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THE JOURNAL FOR R/C SOARING ENTHUSIASTS

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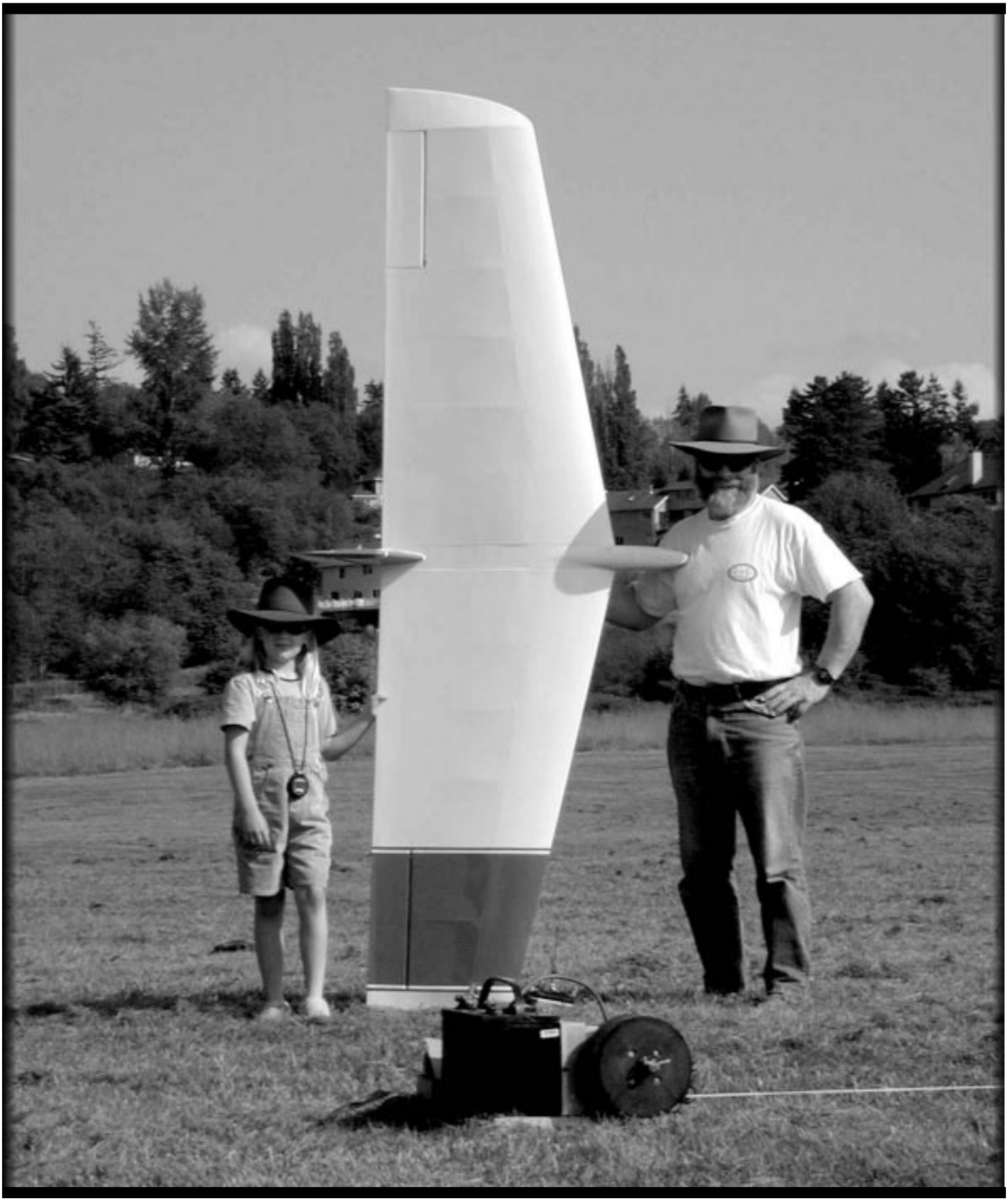

R/C Radio controlled SOARING DIGEST

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**ABOUT *RCSD***

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

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## TABLE OF CONTENTS



Don't forget to check out the *RCSD* web pages each month. Cover photographs are always available for viewing, and usually available for downloading, as well. Special article .pdf files are frequently available for a limited time, and of course our web masters update the highlights and status information of each issue as it becomes available.

### Advertiser Index



## RCSD ON THE WEB

http://www.b2streamlines.com/RCSD.html

**Monthly Feature Photography & Web Version of the Printed Article** (where appropriate)
**Highlights & Mailing Status of the Current Issue**
**About RCSD**
..... **Subscription Information**
..... **Advertising Rate Card** (Adobe Acrobat PDF format)
..... **RCSD Feature Columnists, Reporters, and Editors**
..... (E-mail/web addresses, plus general information about their areas of interest)
**"Getting Started in RC Soaring"** ..... Getting started guide - Adobe Acrobat PDF format
**Links to Organizations, Special Interest Groups & Clubs**
**On-Line Articles -** Great articles originally written for the printed version of *RCSD*.
..... "Trimming Your Sailplane for Optimum Performance" by Brian Agnew
..... "Flys Faster" by Dr. Michael Selig
..... "The Square-Cube Law and Scaling for RC Sailplanes" by Dr. Michael Selig
..... "Modifying & Building the MB Raven (Parts 1-4)" by Bill & Bunny Kuhlman
..... "Butterfly and Moth Airbrushing Tutorial" by Joedy Drulia
**Bookshelf Listings -** A listing of recently published books of interest to aeromodelers.
**Complete RCSD Index, 1984-2002**

