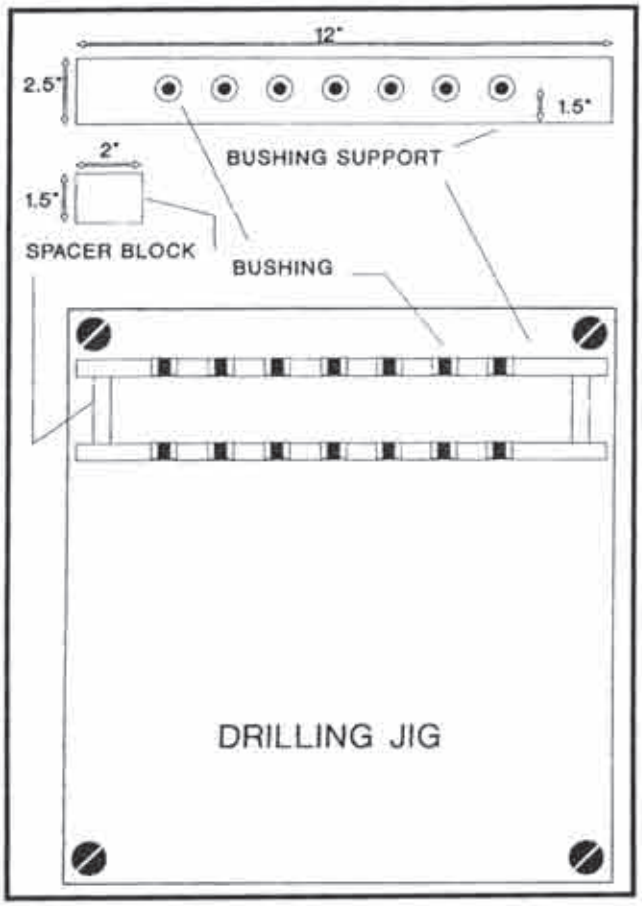
The next step was to press the bushings into the bushing supports; once again the old drill press was used to keep the bushings at a perfect 90°. The proper size drill bit was placed in the chuck, the bushing slid onto the bit, and a dab of epoxy was added on the splines for good measure. I then pressed them into the holes with the spindle drive of the drill press.

To assemble the jig, I inserted all my 12" bits into the bushings and gently separated the front and back bushing supports about 2" from each other. I then cut smaller spacing blocks (two taped together and cut as if one), which will be attached between the two bushing supports. The next operation was a little tricky and consumed almost every clamp in the old workshop. I marked the location of the spacing blocks on the bushing supports and mixed up 30 minute epoxy to attach every thing together. The drills were kept in the bushings; then the front and back bushing supports were

epoxied to the spacer blocks. The entire assemble was positioned on wax paper over the Melaine shelf, and then clamped down to the shelf.

Make certain to check that the drills can still rotate in the bushings. If they don't, some minor adjustments may be needed before the epoxy sets. Once the epoxy had cured, I drilled and inserted 1 1/2", #6 wood screws from the bushing supports into the spacer blocks. Still with me? The end is near. Now, the entire assembly is clamped into position on the Melaine shelf to check for alignment. With 12" bits inserted full length, I had a droop of 1/64" at the end of the bits; not bad. This was corrected by shimming with .003" mylar along the bottom of the front bushing support. Now, the assembly was epoxied and clamped perpendicular to the center-line of the shelf board. Once the epoxy cured, screws were inserted from the bottom up into the jig from the shelf board.

To complete the installation, I clamped the finished jig to a true flat work bench and drilled 1/4" holes in the corners down through the bench. The holes in the bench were enlarged to accept the thread inserts, and the shelf board was countersunk to receive the four screws used to mount the entire assembly. I then purchased wheel collars for the bits, and use them to adjust for drill depth. Four holes were drilled in the spacer blocks to hold the attachment screws when not in use.



The bushing jigs I used were 1/8", 3/16", 1/4", 5/16", and 3/8". The bushing jigs are not available in the slightly larger sizes to drill holes to accept brass tubing, so I did the following. I cut a section of tubing and cut teeth into one end with a cut off wheel. Then, I slid the tube onto the drill bit extending the tip of the bit 1/4" past the tube; you can either tape or C.A. the other end to the bit. This will now oversize the hole to match the tubing outside diameter. Make sure to first drill the hole with the bit, only.

Some may consider this project overkill, but I don't get the jitters when drilling stabs or wings, anymore. The jig is also quite versatile;

(Continued)

the 3/16" bushing guides can be used to center that red hot poker used to melt out wiring channels. To drill a wing or stab, just keep it on the bottom bed, and just shim it up from the bottom with sheet stock balsa or ply.

Try it, you'll like it.

Materials

12"X36" Melaine Shelf	$6.49
1"x3"x36" Poplar	$4.69
Drill Bushings (10)	$31.00
Misc. epoxy, screws, etc.	$2.00

Woodworker's Supply
1-800-645-9292
4 Locations: Seabrook, NH - Graham, NC - Gasper, WY - Albuquerque, NM

■

An Interview with Bill Kuhlman One of the B's in B²Streamlines

by R/C Soaring Digest

Introduction

The month of May saw a whirlwind of activity down Wylie, Texas way. There was the usual, open-to-all, Saturday night BBQ we host during the Texas National Tournament event, and our Traveling Reporter, Gordy, passed by our way three weekends in a row. Family members came and went. And then there were the four rabbits that stopped by for dinner late one evening, saw the clover and tasted the carrot tops; needless to say, they too decided to stay a bit... You see, it's real quiet out our way, most times that is, with only the sweet music of the birds and sailplane chit chat to keep one wide awake.

With all the comin' and goings, it came as no surprise when the phone rang from yet another guest: Bill Kuhlman from up Washington state way. He planned to pass through this neck of the woods and wondered if we'd be around long enough for him to stop in and pass the time of day. Well, needless to say, we were delighted, although we missed not being able to catch up with the *second* B in B^2, Bunny Kuhlman, another tailless enthusiast!

Well, after chatting with Bill about this and that, we realized that many of you readers would like to know just how the B^2's got started in the hobby, why they do what they do, and what's around the corner for other tailless enthusiasts.

And, with the introductions out of the way, here's what Bill had to say...

Interview

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E-mail: bsquared@halcyon.com
http://www.halcyon.com/bsquared/

Q. How did you get involved in the hobby, Bill?

I really can't remember a time in my life when I haven't been interested in aviation, and I've often thought this fascination is genetically based. My first gift was presented to me shortly after birth, while I was still in the hospital, and came from my father. It was a small plastic model of the P-40 Warhawk which currently resides on a shelf near my work space at home.

We lived in Van Nuys, California, not far from the Van Nuys airport, until I was in sixth grade. The airport was close enough that I could stand at some high point in the neighborhood, usually the top of the neighbor's brick barbecue chimney, and watch the aircraft take off and land. My desire to watch things fly has never abated.

My father worked for Douglas aircraft, then McDonnell-Douglas when the firms combined. I remember the thrill I experienced when he brought home large plans for several of the Douglas aircraft — the DC-6, DC-7, and the then new DC-8.

I assembled my first model, a small all balsa glider, at around age five. By the time I was twelve I spent nearly the entire summer building a Frank Ehling Nordic 72 from a Jetco kit. I added a battery holder in the nose and ran wiring out to the wing tips and the top of the vertical fin where sockets held small light bulbs. I covered the finished model with Saran Wrap and had every intention of going to Sepulveda dam and flying it at night, but it turned out so beautiful that it flew only once — a single hand toss which took it the entire length of the side yard.

My parents bought my first set of radio gear, a C&G Venus transmitter and Citizenship LT-3 receiver, around 1960. Some sort of simple servo was purchased at the same time. Controlling the servo was a bit of a problem since the transmitter and receiver were single channel and there was no relay. Well it really wasn't that big of a problem because the first thing the gear went into was a boat. I figured I couldn't mess up too bad moving in two dimensions and within the confines of the swimming pool.

Having the boat turned out to be a very beneficial choice. I learned how the radio equipment worked and, since the boat wasn't originally designed for RC, I also got to try my hand at custom building a frame for the receiver, a tray for the servo, and mounts for the drive motor and two battery holders. Nothing plugged in, so I also learned how to solder.

I went on to build a bunch of powered aircraft — a Sterling Piper Cub, countless TopFlite Schoolboys, a Schoolmaster which was modified to be a twin (two TD .049s), and a Midwest Wildfire which I bought partially completed at the Toledo show. I always remembered the Jetco Nordic with great fondness, however, and that prompted me to scratch build an RC glider while at Purdue University in the early 1960's. It was fairly realistic, with a hexagonal cross-section fuselage and long tapered wings. The wings were solid balsa and the airfoil was something of a Jedelsky section. It flew well after being launched by a lightweight highstart.

After three years in the military I went back to the Jetco Nordic, which was still being produced, and built an RC version with that same LT-3 receiver and a small Bonner escapement which provided rudder only

Reprinted from "On the Wing... the book"
Courtesy of Bill & Bunny Kuhlman

A MULTIDISCIPLINARY APPROACH TO DESIGN

A recent issue of the Journal of Aircraft, published by the American Institute of Aeronautics and Astronautics, was devoted to optimization of aeronautical systems through multidisciplinary approaches.

The most interesting article for us was one directed toward actively controlled fiber composite wings[1]. Although the article itself was very heavily mathematics oriented, several charts and diagrams provided basic information of use to model builders. What follows is not a review or condensation of the article, but rather a description of a derived design methodology/philosophy which is suitable for both tailless and conventional RC sailplanes.