## The Soaring Site

### Update on 60 Acres

In the March issue of *RCSD*, we discussed the threat to a flying site called 60 Acres. Since then, we received a heads up from Bill & Bunny, directing us to the web site of *The Seattle Times*. The headline on the web page said, "Sewage plant put on hold for a year," by Nick Perry, *Seattle Times Eastside bureau*. Two paragraphs in the article caught our eye:

"As well as feeling pressure from city officials, county politicians and staff have been the target of a well-organized campaign by the Seattle Area Soaring Society, which has flown remote-controlled gliders in the south section of 60 Acres for 30 years. The society has sent out thousands of letters and e-mails urging that its part of the park remain untouched."

"We are very happy with where it's headed," said Sherman Knight, a society member and Kirkland lawyer. "But until the county starts breaking ground somewhere else, we are still a little nervous."

*Hmmm... We always knew that the Seattle Area Soaring Society was a "well-organized" group! Our best to all of you as the story continues to unfold!*

### New Aeromodelling World Record Attempts - 03.06.2003

*And, in another heads up from Bill & Bunny, they forwarded an e-mail message regarding new aeromodelling world record attempts. What follows are the details of the message.*

"This is a message from the FAI 'Aeromodelling Information' mailing list." (CIAM Home Page: http://www.fai.org/aeromodelling)

"FAI has received the following Class F (Aeromodels) record claim:

Claim number 7793:
Sub-class F3B (Glider)
F3: Radio controlled flight Category
Type of record: N°158: Distance to goal and return
Course/location: El Mirage Lake, CA (USA)
Performance: 1.90 km
Pilot: David L. HALL (USA)
Date: 27.05.2003
Current record: none

Claim number 7794:
Sub-class F5-S (Aeroplane, electric motor (rechargeable sources of current))
F5: Radio Controlled Flight Category
Type of record: N°174: Distance to goal and return
Course/location: El Mirage Lake, CA (USA)
Performance: 6.21 km
Pilot: Gary B. FOGEL (USA)
Date: 27.05.2003
Current record: none

Claim number 7795:
Sub-class F1N (Indoor Glider)
F1: Free flight Category
Type of record: N°118-d: Duration (ceiling over 30m)
Course/location: Johnson City, TN (USA)
Performance: 1 min 23.1 sec
Pilot: Jim BUXTON (USA)
Date: 29.05.2003
Current record: 1 min 13.9 sec (31.05.00 - Leonard George SURTEES, Australia)

"The details shown above are provisional. When all the evidence required has been received and checked, the exact figures will be established and the records ratified (if appropriate)."

*Good luck, guys!*

### The Baltimore Area Soaring Society http://www.soarmd.org

*This month's quick trip via the Internet took us to the east coast and home of the Baltimore Area Soaring Society. Their 'Home' page describes their interests and activities; extracts are printed below:*

**Blackbird XC.3**

Smiling faces following a successful first flight. Alyssa and Bill hold the 107 inch span Blackbird XC at 60 Acres South. The eight pound five ounce aircraft flew beautifully after being winch launched. Detailed coverage included in this issue of *RCSD*!

Photo by Doug Brusig.

**Back Cover**

**Oc-Tow-Berfest 2002 Scale Aerotow Event**

Walt Torgerson's 1/4 scale Airworld Slingsby Kirby Kite took Best Vintage Sailplane at this event!. The model has fiberglass wing skins over the built up wing and tail structure.

Photography by Mark Nankivil, St. Louis, Missouri.

"The Baltimore Area Soaring Society is an AMA sanctioned Club of approximately 60 members, formed in 1980 to enjoy the pleasure of silent R/C flight. BASS is sanctioned by the Academy of Model Aeronautics and is recognized by AMA as a Gold Leader Club.

"Almost all areas of silent flight are pursued within the Baltimore Area Soaring Society. Our members participate in Thermal Soaring, Slope, Hand Launch and electric powered R/C. Our main purpose is to promote friendship among modelers and a better understanding of the construction and successful operation of R/C sailplanes and electric aircraft.

"Members enjoy the use of BASS supplied equipment specific to thermal soaring. BASS maintains both contest and sport winches, retrievers, winch batteries, battery chargers, retriever pole, frequency pins and related supplies. In addition to this equipment, BASS even provides a "Club Trainer" to allow newcomers to experience the thrill of soaring. Members also receive the club newsletter, *BASS News*. This is published 11 times a year and truly is the "Information Provider to the Glider Guider".

The Baltimore Area Soaring Society operates two Flying Sites north of Metropolitan Baltimore.

"For additional information about the Baltimore Area Soaring Society, select a member from our information Contact List."

The 'Home' page had a link under a category called "FYI" that took me to a "Soaring Guide." Written by Bradley J. Smith. "The R/C Soaring Guide" turned out to look more like a book, divided into 3 parts: Soaring for Beginners, Intermediate Soaring, and Plane Reviews. There are 11 chapters: An Overview of R/C Soaring, Getting Started, Building your First Plane, Learning to Fly, Intermediate Equipment, Intermediate Trimming, Intermediate Flying, Intermediate Competition, Beginner Sailplanes, Nostalgia Sailplanes, and Intermediate Sailplanes.

It never ceases to amaze me that there's so much information available via the World Wide Web. Unfortunately, I don't have a lot of time to stop and review the information in-depth, such as Bradley's "Guide." For those of you interested in any of the subjects he covers, please check it out!

I plan to continue to visit web sites to see how they've changed and what information is available. If any of you have a specific club or personal site you'd like to see covered, please let me know! And, be sure to point out any special information you'd like me to share with all the readers!

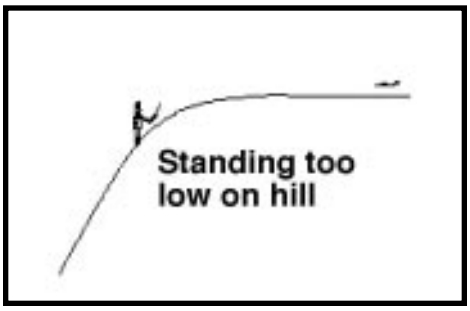
**Happy Flying!**
**Judy Slates**

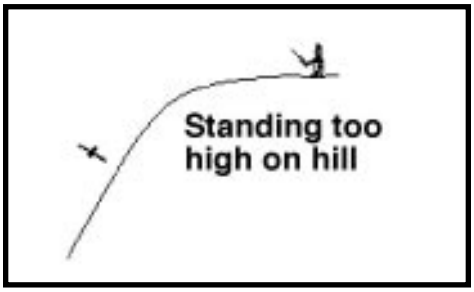
# Slope Flying Tips

by Bill Kuhl
Bkuhl@luminet.net

It is my theory that learning new skills as a novice you see things more critically than as a more experienced person. Eventually everything becomes so automatic that you really don't think about what might have been a problem as a novice. For me, every slope flying session is a learning experience. The following slope flying tips might be helpful to you if you are fairly new to slope soaring.

**Think About Your Field of Vision**



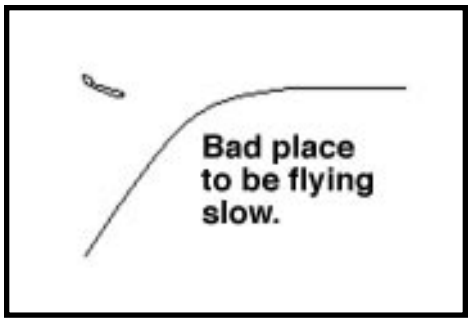

Think about where you are standing on the hill and your field of vision. For example, don't be standing so low on the hill that in the course of a normal landing, your plane disappears from sight on a normal landing. Alternatively, do not stand so far back on the top of the hill that if your plane would suddenly lose lift that it disappears from your line of sight.

**Launch it Hard**

Launch your slope plane straight ahead with plenty of force, especially when there are strong gusts. Make sure the trim is correct with test glides under calmer conditions before trying


full-force launches off the slope. The hard launch makes the controls more effective quickly than when using a wimpy launch.

**Don't Get Caught in a Bad Spot**

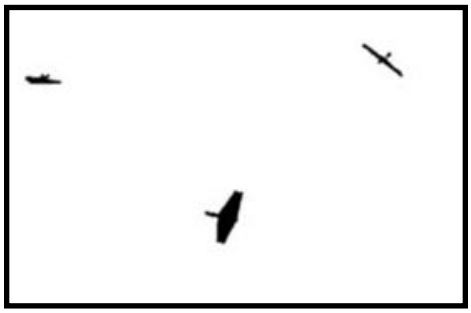



With strong, gusty wind it is important to keep your plane flying as fast as possible to keep it from being blown off course. This can be especially bad if you are flying close to the hill in the direction of other pilots or spectators.

**Keeping the Speed Up**

How do you keep the speed up on a plane with no motor? Fly smooth, using minimal control inputs for wide turns, and minimal corrections. When you have excessive altitude, this is a good time to point the nose down and trade altitude for speed. At some point it might be necessary to add ballast.

**Avoiding Mid-airs**



When several gliders are sharing a relatively small airspace, there is always the chance for mid-air collisions. Funny, if you have ever flown slope combat, you know how hard it can be to purposely collide with other gliders. Left to chance, mid-air collisions happen much too frequent.

Try to fly the same direction as most of the planes. Chances are that damage will be way less in a collision with a plane going the same direction. Head-on collisions add the speed of both planes to the energy of the impact.

At times I try to make a very quick glance to the opposite side of the slope to gauge the altitude of other planes. I try to adjust my altitude either higher or lower. Those planes could change altitude but still I think chances are better they will still stay level and a collision will be avoided. If your plane does collide with another, try to get the nose down to pick up speed right away and then try to roll away from the hill to regain altitude. In watching video I had taken of a mid-air it was interesting to watch in slow-motion how the planes were tumbling after impact. This is why it is important to gain speed quickly to regain full control to pull out.

See ya on the slope!