CONSTRAINTS

Any design process begins with a determination of the constraints imposed on the eventual design. All of our models must conform to the majority of the FAI regulations for RC sailplanes. From the start, then, we know the wing loading must be over 4 oz/ft^2 and under 24 oz/ft^2. We also know the mass of our completed glider must be below 5 kg (176 oz). Other constraints include the minimum nose radius, a ban on telemetry, and a requirement that all model controls be actuated from the ground, but not all of these are adhered to by AMA regulations. (Thermal sniffers and electrostatic stabilizers can be used in AMA competition.) Additionally, our design may be constrained by certain AMA regulations regarding span, or local rules may define a maximum number or type of control surface.

DESIGN APPROACH

The main thrust of all of the articles in the Journal of Aircraft is the entire design approach needs to be based on a multidisciplinary process in which each segment to be optimized affects all other segments. This implies that while we will of course endeavor to maximize overall sailplane

Continued

control. I'd fly it at the local park in the evening, a very relaxing experience.

Then I got involved in tropical fish, eventually managing more than 150 tanks and raising some species for commercial sale. I wrote my masters thesis on the behavior of a very small South American cichlid. My interest then turned to tropical birds and finally model railroading, but aviation was still on my mind, and I often sketched glider designs.

Around 1980 my oldest son decided he wanted to get into RC cars. I somehow talked him out of getting a car and into getting an airplane. He had a paper route and bought himself a JR Century 7 system and a Sig Riser. My younger son bought a JR four channel system and a Gentle Lady. The local park served as the flying field, and both boys started out as excellent pilots. The electronic games, which were just getting popular, had honed both their reaction times and their perceptual skills.

We were out at the park one evening, being bugged by a few mosquitoes, and I looked up to see the Riser slowly circling in some warm air with the setting sun lighting the transparent covering. It was an incredibly beautiful sight, and one which I suddenly realized I missed terribly. I bought a Century 7 system and began building gliders.

Q. So how did Bunny get involved?

Bunny watched one of my gliders being built, fell in love with the wooden structures, and wanted to see an RC sailplane fly. We went out to the local park and I put my House of Balsa Allure on the high start. My reactions aren't as fast as either of my sons', the glider was out of trim, and it went nose first into the ground behind a small rise. Bunny ran over and saw the airplane impaled in the ground. She didn't want me to see it in that condition, so she grabbed hold of the tail boom and tried to pull it out of the ground. It wouldn't budge. She still recounts the experience as being quite eye-opening. She learned that even though powerless, gliders can go fast, the pilot is not necessarily in control of the aircraft he's flying, and although an airplane may be light and beautiful it can do a lot of damage. But she was hooked on building aircraft out of wood and hooked on flying RC! (Bunny's father was a carpenter, and he taught her to identify aircraft flying into and out of McChord Air Force Base which was a few miles away, so maybe there's some genetics at work there, too.)

Bunny cut out all of the wing ribs and built the entire rudder for our 1/4

Continued from page 14

performance, our method of achieving this goal will simultaneously encompass structural, aerodynamic, and control systems, while always remaining within those previously defined restraints. As we explain these systems in detail, through example, we will outline their relationships.

STRUCTURE

Overall size, in our opinion, should be the designer's first consideration. As a pertinent example, we have recently been giving greater thought to winch power versus sailplane size. This came about because our two meter 'wing, the Blackbird, with 1250 in^2 of wing area, can not really take advantage of the power available from our winch. Even very strong zoom launches do not tax its capabilities. At the other extreme, our XC version of the Blackbird (2300 in^2) overloads the winch to an extreme degree. What we need is a 'wing with about 1700 to 1800 in^2 of area. We feel this would allow most efficient use of winch power, while at the same time improve performance compared to the two meter version. If you are designing for contest flying prescribed by AMA regulations, such manipulations of wing area may not be possible to a large extent due to wing span limitations and the desire for optimum aspect ratio. For PAI events, however, such size optimization is both possible and desirable.

Of related interest is flying weight (mass). This is because mass and size are usually positively related and because required lift is directly related to mass. Mass also has an effect on other performance characteristics, such as speed.

Sailplane structure also includes overall planform (tailed vs. tailless, tapered vs. constant chord, sweepback, etc.) The stresses imposed on the wing panels will vary depending on whether or not there is a fuselage, and other distribution-of-mass factors, so spars must be sized for strength and located where strength can be put to best use. It should also be kept in mind the structure may also be influential in drag reduction, as we'll describe in more detail in the next section.

Continued

RESOURCES

TWITT: Contact information can be obtained from that organization's advertisement in this issue of *RCSD*. (See page 28.)

Marske Flying Wings can be reached at Marion Municipal Airport, 1520 Pole Lane Road, Marion, OH 43302 or on the internet at <http://www.continuo.com/marske/>.

The complete URL for nurflugel.com is <http://www.nurflugel.com>.

Harry Volk, Cirrus Aviation Ltd., P.O. Box 7093 Depot 4, Victoria B.C. V9B 4Z2, Canada. As of June 20th of this year, the address will be P.O. Box 1375, Nanton AB T0L 1R0, Canada.

Books currently published by B²Streamlines:

- Tailless Tale by Dr. Ing. Ferdinando Galè - The first published book dealing specifically with tailless model aircraft.
- On the 'Wing... the book by Bill and Buuny Kuhlman - A collection of the first 52 articles and columns which appeared in *RCSD*.
- On the 'Wing... the book, Volume 2 by Bill and Bunny Kuhlman - Includes all of the "On the 'Wing..." columns from January 1993 through December 1997.
- Aerodynamic Design of Radioguided Sailplanes by Dr. Ing. Ferdinando Galè - A reference work for the model sailplane designer who is looking for a more technical explanation of aerodynamics and stability and control.
- Understanding Polars Without Math by Bill and Bunny Kuhlman - How to interpret lift, drag, and pitching moment curves for airfoil sections and wings, and how to determine complete aircraft performance.
- Structural Dimensioning of Radioguided Aeromodels by Dr. Ing. Ferdinando Galè - Materials and methods for building strong light aircraft. How to determine loads and build balsa, foam, fiberglass and carbon structures.
- Gliding With Radio Control by Martin Simons - A beginner's guide to building and flying model sailplanes.
- RC Soaring... A Laughing Matter by Gene Zika - Two hundred cartoons, all related to RC soaring and all works of art. Insightful, humorous and downright hilarious.

B²Streamlines, P.O. Box 976, Olalla WA 98359-0975 USA. WWW home page is at <http://www.halcyon.com/bsquared/>, e-mail address is <bsquared@halcyon.com>.

scale Pioneer II-D. She cut gussets from 1/64 inch plywood, built the alignment jig, and figured out the hinging system to best match the original aircraft. In addition to working with wooden structures, she's the other set of hands when we cut foam cores and do vacuum bag carbon spars and fiberglass wing skins. She also proof reads all of the articles before they're sent in for publication in *RCSD*.

Q. How did you get involved in tailless design?

We saw a picture in a magazine. Bunny and I were sitting on the couch going through the just arrived *Model Aviation*. The soaring column had a picture of the German Versmold club and their entries in a recent postal contest run by Kale Harden of Florida. All of the models were tailless. We wrote a letter to Kale and he introduced us to Reinhard Werner who had just written a book for one of the German model magazine publishing companies. We bought Reinhard's book, subscribed to *FMT*, and I began learning German by holding either the book or the magazine in one hand and a German-English dictionary in the other. (It was a purely osmotic process.) We made contacts with modelers in Germany and found out about TWITT (The Wing Is The Thing) in another magazine article. It's been an ever expanding network ever since.

We built a couple of Ravens as trainers, then a Blackbird 2M. We entered local contests for a few years, but didn't find them to be very much fun. Our first *RC Soaring Digest* article appeared in 1988. Vacuum bagging wings and spars came a few years later when we were evolving the Penumbra series. Swept wings presented an entirely new experience for us. Penumbra turned out to be easy to fly and it thermalled well. The L/D was phenomenal, and the potential for it to become a contest machine was obvious.

Now that we're retired, Bunny and I are hoping to build a molded high performance swept wing and perhaps go back to being involved in contests now and then.

Q. How did "On the 'Wing..." become a regular feature in RCSD?

Our initial foray into tailless sailplanes happened in 1984, and by 1988 we had quite a large collection of information on flying wing design and construction, and some wonderful experiences which we thought others would like to hear about. The first Scale Soaring Fun Fly was held in Richland, Washington that year, and we had flown our 1/4 scale Pioneer at the event.

We contacted Jim Gray, *RCSD* editor at the time, and asked if he'd be interested in a monthly column devoted to tailless sailplanes. *RCSD* did not have any regular columnists at the time, so it was a new venture for the magazine. We mailed the first six articles to Jim and have been writing steadily ever since.

"On the 'Wing..." has been a very positive influence on us in that we are continuously collecting information, receiving questions from readers, and communicating with people from all over the world.

Q. Where did you learn everything you know?

Everywhere! There's been no single source, and I don't think we'll ever stop learning. We actively search for information in magazines, books, and on the internet, and we ask questions of those who have expertise in the area. One aspect which may be a bit surprising is that we learn something every time we're asked a question. Explaining a concept to someone else does a lot for retention and often gets us to thinking about some new aspect of design, construction, or flight.