■

## SCHEDULE OF SPECIAL EVENTS

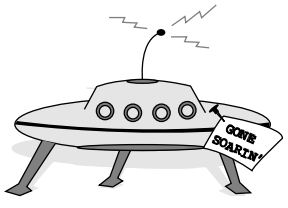
**July 19-20, 2003**
Gamblers Gala TD Contest — Gardnerville, NV
Lee Cox, lecofly@charter.net
(775) 782-5443
www.sierrasilentsoarers.com

**July 19-26, 2003**
AMA/LSF NATS — Muncie, IN

**October 10-11, 2003**
Texas National Tournament (TNT) — Dallas, TX
www.SLNT.org

**November 29-30, 2003**
Tangerine Soaring Championships — Orlando, FL
www.orlandobuzzards.org

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

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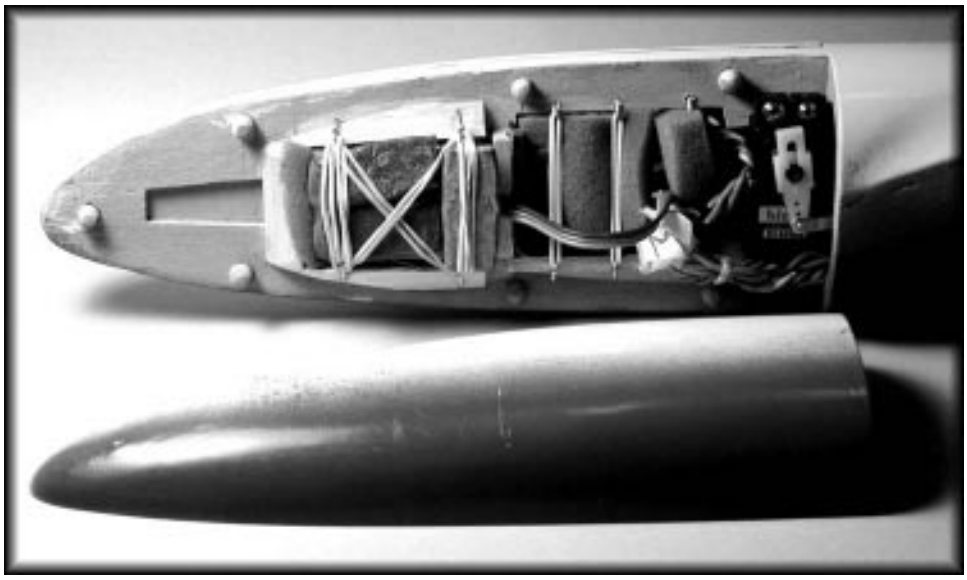


Side view of the nose of the completed fuselage. The lead nose weights closely follow the contour of the keel and the triangle stock right in front of the battery pack. Lead sheet is also placed on both sides of the battery pack. The receiver is placed in foam between the battery pack and the rudder servo.

## Blackbird XC.3

*Construction of our Blackbird XC is complete and test flying was successful. Read all about it!*

### The framework

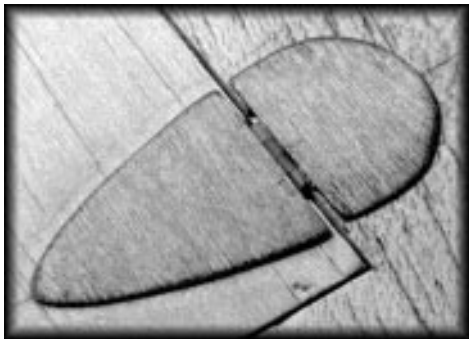
Several pictures of the airframe in various stages of construction were included in the last installment. A few photos of the completed airframe are included in this installment.

Several construction points deserve additional explanation.

Flaps: The flaps are constructed of 1/8th inch square spruce sticks glued to 1/16th balsa sheet. The outside rectangular frame is just slightly smaller than the balsa framed opening in the bottom of the wing. The flap "ribs" are placed diagonally to provide torsional resistance and prevent warping. A plywood mounting plate was added at the inner end to serve as a mounting point for the short control horn. The upper surface of the truss framework was then covered with 1/16th inch balsa sheet.

The method we used for hinging the flaps is rather unique. The bottoms of the wings were turned upward and the flaps put in final position within their wells. The hinges were then placed evenly across the front of the flap and their outlines traced. Using the traced outlines as a guide, a Dremel tool with a router base was used to cut away the flap and wing material to the depth of the hinge.

Very small quantities of thin oil were applied to the bearing surfaces of each hinge and the pin removed. The lightly oiled hinges were then strung together with a single piece of music wire.



A typical flap hinge. The nylon hinge is inset into the balsa sheet covering the wing and flap, and 1/64th inch contoured plywood plates are then glued over the hinges to support the Ultracoat covering material.

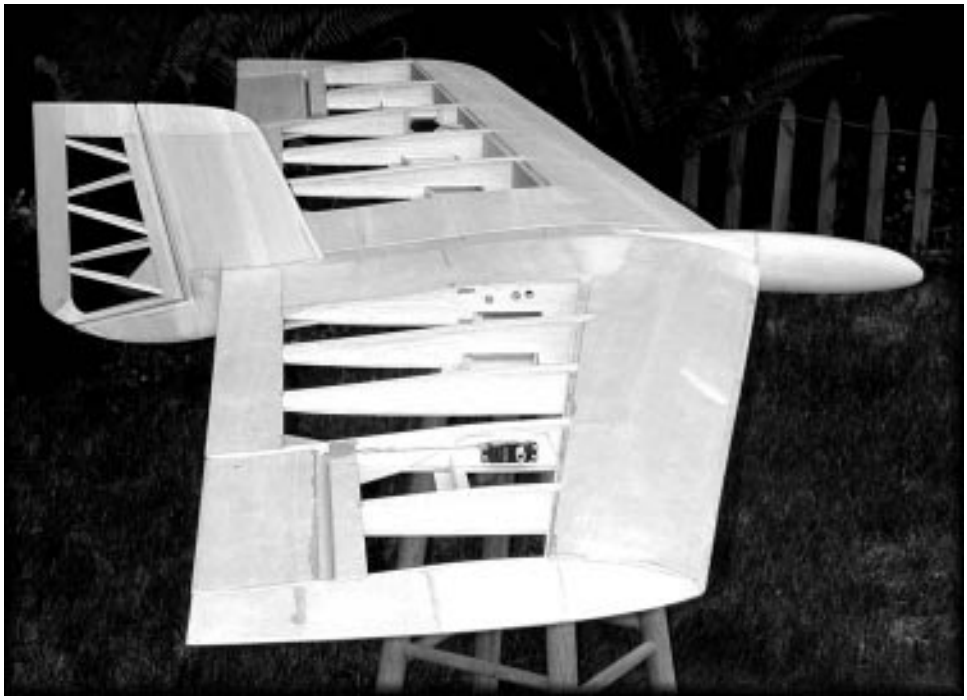
(R) Molten lead was poured into the nose through use of aluminum dams and tipping the sides at 45 degrees. Each side holds slightly more than a half pound.

With the flap still in place within its cavity, the hinges were arranged in their shallow depressions. The point of a #11 X-Acto blade was used to hold one side of the hinge in place while thin CA was run around the outline. This permanently fixed one half of the hinge. All of the flap side hinges were glued in first while the music wire kept them all in line and the oil kept extraneous glue from sticking to the hinge bearing area. The process was then carried out on the other half of each hinge. Once completed, the hinges were in a straight line and rigidly fixed to both the flap and the wing.

A closeup of the flap servo location which provides an idea of how the control system operates. Full flap deflection is 45 degrees.

Granddaughter Anna, age three and half, steadies the completed airframe for the camera. The flap structure is obvious in this view.

(Below) Side perspective of the complete airframe. The elevon servo can be easily seen, the flap servo is under the wing root sheeting. The reflex of the airfoil is evident in the curvature of the lower surface.



To cover the bare faces of the hinges, we used 1/64th inch plywood cut to a rounded airfoil shape using scissors and a couple of aluminum templates. Thick CA was then applied to each hinge half and the appropriate plywood cap glued on - round at the wing, tapered at the flap. The final step was to run thin CA around the perimeter of each hinge cover.

After removing the music wire guide and covering both the interior and exterior flap surfaces and the wing bottom, the original hinge pins were reinserted and fixed in place by pushing the extended end into a cut slot. The result is relatively clean from an aerodynamic perspective, and sufficiently solid to withstand both the power of the servo and the expected air loads.

The one thing we now wish we'd done was to go around each of the plywood caps with some spackle to smooth the plywood-balsa interface. As it is, the covering does not fully attach to the wing surface around the perimeter of the cap. No big deal, but in retrospect...

Construction jigs: Since the wing itself has a straight taper, jigs for setting up the wing are simple, despite the fact there's no flat area on the lower surface of the BW 05 02 09 airfoil. Trailing edge stock serves this purpose extremely well.

Trailing edge stock was also used during the framing of the vertical fin and rudder for the same reason.

Spar webbing: Another thing we did differently involved the spar webbing. In the past we've carefully cut the plywood and balsa webbing and glued it into the space between the spars. This time we glued the spar webbing to the rear face of the spar caps beginning with the first open bay. The spar webbing in the first bay, where the

Underside of the Blackbird XC with flaps fully deflected. Granddaughter Anna, age three and a half, provides some scale.

wing rods receptacles are located, retains the interior webbing equivalent to the original Blackbird 2M plans.

Trailing edge webbing: Using 1/16th inch balsa sheeting certainly brought the overall weight down, but it also caused minor structural difficulties in some areas. The major problem appeared at the front of the trailing edge sheeting. Despite the curved surface, the sheeting tended to bend too easily in our estimation. Our solution was to add a vertical web of 1/16th balsa sheeting inside the leading edge, fully spanning the upper and lower sheeting between adjacent ribs. This created a triangular "box" which substantially stiffened the area with very little weight penalty.

**Installing radio gear**

We had originally chosen the Hitec receiver for this aircraft, but from the start were not convinced this was the best way to go. After reversing one of the flap servos and being able to use a Y-connector to drive both servos from the throttle channel, we gravitated toward using the FMA Direct M5 because of it smaller size and the confined area in the nose pod.