Q. Why B^{2}Streamlines? How did it come about and what are you doing now?

B^{2}Streamlines was to be an after retirement business. We had a fairly good idea of when we were going to retire, and we knew we wanted the business to be well established when the big life change occurred. Bunny's propensity to wooden structures and my own fascination with just looking at plans had us beginning with a plan service. We of course specialized in those designs with open bay wing structures, but there were quite a few which used rather unique construction materials and methods. We began collecting plans for "old timers," and Ferdi Galè in Italy was kind enough to send plans for a number of vintage models, both powered and glider. Eric Marsden, a prolific modeler, sent a large number of his plans for scale rubber powered models, plus some electrics. Martin Simons provided full size plans for his PWS-101, and we acquired plans for a few scale French gliders as well. We eventually amassed quite a collection and published a rather large catalog. We had our own blueline machine and got very good at running large sheets, some up to eight feet long, through it.

About that time Ferdi mentioned that he, too, was fascinated by tailless aircraft, and was wondering if he should write a book using the materials he had gathered. We gave his idea a positive response and added that we would be most happy to publish it here in the States once completed. That book was "Tailless Tale," and it's still in print. The next title we published was "On the 'Wing... the book," a collection of the first 52 "On the 'Wing..." columns.

The book publishing side of B^{2}Streamlines became increasingly successful and we decided to sell the plan service. Harry Volk, a Canadian who was very involved in the ultralight arena, was looking for a

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AERODYNAMICS

The portion of the design process devoted to aerodynamics was really introduced in this article when we spoke of the lift necessary to support the mass of the sailplane. Airfoil choice is dependent upon camber, which dictates the amount of lift generated. Lift can be augmented, always with some penalty, through use of various control surface movements. Flaps, as an example, change the camber line and thus influence lift, but with the penalty of higher drag. Local aerodynamics are changed through control surface deflection.

Also influencing the sailplane's aerodynamics is wing shape. Lowest drag is achieved with some small amount of sweepback of the quarter chord line, for instance, and the lift distribution can be tailored to specific requirements through transitioning of airfoils and careful attention to taper.

Consideration must also be given to overall drag. The shape of the lifting surfaces is certainly important, but the wing-fuselage junction, empennage configuration, hinge design, and other factors must also receive careful attention. Of recent interest to modelers is the measurably lower drag of foam core wings when compared with that of open framework structures. The smooth ridge free skin of the foam core wing creates smaller and less numerous vortices.

CONTROL

Velocity, glide angle, and other important variables are easily examined as the sailplane is traveling in a straight line. But our goal when installing RC gear is to have an aircraft capable of turning and having its altitude, attitude, and speed varied according to our input. We wish to have control of the sailplane during its flight, and hopefully with as little degradation of performance as possible. So we install a rudder, elevator, ailerons, flaps, spoilers, air brakes... anything which we feel will allow us some added degree of control and which we hope will allow us to go up more easily, and come down safely and effectively when desired.

post-retirement business, and he bought the entire operation. Anyone at all interested in scratch building model aircraft should get a copy of Harry's catalog. It's filled with classic, high performance, and unique designs.

We currently have eight books in print and have just signed contracts with Antonio Mazzone, an aerospace engineer living in Italy, for two more. Both of these books will be published before the end of the year. Antonio is currently doing independent research in the areas of micro flight and ornithopters.

The title of Antonio's first book is "Aerodynamics and Flight Mechanics of Aeromodels." While centered on basic aerodynamics, it includes a chapter on aeroelasticity, plus chapters on propellers, helicopters, biplanes and seaplanes. These are subjects not usually covered in basic aerodynamics textbooks. It will be around 150 pages in length, and there are about 180 line drawings and tables.

The second book, "Balsetta," is centered on small balsa flying models and will include full size plans for about 20 such designs, including conventional, V-tail, flying wing, tandem wing and canard, and a few scale projects, too. This book is science oriented. There's significant information on aerodynamics, stability and control, and construction tools and techniques. Children and those just starting in the hobby will enjoy building and flying the models and learn valuable skills. Plus, there's an entire chapter devoted to small (under one inch span) boomerangs!

For those with access to the internet, we have also begun selling pre-read books. This began as we tried to eliminate some duplicates from our own library, but it's grown remarkably. An accurate printed catalog is nearly impossible to maintain because of rapid inventory changes. Thus the list of available titles is accessible only on one of our web pages. All we need is an e-mail or snail-mail letter of intent; we'll hold books for buyers' checks to arrive.

Q. What is your best seller?

Our most popular book by sales volume is "Tailless Tale." It's been in print longer than any other title. But the book for which we get the largest percentage of positive comments is "Understanding Polars Without Math," a book which came about in a rather unique way. When readers were asked what they'd like to see in *RCSD*, one replied, "Aerodynamics... I would like to know how to read airfoil polar plots to determine optimum angle of attack... I see the needed information (in other books), but an article simplifying the equations for people of average intelligence would be helpful." Comments we have received indicate that "Understanding Polars Without Math" fulfills this wish for those interested in models **and** full size aircraft.

Q. Getting back to tailless sailplanes, what do organizations such as TWITT and web sites like nurflugel.com have to offer?

Two things: knowledge and motivation.

TWITT was originally established to build and fly a full size tailless aircraft. While that specific goal was never reached, the organization was able to get some private funding as an educational institution. The membership includes a cross-section of people, aerodynamicists to artists, all of whom have an interest in tailless aircraft, either full size or model. Meetings are held in the San Diego area every two months, and the speakers list is very impressive. The TWITT newsletter is always filled with items of interest from around the world.

Nurflugel.com is a web site run by Doug Bullard and it, too, is devoted exclusively to tailless aircraft. It's one of the most visited aviation sites on the internet. Nurflugel.com established an e-mail list some time ago, and comments, questions and answers abound. The knowledge base is immense.

With all of that information available, it's not long before a person becomes motivated to build a model, do some design work, or somehow become more active in this arena which has only recently received substantial positive public attention.

Q. Tell us something about the Marske Flying Wings Workshop you just attended.

Jim Marske has been flying full size gliders since before he was 18. He became interested in the concept of a tailless glider after seeing Al Backstrom's plank at an air show, and eventually constructed several tailless gliders of his own design, incorporating improvements in each rendition. He kitted two of his designs, the Pioneer II and the Monarch, for the homebuilt market. The Pioneer is a 13 meter span "sport" sailplane which has excellent performance and an extremely high level of safety. The Monarch is an open cockpit sailplane with surprising performance. The wing loading is very low, around two pounds per square foot, so it's able to make small circles and work light lift. Monarch launches are usually by auto-tow with a 1000 foot line, giving a launch height of about 900 feet. Despite this seeming limitation, Jim had one Monarch flight which lasted eight and a half hours.

So here are two aircraft, one with excellent performance despite its limited wingspan, and the other able to work what Mat Redsell calls "micro-lift." I intuitively knew the workshop would be a learning experience.

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Control surface deflection will always have some aerodynamic effect, and this effect will always be transferred to the aircraft's structure. Many of us forget this relationship during the design process. We must not only consider the loads imposed upon the servos and control systems, but also the stresses which are imposed upon the aircraft as a whole. Steeply banked turns place tremendous loads on the conventional tailed sailplane's wing center section. While servos may easily handle the aerodynamic load generated by the deflected control surfaces, the spar and spar-fuselage connection must also remain intact.

INTEGRATION OF THE THREE SYSTEMS

It should be evident from the above that structure, aerodynamics, and control are interwoven to the point of being inseparable, and a change in one aspect of the design process affects all three realms. While our primary design goal is always the maximizing of sailplane performance, it should also be obvious an immense number of design objectives must be met in the process. Improved glide angle, quicker turns, increased roll rate, greater velocity, or better thermal performance may be classed as design goals. But such things as control of wing flex and twist, freedom from flutter within the prescribed speed range, dynamic stability, effective control, maximum lift with minimum increase in drag, and retention of spar integrity under expected g loads are also inherent considerations within the design process. It is the successful integration of the three disciplines - structure, aerodynamics, and control - which produces the optimum sailplane for a particular task.

By developing a more complete understanding of these three disciplines, their interrelationships and the design process, better sailplanes can be produced.

---

[1] Livne, E., Schmit, L.A., and Friedman, P.P., "Towards Integrated Multidisciplinary Synthesis of Actively Controlled Fiber Composite Wings," Journal of Aircraft, Vol. 27, No. 12, December 1990, pp. 979-992.

The workshop included the history of tailless gliders, airfoil and planform design, and construction material and methods, plus the ability to ask Jim Marske and Mat Redsell questions while in casual conversation. The group was small, and there was more than ample opportunity for individuals to get together and share information, knowledge, and experiences. As I implied above, knowledge yields motivation. Many of the concepts being developed for full size aircraft by Marske Flying Wings are directly transferable to model building, and vice-versa. I learned a lot and came away from the workshop even more motivated than before. It was an excellent experience. Much of what I learned will form the basis of future "On the 'Wing..." columns.

Q. What do you have in the way of current projects?

We have two projects on the building board at present. We're about half way through construction of another Blackbird 2M. This rendition will use the BW 05 02 09 airfoil we used on the modified Raven which appeared in *RCSD* a short while back. We're also building another Dave Jones design, the R-2. This is a beautiful airplane, similar to the Raven, but with a parabolic wing planform. The fuselage is too deep for our taste, but the Raven fuselage looks like it will work well.