This arrangement worked out extremely well. The receiver is well padded in a configured piece of foam, held in place with small rubber bands. See the included photo. Four of the five available channels are used - flaps are on throttle, there's one elevon on aileron, the other on elevator, and the rudder servo is run off the fourth (rudder) channel. Our JR PCM 10 transmitter was programmed for V-tail with rudder to aileron mixing and flaps on the throttle stick.

The battery complement, a four cell 1400 mAh NiCd pack, is also held in place with small rubber bands.

Servo cables, as mentioned previously, are run through the wing in conduits, and all are twisted to avoid picking up extraneous signals.

**Covering**

The Blackbird XC we've been flying for many years was finally in need of recovering, so we purchased 25 foot rolls of Ultracoat in red and white some time ago. This seems like an awful lot of covering, but we used a bit more than a third of each roll covering that airplane. With sufficient material left over, it was only natural to use the same colors on this new XC machine.

Asymmetry remains an intriguing scheme for us, and we rapidly decided upon a contrasting band around the right elevon area. The final pattern consists of a red band over the top of the wing and a white band along the bottom. This gives a little bit of contrast at altitude without making the covering process too complicated. Separation bands of 3/8th inch width were applied afterward.

Jim Pruitt, a Bremerton resident, has been wanting to get back into modeling after a rather lengthy respite and has been following the Blackbird XC construction process from the start. Jim volunteered to help with the covering job. A couple of his photos, taken during the several hours it took to get most of the covering accomplished, are included. Nearly thirty five square feet of covering later, the job was done.

The right wing, bottom covering in place, ready for the upper surface covering to be applied. Notice the interior framing of the flap bay.

Bottom of the right wing after the covering was applied. The flap recess has not been cut out yet, so the hinges are not connected. Each flap is over fifty square inches in area, so substantial servo power is required.

To make sure the flaps closed securely, we induced a 1/8th inch twist during the covering process. The slight twist forces the outer portion to seat first and the servo brings the flap to the fully closed position. The inner portion is held in place by the servo, and the outer portion by the imparted twist. This method is used on full size aircraft, so we anticipated it would work in this application as well. It does.

**Balancing**

Aaron Coffey's Panknin spreadsheet, available on our web site, was used to determine the location of the neutral point (NP) and the static margin. The leading edge of the wing is swept back at ten degrees, so the quarter chord sweep is 7.5 degrees. The root chord is 27 inches and the tip chord is 17 inches. The spreadsheet shows an area of 2354 square inches (16.35 square feet) for these planform dimensions. In reality, due to the shape of the wing tips, the area is 2300 square inches (16 square feet) and the area is a bit further rearward than the simple trapezoidal shape used by the spreadsheet. The spreadsheet shows the NP as being ten inches back from the apex of the leading edge, slightly forward of where it is actually located, so there is a small safety factor built into the computations. A static margin of 5% (0.05) places the CG 1.1 inch forward of the NP, 8.9 inches from the leading edge apex. We marked the NP and 5% static margin CG on the bottom of the fuselage using a fine felt tip marker.

The balsa blocks which form the nose were previously hollowed out, leaving ample room for lead. We made dams of aluminum sheet and used wooden dowels stuck in the mounting pin holes to support them. The nose blocks were supported on wet rags while molten lead was poured into the dammed cavities. About 0.4 pounds went into each side. Once hardened, the nose blocks were rigged at a 45 degree angle and more lead was poured in until level with the original pouring. This filled the nose blocks back to the location of the triangle stock in front of the battery compartment. The included photo shows the finished product, a half pound of lead in each side. Additional flattened lead pieces were placed on either side of the battery pack, held in place with the rubber bands.

After adding all that weight, the CG turned out to be slightly more than a half inch in front of the marked NP. This is equivalent to a static margin of 0.025 or 2.5%. Based on previous experience, this is a small static margin. The one thing which kept coming to mind, however, is the lower positive pitching moment of the BW 05 02 09 airfoil compared to the CJ 25$^2$09 which we used on the last Blackbird XC. With less downforce at the rear, a more rearward CG is possible. We just had to make sure the CG was in front of the computed neutral point. More about how this worked out in the next section.

With all of the lead in the nose, the overall weight came out to be eight pounds five and half ounces, well below the eleven pound FAI maximum. This also compares very favorably with the ten pound eight ounce weight of the last Blackbird XC. The wing loading for the completed aircraft is just eight and a third ounces per square foot, very low for an aircraft of this size.