Q. And after that?

Attending the Marske Flying Wings Workshop has of course had an influence on our construction agenda. We're looking at the new Pioneer III and Monarch G as scale subjects. Mat Redsell has graciously

Continued from page 17

DRAW TAILLESS

```
1     REM  **** DRAW TAILLESS ****
10    CALL  - 936
20    PRINT "DRAW TAILLESS will provide a line"
30    PRINT "sketch using input parameters."
40    PRINT : PRINT "What is the sweep ratio? ";: INPUT SR
50    PRINT : PRINT "What is the root chord? ";: INPUT RC
60    PRINT : PRINT "What is the tip chord? ";: INPUT TC
61    PRINT : PRINT "Do you want the vertical fin area on thewing
      tips or on the center line?        ENTER 'W' for Winglets
      'S' for Single fin": INPUT A$
63    IF A$ <  > "W" AND A$ <  > "S" THEN  VTAB (9): GOTO 61
70    REM   ***** RADIANS
80    R = 57.2957795
90    REM  ***** SIN
100   S6 =  SIN (60 / R)
110   S2 =  SIN (240 / R)
120   REM  ***** COS
130   C6 =  COS (60 / R)
140   C2 =  COS (240 / R)
150   H = 88
160   V = 50
170   PRINT : PRINT "Span (150 = Max.)? ";: INPUT SP
171   IF SP > 150 THEN  VTAB (15): GOTO 170
180   HS = SP / 2
190   CH = (RC + TC) / 2
200   SW = SR * CH
210   WS = SW + TC - RC
220   A = (SP * (SW + TC)) - (HS * SW) - (HS * WS)
230   IS =  SQR (((SW + TC / 2 - RC / 2) ^ 2) + (HS ^ 2)) * 2
240   AR = IS / CH
250   HGR : HCOLOR= 3
260   REM H=88, V=50
270   HPLOT H,V
280   REM ***** A
290   HPLOT  TO H + S6 * 100,V + C2 * 100
300   HPLOT H,V
310   REM ***** B
320   HPLOT  TO H + S6 * 100,V + C6 * 100
330   HPLOT H,V
340   REM ***** C
350   HPLOT  TO H + S2 * 100,V + C6 * 100
360   HPLOT H,V
370   REM ***** D
380   HPLOT  TO H + S2 * 100,V + C2 * 100
390   HPLOT H,V
391   REM  CG
392   HC = H + S6 * ((SW + .001) / 2 + CH / 4)
393   VC = V + C6 * ((SW + .001) / 2 + CH / 4)
394   HPLOT HC,VC + 10 TO HC,VC - 10
400   REM ***** PT L.E.
401   HPLOT H,V
410   HO = H + S6 * HS + S6 * SW
```

loaned us plans for the Minibat, a small glider with swept forward wings — a model of this 'ship would have a six foot wingspan in quarter scale! Additionally, we very much want to build some more composite based swept wings along the lines of the Penumbra series. We have the two books by Antonio Mazzone to be published by the end of the year, and we've already started composing "On the 'Wing... the book, Volume 3." Lastly, material for several of our "On the 'Wing..." columns has already been collected. We have some great material which we just can't wait to have published in *RCSD*.

We would very much like to thank Jim Gray for saying "yes" to the notion of a monthly column on tailless RC gliders within *RCSD*. We'd also like to thank the many *RCSD* readers who have found our column to be of interest and given us feedback, ideas and material. And special thanks to Jerry and Judy for allowing us to have *RCSD* as our forum, for their tremendous support of our various endeavors, and for their unwavering dedication to RC soaring. One could not ask for better editors, better publishers, or better friends. ■

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```
420  VE = V + C2 * HS + C6 * SW
421  HT = HO:VT = VE
430  HPLOT  TO HO,VE
440  REM  ***** RT TIP
450  HO = HO + S6 * TC
460  VE = VE + C6 * TC
470  HPLOT  TO HO,VE
471  REM  RT WINGLET
472  IF A$ <  > "W" THEN  GOTO 480
473  HO = HT + S6 * .3 * TC:VO = VT + C6 * .3 * TC
474  H1 = HO:V1 = VE - .2 * HS
475  H2 = H1 + S6 * .35 * TC:V2 = V1 + C6 * .35 * TC
476  HPLOT HO,VO TO H1,V1 TO H2,V2 TO HO,VE
480  REM ***** RT T.E.
490  HO = H + S6 * RC
500  VE = V + C6 * RC
510  HPLOT  TO HO,VE
520  REM ***** LT L.E.
530  HPLOT H,V
540  HO = H + S2 * HS + S6 * SW
550  VE = V + C6 * HS + C6 * SW
560  HPLOT  TO HO,VE
561  HT = HO:VT = VE
570  REM ***** LT TIP
580  HO = HO + S6 * TC
590  VE = VE + C6 * TC
600  HPLOT  TO HO,VE
601  REM  LT WINGLET
602  IF A$ <  > "W" THEN  GOTO 610
603  HO = HT + S6 * .3 * TC:VO = VT + C6 * .3 * TC
604  H1 = HO:V1 = VE - .2 * HS
605  H2 = H1 + S6 * .35 * TC:V2 = V1 + C6 * .35 * TC
606  HPLOT HO,VO TO H1,V1 TO H2,V2 TO HO,VE
610  REM ***** LT T.E.
620  HO = H + S6 * RC
630  VE = V + C6 * RC
640  HPLOT  TO HO,VE
641  REM  SINGLE TAIL
642  IF A$ <  > "S" GOTO 650
643  TA = A / 10:S =  SQR (TA)
644  HO = HO + S6 * S:VO = VE + C6 * S
645  H1 = HO:V1 = VO - S
646  H2 = H1 + S2 * .4 * S:V2 = V1 + C2 * .4 * S
647  HPLOT HO,VE TO HO,VO TO H1,V1 TO H2,V2 TO HO,VE
650  REM PRINT DATA
660  VTAB 24: PRINT "Area = "; INT (A);"       Aspect Ratio = ";
     INT (AR * 100) / 100
665  PRINT "Root Chord = ";RC;"   Tip Chord = ";TC
668  PRINT "Sweep Ratio = ";SR
670  PRINT "Another design? ";: GET A$: PRINT A$: IF A$ = "N"
     THEN  TEXT : HOME : END
671  IF A$ = "Y" THEN  TEXT : HOME : GOTO 40
672  VTAB 23: GOTO 670
```

"SHORT CUTS"

by Steve Savoie
Bennington, Vermont

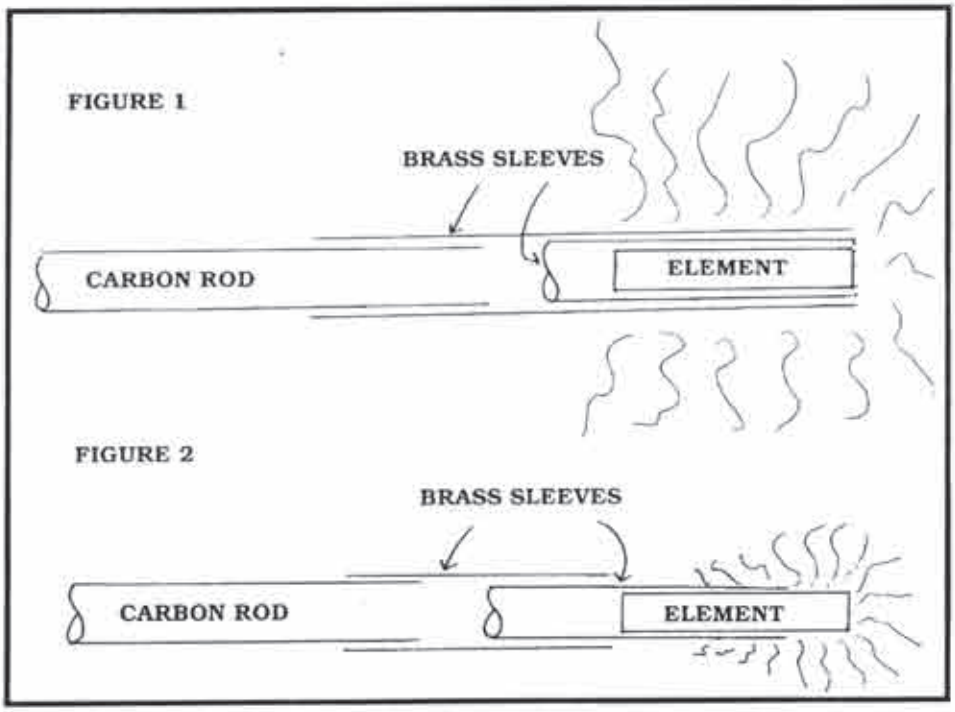
Servo Channel Melt Out Tool

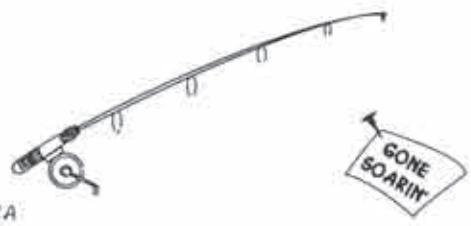
Have you ever bagged a wing and had everything come out just right with a mylar paint transfer finish and then dread the fact that you have to guide a red hot poker down the center to melt out servo lead channels? I have been quite lucky the majority of the time and have beaten old Murphy at his own game. Did you notice I said "the majority of the time"? My last wing was for a SD7037 Pixy, which received some minor blemishing when the 3/16" poker got hung up on the sub-root. That was it! There had to be a better way to melt out channels than to heat up the end of a weenie roaster in the wood stove and take the deep plunge!!

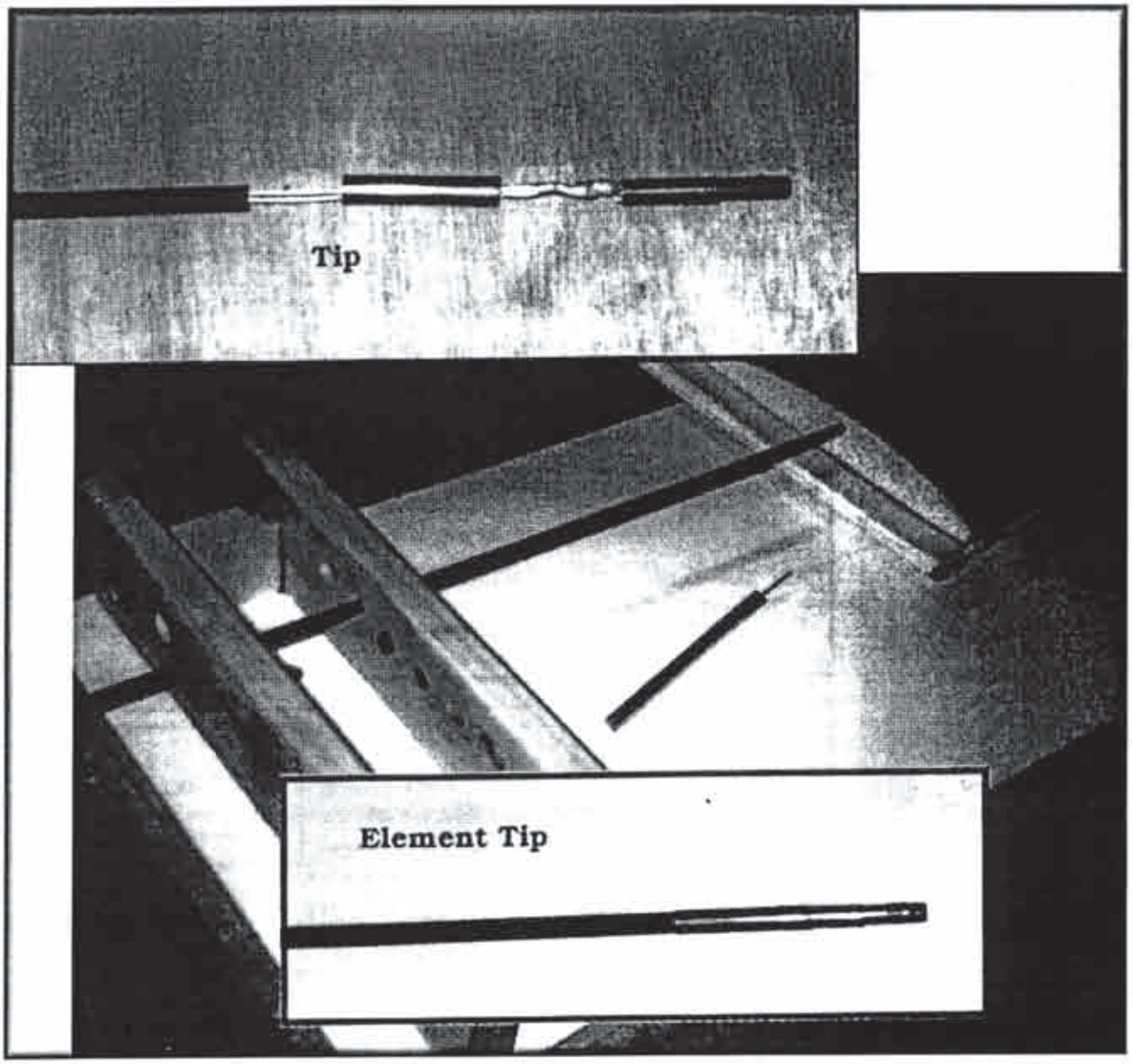
A few weeks later, I was scanning an electric supply catalog when I noticed an ad for cartridge heaters. Cartridge heaters are used for custom design when a small heat source is needed at a remote location, such as an electric glue gun, or a mold heater. The one I selected from the catalog was 1 1/4" inch long by 3/16" in diameter and rated for 40 watts. The only problem was that it was designed for 120 VAC. I wanted to use the power supply from my foam cutter, 4-16 VDC, but this was not practical according to the design engineer at the company. So, I ordered the 40 watt unit and waited for it to come in. It was a bit pricy, $18, but comparing the price against the time and materials invested in the Pixy wing, it was well worth it. My next obstacle was how to safely wire and guide the unit.

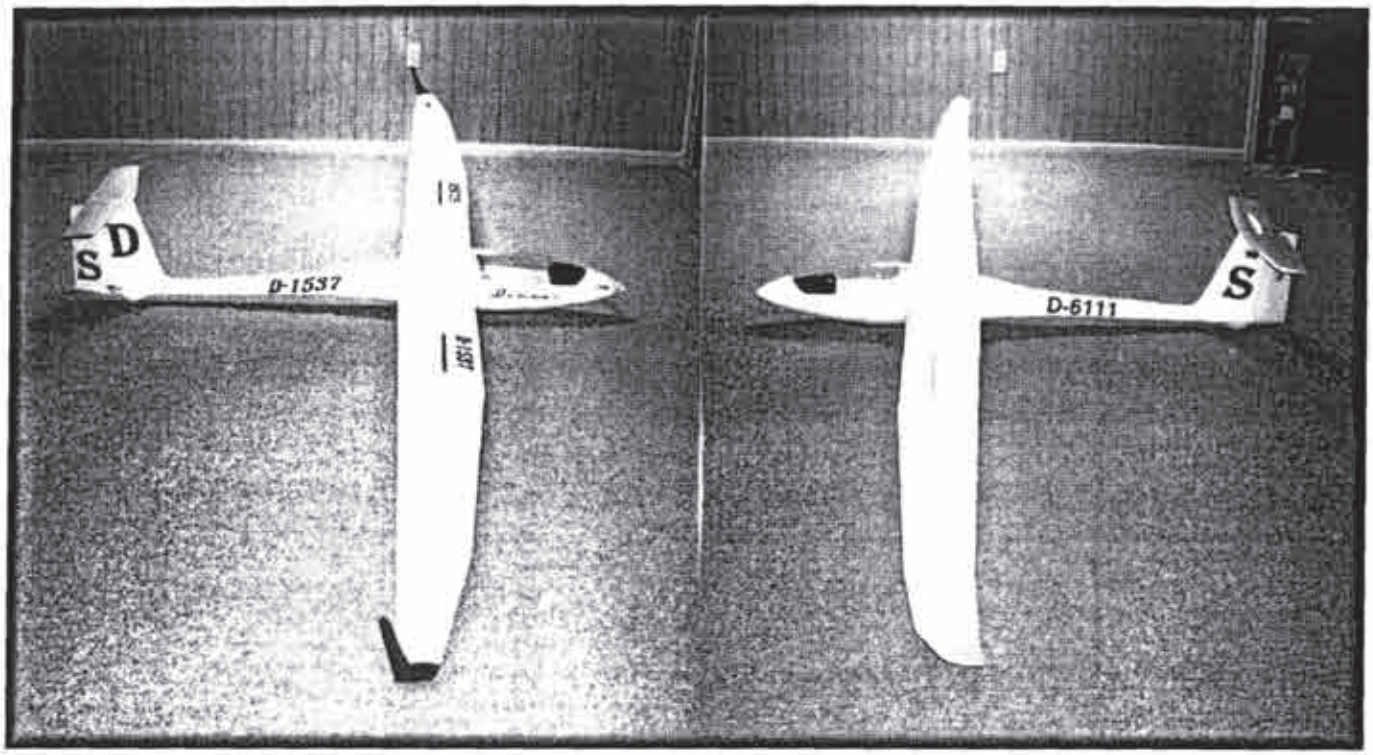
I called George Sparr at Aerospace Composite Products and he set me up with a 4' length of .245" O.D. hollow carbon fiber rod which was stiff, lightweight, and provided a large enough I.D. for the wiring. The only thing I didn't like was the fact that carbon fiber would conduct current. I used small gauge wire and spliced the two leads of the heater at different lengths and I doubled up on the shrink tubing. The next step was to adapt the 3/16" O.D heater to the .245" O.D. rod. Several small pieces of brass tubing were used to accomplish this. I had to pinch in the sides of the tubing, prior to fit up, to give the entire assembly a tight friction fit.

To guide the unit I used a drill jig, ***RCSD June 95***, that already had guide bushings for a 1/4" drill bit. The first few attempts to melt out foam worked well, but the channels were too large: 5/16". The tip of the element took about 2 minutes to come up to temperature due to the low heat output of the element, but the rate of feed was just right. The original set up is shown in Figure 1. The problem with this arrangement was that the brass tubing was absorbing too much heat and since its O.D. was slightly larger than 1/4" it melted out larger channels. To cure this, a new set of adapter tubes was cut and arranged so that the smaller O.D of the heating element was exposed to the foam. See Figure 2. This produced channels 1/4" in diameter. I have used this heater several times now and I'm quite pleased with the results. Several pictures are included that depict the final versions. And as of this writing, the old weenie roaster has been retired. ■









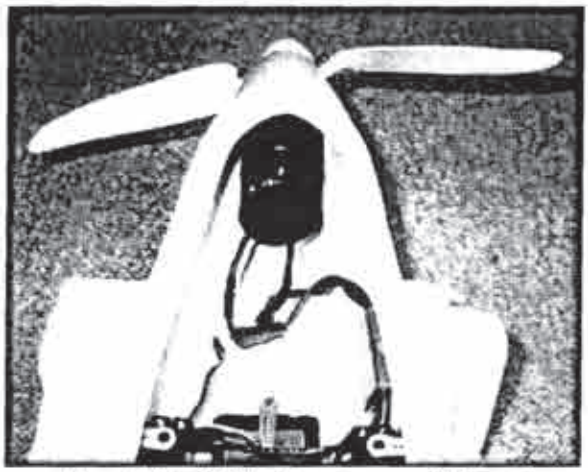
4 meter Discus & Discus 2-a.

Flight Comparisons Between A Roebers Discus & a Rodel Discus-2a

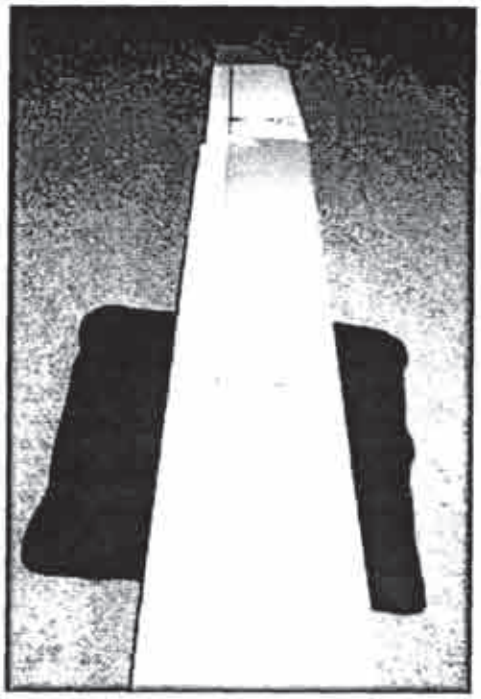
by Joe En-Huei
West Windsor, New Jersey

Introduction

I have been flying a legendary 4 meter Roebers Discus for several years. It is one of my favorite scale sailplanes on which I have logged numerous long flights. My Roebers Discus has impressed many spectators and my flying buddies because of its beautiful wing planform, streamlined profile and its spectacular thermalling performance. When the 4 meter Rodel Discus-2a (second generation of Discus) was unveiled several months ago, I was very curious to know how well it would perform in the air. So I ordered it through Sailplanes Unlimited, NY, NY to find out.



(Above) Ultra-2000 in the nose, with 13x6.5 prop, 20 cell.



(R) Two ailerons in each wing.

I was amazed by the high quality and completeness of the Rodel Discus-2a kit and its value is phenomenal. A construction manual in English included in the kit is a plus. Rodel has been producing large size, quality scale sailplane kits such as ASW-27, FOX, ASK-21, DG-800, Ka-6, etc., with well-built sheeted foam wings. I also own a popular 4.2 meter ASK-21.

Design Comparisons