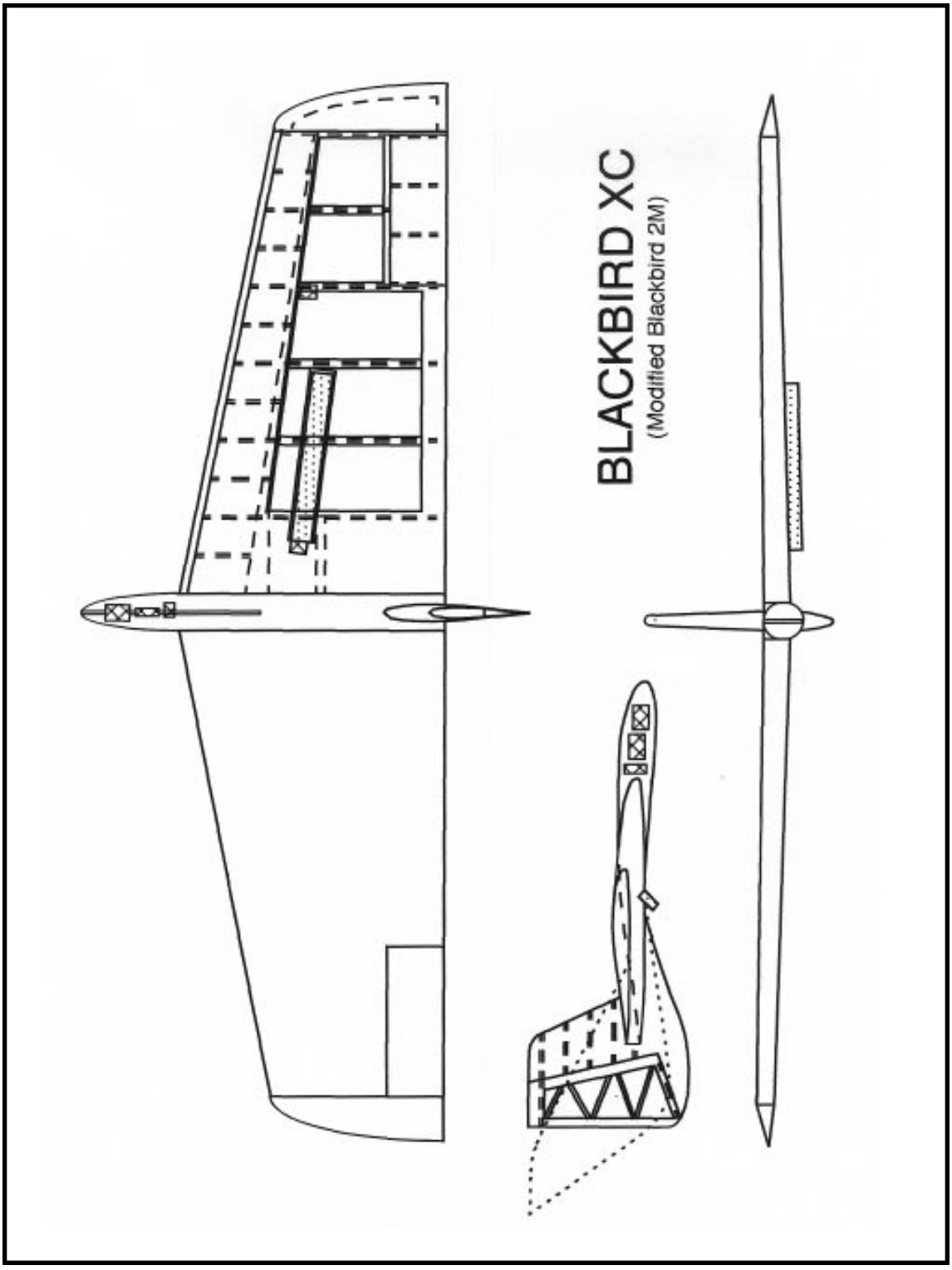
**Test flying**

First, it's necessary to realize that this is an incredibly large airplane - the total wing area is just a few square inches short of the FAI maximum. Getting the airplane up to flying speed poses big difficulties, as can be imagined. Luckily, the wind was blowing at 60 Acres when we went out for test flying.

We talked Doug Brusig into handling the transmitter while Bill, Blackbird overhead, ran across the field at top speed. Several trials, nearly releasing the aircraft in order to feel for pitch instability, resulted in no untoward tendencies being observed. A push forward on the fourth attempt and the Blackbird XC was traveling out in a flat glide with some barely visible elevon deflections from Doug's hands on the transmitter sticks. It appeared from the results of the single hand launch that the 2.5% static margin was going to be right on.

The tow hook was initially placed a quarter inch in front of the 5% static

margin CG, three quarters of an inch in front of the 2.5% spot. This seemed like a good place to start, so the Blackbird was hooked up to the winch line. Tension was built up and the aircraft was thrown straight ahead. The Blackbird immediately rotated into a steep climb. Rapidly pulsing the pedal was sufficient to maintain the climb to release. Once off the line, no trim was required for continued straight and level flight. The mixed rudder was sufficient to get well coordinated turns from the right stick alone. There wasn't much thermal activity, but the Blackbird XC turns gracefully and cruises through the sky in an overtly majestic manner.




The one thing we wanted to test was the aircraft reaction to flap deflection. Slowly lowering the flaps initiated a nose up motion, so they were quickly retracted. We were expecting no pitch change at all, so now must work on getting the transmitter to mix throttle position to elevator in the proper proportion. The tow hook needs to be moved back as well, and we anticipate its final position will be a quarter inch or so in front of the final CG location.

Despite the flap deflection adversely affecting pitch, the Blackbird XC performs exceptionally well. It's docile enough that Alyssa, our seven year old granddaughter who is still perfecting her flying skills with her Highlander, took over the controls for a while on the third flight. She really liked steering the gentle giant around the open blue sky.

We're looking forward to flying the Blackbird XC all Summer and for many years to come.

———

Suggestions for future columns can always be sent to us at either P.O. Box 975, Olalla WA 98359-0975 or <bsquared@appleisp.net>.