The primary design difference between a Roebers Discus and a Rodel Discus-2a is the wings. Other design differences are subtle to the eyes. The wings on the Discus have a dihedral break (about 2.5 degrees at-rest angle on each wing) and have triple tapered planform. The wings on the Discus-2a have polyhedral breaks (varying from about 1, 4, 11 and 29 degrees at-rest angle from root to tip on each wing), quadruple tapered planform, and an additional wing-tip aileron (need two aileron servos for each wing). The trailing edge of Discus' wings is straight and slightly swept forward, while the molded wing-tip section of Discus-2a is bent upward and slightly swept backward similar to a Ventus-2's design. The aspect ratio of wings on the Discus-2a appears to be slightly higher. The airfoil is HQ and Eppler series for Discus and Discus-2a, respectively. The airfoil at the wing tip of Discus-2a is quite thin with about 3 degrees of washout. The HQ airfoil is slightly thicker and has more camber than the Eppler's.

It is worth mentioning that the fuselage of Discus-2a has the wing root fairing molded in, and the gap between the wing root and fuselage can be eliminated with hinge tape; the fuselage of Discus has no wing root fairing. Some say the gap might be one of the sources creating in flight whistling. I installed a skid to keep the outboard of aileron from being in contact with the ground. I added 1/2 ounce of lead to the

tip of the right wing for balancing.

The wing loading is around 23 and 21 oz/sf on Discus-2a and Discus, respectively. It is noted that 4 meter sailplanes are very efficient and are ideal for electric conversion. A 70 percent aileron differential is on the Discus to minimize adverse yaw. For the Discus-2a, I programmed 70 percent and 100 percent differential on the ailerons and wing-tip ailerons, respectively.

Flight Comparisons

I test flew both planes at the Northeast Philadelphia R/C flying field in PA and a private field in Princeton, NJ during early spring of 2000. Both planes were motorized and self-launched from a dolly for the convenience of independent soaring and both planes were balanced slightly nose heavy.

I noticed the Rodel Discus-2a has a higher glide ratio and covers more distance than the Roebers Discus when cruising around. The Discus-2a has a faster roll rate and is also more responsive to pitch/yaw control input. Both planes respond equally well to presence of lift when trimmed to fly slow. The Discus-2a "grooves" very well in circles and climbs effortlessly in thermals (its tendency to sideslip in circles is extremely low – perhaps due to polyhedral wings and special wing-tip design). To maintain tight circles in thermals, both planes require generous rudder input with a light touch of opposite ailerons. Due to a higher wing loading, the Discus-2a requires a higher air speed in circles. The Discus "self-recovers" quicker than the Discus-2a upon an intentional stall. Both planes penetrate well when flying in strong winds.

When flying fast, the Discus-2a retains its energy extremely well (better than the Discus). The Discus-2a is rather "quiet" in flight versus the Discus tends to whistle (quite entertaining to my ears). The Discus-2a is a beauty to behold in flight due to its polyhedral wings and fancy planform. Discus-2a's spoilers are very effective for a short landing run. (I coupled spoilers with slightly "up" elevator to maintain the nose level.) I am surprised the Discus-2a can be this efficient considering its size.

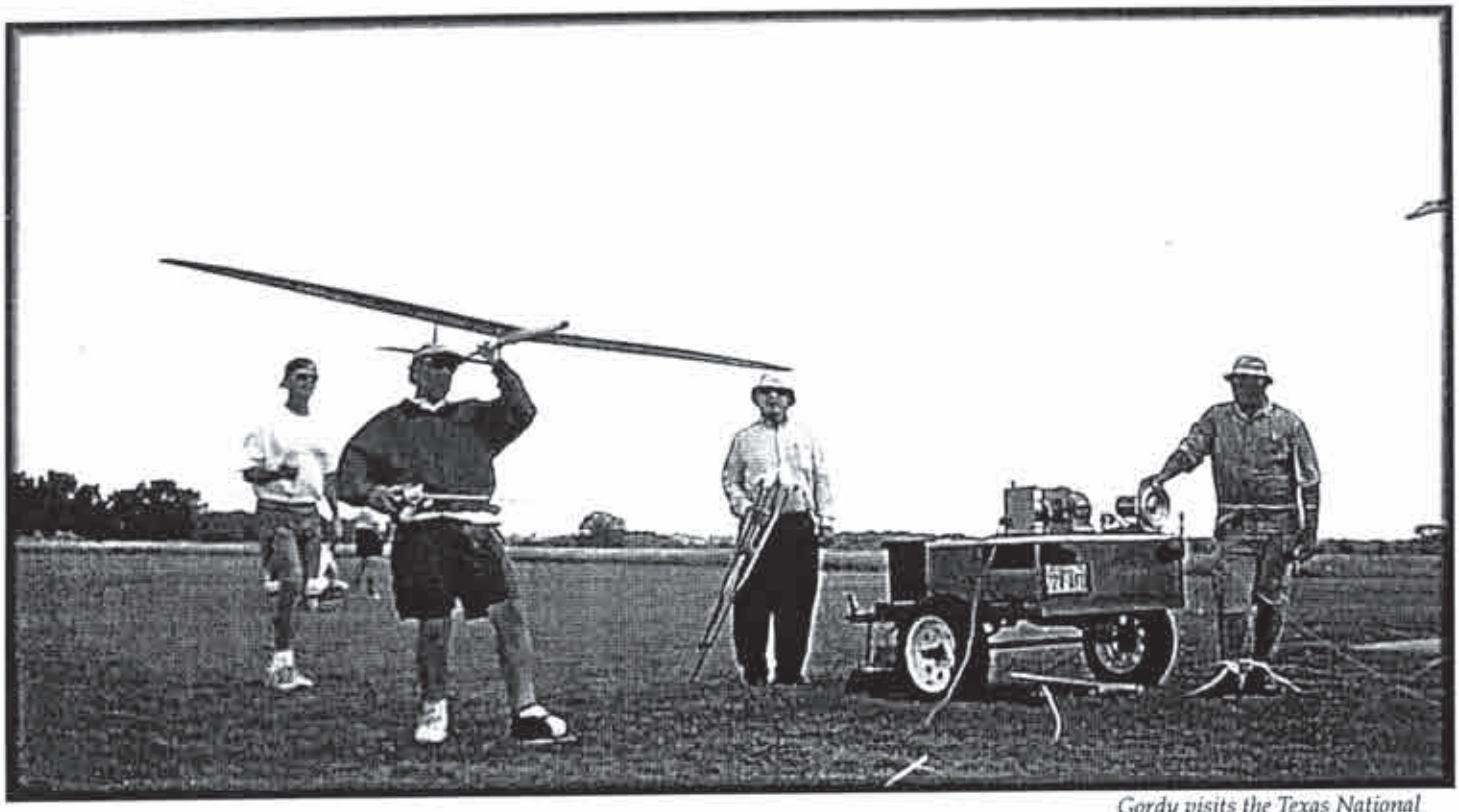
The construction manual indicated that Discus-2a could be flown without activating the wing-tip ailerons. So, I taped the wing-tip ailerons, disconnected the servo leads and flew the plane. I noticed the roll rate became slower and I preferred to fly with the wing-tip ailerons activated for better handling, especially during low speed flight.

Conclusions & Acknowledgments

Due to a new wing design and other improvements, test flights indicated the Rodel Discus-2a seems to have a higher level of efficiency over its predecessor, the Roebers Discus. Both planes are very enjoyable to fly in addition to their aesthetic appealing qualities. In fact, I found the Discus-2a outperforms other 4 meter scale gliders that I have flown. I always wish that scale gliders' performance could be measured/quantified to substantiate my observations. I have the impression that the design of the Rodel Discus-2a was optimized for thermalling and speed. I believe that the Rodel team has invested big efforts in designing this kit.

My sincere thanks go to Sailplanes Unlimited for importing the recent Rodel Discus-2a and the Roebers Discus several years back, to Kirk Massey of New Creations R/C for supply of electric items, and to Northeast Philadelphia R/C Club for allowing me to fly at their beautiful field. Herr Roebers and Herr Rodel should definitely be credited for their passion in der Welt of scale sailplane design. ■

GORDY'S TRAVELS



Gordy visits the Texas National Tournament (TNT) in early May. Photo courtesy of Lynn Williams.

Packing Your Sailplanes the Safe, Slim Way

by Gordy Stahl
Louisville, Kentucky
GordySoar@aol.com

With all my traveling, I am pretty lucky to run into good deals on sailplanes and end up selling quite a few sailplanes. Shipping was always a hassle, but with a few tricks stolen from experts, I figured out where to get the box, what to use for packing and how to pack to protect the tails.

Having received planes from most of the suppliers and seeing the damage that shipping companies (US Mail, Fed-Ex, and UPS) managed to do to all composite airplanes, I have seen the shortcomings in their systems.

First, where does one find a box to fit an Open Class Sailplane? That one is simple. You just go to the local hobby shops; they always have a stash of boxes from kits they got in from suppliers. No, they aren't usually long enough, so you have to take two and make a 'telescoping' box. By slicing one of two similar dimensioned boxes up one seam, it can be slid over the end of another to extend the total length.

Fold the flaps of the bottom box inward so that they act as a 'doubler'. Then slide the other box over as far as needed to just accommodate the length of the longest part of the plane's components. To keep the boxes in place, I just use lots of tape, around and around the overlap point.

To protect the plane inside, I have seen packing done with the dreaded 'styro-peanuts', sheets of Styrofoam, crumpled paper, bubble wrap and combo's of each.

Keep in mind there are huge penalties for an over-size package! So, we want to keep that box as slim as possible.

That might mean slicing the boxes length-wise up the sides so that you end up with four halves of boxes. Then, sliding one half of one into the other to further condense your overall size. Again, lots of tape is the trick for added strength. You will be amazed at how easily boxes can be modified with a utility knife! It's actually better if the plane is very snuggly packed in the box!

Out of all the sailplane MFG'ers I queried about shipping damage history, only RnR mentioned that they had nearly none! Their secret turned out to be a very compact, but tightly packed, package... And bubble wrap.

Their kits are wrapped in bubble wrap, and layers of bubble wrap are laid in until the box is bulging, then taped shut. It turns out that when the box is that 'full', instead of the insides taking a pointed hit, the forces are spread over the entire package... of AIR!

I have found that balled newspaper can work the same way, and is cheaper; you just have to ball up lots of it and really push it in.

If your plane has a removable V-tail, find a separate box just big enough to fit the V-tail into the corners, then fill it to the brim with stuffing; but also pack some solid blocks of Styrofoam to keep the 'face' of the box from being compressed. Again, make it so that the box is bulging slightly. Most kit damage isn't from being crushed; it's from being poked or creased. The second V-tail box ships cheap, so don't worry about adding shipping cost. It's small and doesn't weigh much.

If your plane is a standard tail without removable components, sometimes it's best to carefully use an Exacto to cut them cleanly loose for easy re-gluing. But often, if the plane is 2 meter size or smaller, just 'tight packing' will work fine.

My local hobby shops know when I come in that I will probably be rummaging in their 'box room'.

Which company is best for shipping sailplanes? They all have their track records of woe, but I have had very good luck with US mail. The big drawback is that there is no in-route tracking, like UPS or Fed-X can do.

Keep the box as compact as possible, pack it till bulging, add doublers over possible sensitive areas, and avoid peanuts!!!

Now all you have to do is let me know what you got to ship me!

When you read this, I will have been to the Texas TNT TD event; from there on to Lake Wilson, Kansas' Midwest Slope Chal-lenge...

Life ain't all bad! See ya next trip!

■

SCHEDULE OF SPECIAL EVENTS

June 7-10
Elmira Scale Aerotow 2000 — Elmira, NY
John Derstine, (570) 596-4392
johnders@postoffice.ptd.net
http://www.Geocities.com/~scalesoar

June 10
Cross Country Challenge 2000 — Lancaster, CA
Merrill Brady, mmglidert@keyway.net
Gary Fogel, gliderrc@aol.com

June 9-11
Montague Cross Country Challenge — Montague, CA
3rd Annual, Practice June 9th
DG Airparts, Inc., dgair@cdsnet.net
(541) 899-8215

June 23-25
MSSC 2000 — Louisville, KY
Ed Wilson, (502) 239-3150
ewilson1@bellsouth.net

June 24-25
Spring Fling 2000 — Sacramento, CA
Dudley Dufort, (916) 448-1266
www.svss.org

July 1-2
CRRC 3rd Annual RES - 2m & UNL — Sudbury, MA
Info. & Map: http://www.charlesriverrc.org
Dick Williamson, (781) 981-7857
Williamson@ll.mit.edu
Pete Young, (617) 484-0640
pwyoung@ix.netcom.com

July 29-30
GNATS Aerotow 2000 — Ontario, Canada
Phil Landray, (905) 468-3923
linden@niagara.com
Gerry Knight, (905) 934-7451
Lou Kleiman, (905) 688-4092
Mistral@niagara.com

August 3-6
International Electric Flight Festival — San Diego, CA
Ron Scharck, (858) 454-4900
Scharck@aol.com

August 6-12
F5 World Championships — San Diego, CA
Ron Scharck, (858) 454-4900
Scharck@aol.com

August 12-13
CRRC Soar-In Contest — Sudbury, MA
Anker Berg-Sonne, (978) 897-1750
anker@ultranet.com
John Nilsson, (978) 368-7136
nilssonj@rd.simplexnet.com
Info. & map: http://www.charlesriverrc.org/

August 19-20
Safari 2000 — Cape Blanco, OR
Mike Shaw, (541) 269-2423
http://clubsos.homestead.com/indexweb3.html

August 26-27
Washington Scale Aerotow Fun Fly — Yakima, WA
Gene Cope, (509) 457-9017, gcope@ixpnet.com
Frank Smith, (509) 924-8440

September 2-4
Soar Utah 2000 — Salt Lake City, UT
Scott Marshall, (435) 843-9478
marshall@trilobyte.net
http://www.silentflyer.org

September 2-4
OVSS Fall Roundup — Muncie, IN
Marc Gellart, (419) 229-3384
lsoar2@wcoil.com
Paul Siegel, (513) 561-6872
psiegel@fuse.net

September 29 - October 1
Oc-Tow-Berfest 2000 — St. Louis, MO
Peter George, (314) 664-6613
twometer@worldnet.att.net

For detailed information on events outside of the U.S.A., please view www.sailplanes.com event schedule.

Please send in your scheduled events as they become available!

5TH ANNUAL

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

"Come fly with us in Canada's beautiful Niagara Wine Country!"

July 29-30, 2000

To be held in Central Niagara Peninsula, Ontario, Canada
(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.

Pilots' choice awards include Vintage & Modern sailplanes, and tugs. Proof of 2000 MAAC or AMA membership is required, along with gold sticker radios. Meals and accommodation are available nearby. Registration fee: $12 ($10 US).

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

Classified Advertising Policy

Classified ads are free of charge to subscribers provided the ad is personal in nature and does not refer to a business enterprise. Classified ads that refer to a business enterprise are charged $5.00 per month and are limited to a maximum of 40 words. The deadline for receiving advertising material is the 15th day of the month. (Example: If you wish to place an ad in the March issue, it must be received by February 15.) *RCSD* has neither the facilities or the staff to investigate advertising claims. However, please notify *RCSD* if any misrepresentation occurs. Market Place Listings are $5 a month. Personal ads are run for one month and are then deleted automatically. However, if you have items that might be hard to sell, you may run the ad for two months consecutively.

For Sale - Business

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

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

DesignAire: EASY TO USE AIRCRAFT DESIGN SOFTWARE (PC). 3-D sketch, performance, Wt/Bal, inertias, color graphs, panel analysis, static stability, airfoils, envelope, FAR 23A loads and envelope. Runs "airfoil ii". $119. JammAero POBox 236, Horntown VA 23395. www.jammaero.com.

For Sale - Personal

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

1/4 Scale Mosquito, nice airplane, good shape... $550 or $920 w/all servos, etc. Oden, like new, flown about 10 times, 135" span, very gentle to fly, has air brakes... $650 w/all servos. Eclipse V, all molded, very nice, good thermal ship... $500 or $735 w/all servos. Add S&H. Dale King, (972) 475-8093, Wylie, Texas.

ZIKA

Hobby Shops that Carry RCSD

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

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

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

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

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

King R/C
Five Forks Village
King, NC 27021

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

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@lmco.com>, or Rob Glover at AMA3655@aol.com, http://sh1.ro.com/~samfara/

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

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

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

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

Arizona - Southern Arizona Glider & 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, <buzzwaltzrc@excelonline.com>.

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

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

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

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

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

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

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

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

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

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

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

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

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

Indiana (NE Indiana and NW Ohio) - League Of Flight by Thermal (LOFT), Ft. Wayne, Marc Gellart, (419) 229-3384, <isoar2@wcoil.com>, <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, <harris.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, flyngufs@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@ll.mit.edu>, <http://www.charlesriverrc.org>.

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

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

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

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

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

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

Nebraska - Lincoln Area Soaring Society (Wilson Slope Races), Jim Baker, 920 Eldon Dr., Lincoln, NE 68510, (402) 483-7596, jcbaker@inebraska.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-sandhills.net>.

Nevada - Las Vegas Soaring Club, Ray Dinoble, 10812 Hollow Creek Lane, Las Vegas, NV 89144, (702) 254-7911, <dinobler@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 07506; (201) 427-4773.

New Mexico - Albuquerque Soaring Association (all soaring & electrics), Jim Simpson (contact), 604 San Juan de Rio, Rio Rancho, NM 87124; (505) 891-1336, <jimbonee@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/css.html or Lyn Perry, President (716-655-0775; perryl@ecc.edu); Jim Roller, Competition Coordinator (716-937-6427; Rolj98@aol.com).

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

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

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

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

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

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

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

Ohio, Kentucky & Indiana - Ohio Valley Soaring Series, Marc Gellart, (419) 229-3384, <isoar2@wcoil.com>, <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, <grizzy2@gte.net, (541) 269-2423.

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

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

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

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

Tennessee - Tullahoma (South Central), Coffee Airfoilers, 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 Jamieson, 6931 Desco Dr., Dallas, TX 75225, (214) 369-6118, AJamieson@Sleepmed.com. Larry Sengbush, (972) 291-4840.

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

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

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

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

Virginia - Appalachian Soaring Association, Bristol VA & TN area, Daniel E. Didgeon, Apt A, 721 Meadowview Rd., Bristol, TN 37620; (423) 844-0518: voice mail (423) 914-4290, <ddijun2@aol.com>.

West Virginia & Pennsylvania - Tri-State Soaring, Chip Vignolini, 2784 Mill St., Aliquippa, PA 15001; (724) 857-0186, Voice mail (412) 560-8922, <ydne30a@prodigy.com>.

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

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

Outside U.S.A.

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

Canada - 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, eaweder@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 Bubb, Dorchester, Dorset, DT2 0NJ, phone 01935-83316.

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

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

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

RCSD Index/Database

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

Reference Material

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

"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 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

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 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.

The Vintage Sailplane Association

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

Vintage Sailplane Association
13312 Scotsmore Way
Herndon, VA 22071 USA

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

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

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

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

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

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

Advertising Note

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

Advertiser Index

Events

26	GNATS Aerotow 2000 - Canada
3	Oc-Tow-Berfest 2000 - Missouri
10	Soar Utah 2000 - Utah
27	Spring Fling 2000 - California

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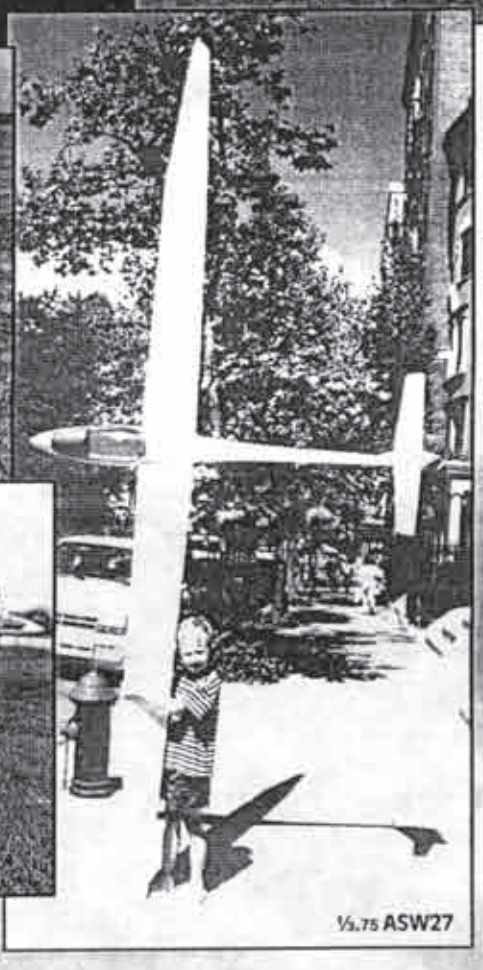

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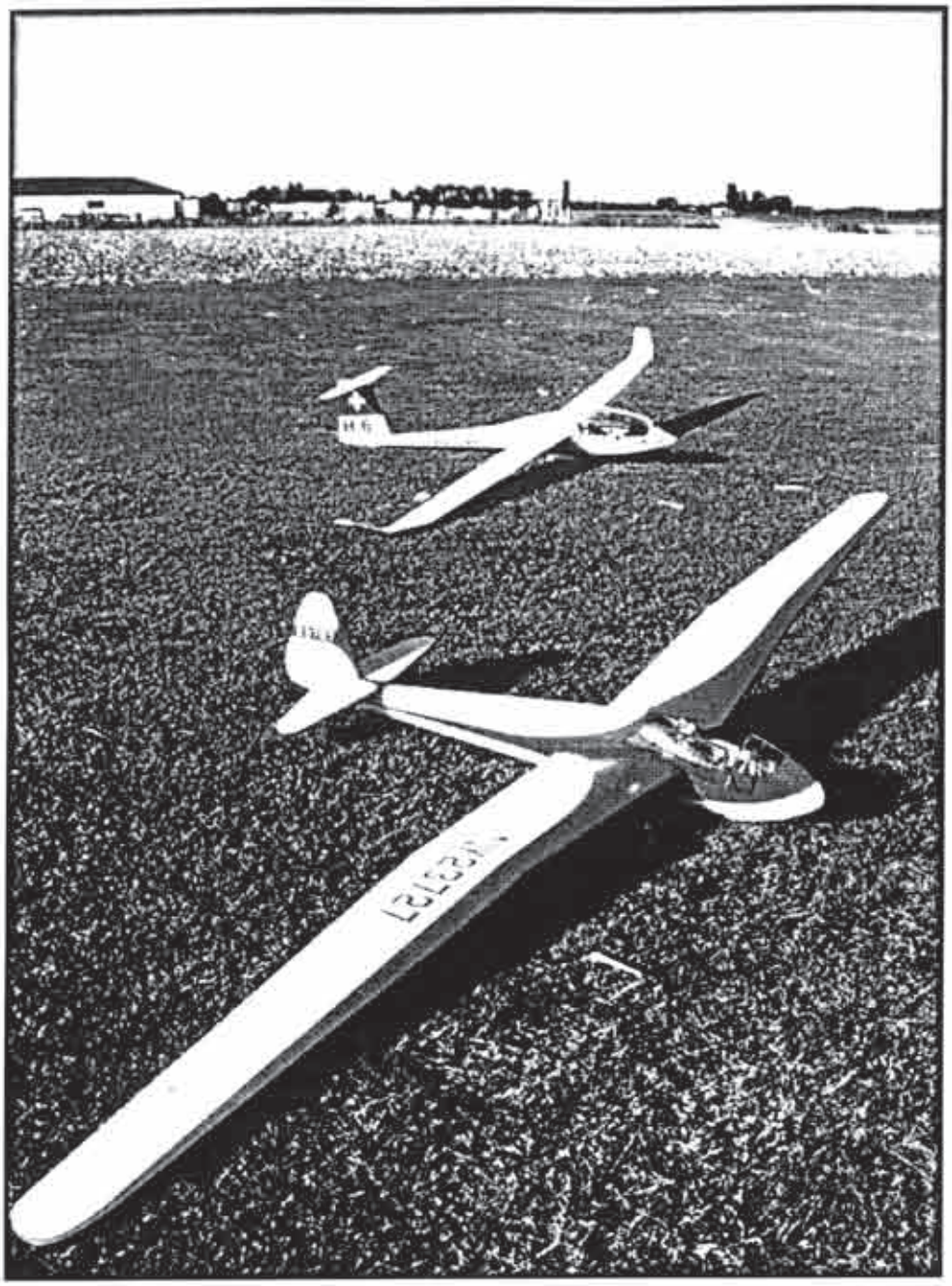
THE GREAT MIDWEST Oc-Tow-Berfest 1999

Report by Peter George
St. Louis, Missouri

(Oc-Tow-Berfest 2000 is scheduled from September 29 through October 1. Please see "The Soaring Site" column on page 3 for more information.)



(Foreground) The scratch built 1/4 scale Orlik by Mickey Sullivan, Arkansas City, Kansas. (Background) 1/3 scale Discus by Tobi Grether, Asheville, North Carolina. Pete George photo.

Richard Ransom's Ka6E on final approach. Steve Gardner photo.

Robin Lehman's beautifully finished 1/3 scale Rippo Fox ready for another tow. Pete George photo.

Mike Watson and his 1/3 scale Ventus 2c. Mark Nankivil photo.

Asher Carmichael's immaculate 6 meter 1//3 scale Rippo ASH 26. Pete George photo.

The gigantic 1/3 scale Wilga, brought to the event by Asher Carmichael of Spanish Fort, Alabama, was the largest tug at the event. Pete George photo.