■

## HYBRED MUTT

**A modeler's shop, piece mill plane.**
**Or, the main reason you save major parts.**

by Robert A. Arrington
W. Valley City, Utah

I started with a Graupner - RC Pilot I bought from a mail order store.

The RC Pilot is a very heavy plane for its 84" wingspan, weighing in at 84 oz. But it would float on very light air with its jadelski wing. The wing is made from solid balsa wood with a deep under camber and joined at the fuselage with a double rod. I also installed Hobby Lobby's barn door spoilers. The only draw-back to the RC Pilot was its lack of penetrating power in wind over 25 mph. We were training a young man to fly when he dove the plane for a couple hundred feet and then pulled out too hard. One wing snapped back and the plane went in. The fuselage and tail feathers were completely gone but I saved the wings.

The next plane was an LS-6 with a 118" wing span by Graupner, purchased from Hobby Lobby. This plane was very good looking with sleek lines and I had fun putting it together, but you had to keep the speed up on it at all times and it handled more like a sports car: temperamental. This plane died in a wing tip stall and the only thing that was worth saving was the elevator.

The part that brought the everything together was a fuselage I got at an Intermountain Silent Flyers club meeting. One of the members had a fuselage from a Cumulus, which had never been used. He was giving it away, so I grabbed it being the cheap soul that I am.

The first thing I did was work on the broken wing from the RC Pilot. I used epoxy and 1 oz. glass to glue the parts back together and then added Kevlar stripes to the bottom of both wings. I was lucky to find a 2500 foot roll of 1/4" strip Kevlar at the local thrift store for $0.50.

I then made plywood ends from 1/4" - 5 ply to match the inner shape of the wings. I used these ends glued to the fuselage so the wing would match in at the root. I wanted it to look like the wing and fuselage were made for each other. Fitting the wing double rod connection system in took the most time and measuring. The existing wing shoulders on the fuselage were parallel which made it easy to drill. I then glued the rods and the new plywood ends to the wing shoulders. In filling and matching the plywood into the curves proved to be a lot of handwork. I had to design and make the rudder using balsa wood. I based it off a stick frame system and shaped it to fit the shape of the plane.

Installing the elevators was fairly simple, using the original full flying elevator system off of the LS-6.

After finishing and installing the radio gear, the plane balanced out with only 3 oz. of lead for a total weight of 56 oz. The first flight was just a dream. It handles more like a Gentle Lady if you slow it up and yet it will fly in a good stiff wind. The Kevlar lets me put more stress on it without worrying.

Just think of the parts sitting around your own shop. What kind of flying mutt can you put together? ■

# Oc-Tow-Berfest 2002 Scale Aerotow Event

by Mark Nankivil & Pete George
Photography by Mark Nankivil
nankivil@covad.net

A 1/3.5 scale LS-4 coming into land.

Thanks to the Midwest Air Wing RC club and mother nature, Oc-Tow-Berfest 2002 was a smashing success! Modelers from both ends of the country showed and towed 180 plus times during the three day event. With several towplanes available there was never a wait for a tow. Twenty pilots from twelve states took full advantage of the "thermal rich environment!" On Saturday we ran the EMS gold medal duration flying event and four modelers walked away with gold medals after flying for over one hour. Several others won bronze and silver medals for making it past the twenty and forty minute mark. The winners of the Pilots Choice Awards were: Peter Goldsmith, Best Towplane for his Towmaule, Walt Torgerson, Best Vintage Sailplane with his Kirby Kite, and Art Frost won Best Modern Sailplane flying his Jantar 2.

Thanks to everyone who came and hope to see you next year!

■

Johnny Berlin & #8217's Pegasus (John Derstine kit) 110 inch wing span, ZDZ 120 motor. AUW of 28 lb.


Richard Ransom, all molded 1/3 scale Schueler ASH 26, 26 lb.

Peter George, EMS Ventus 2c, 1/3.75 scale, 4.8 meter span, all molded.

Bernie Coleman's EMS Duo Discus.


Art Frost's scratch built 1/4 scale ASK-18.

Art Frost's 1/4 scale Jantar 2 based on the Viking Models fuselage. Beautiful model!

Bernie Coleman's flying babe kept the model sailplane pilots company while waiting for the next tow!

Peter Goldsmith also brought along this 1/4 scale Piper Pawnee towplane.

Peter Goldsmith's 6.7 meter Nimbus 2B is the 1/3.5 scale model built from the Rosenthal kit.

The Axel pilot occupying the cockpit of Pete George's EMS Ventus 2c.

(L) Peter Goldsmith's tow plane called the TowMaule. This was a scratch built ship that flew nicely in Peter's capable control and shared with much of the weekend's towing duties.


Caroline Goldsmith with her Roke ASK-18, 1/3.75 scale, 4.2 meter span and 14 lb.. An accomplished pilot in her own right, it sure was nice having her flying with the guys at the field.


Walt Torgerson, 1/4 scale Airworld Slingsby Kirby Kite. The model has fiberglass wing skins over the built up wing and tail structure.

(L) Landing approach with spoilers up and flaps partially down.

Jim Frickie with his Icare Nimbus 4D. 1/5 scale, wingspan of 5.3 meters, weighs 10 lb. and uses 10 servos!

Andrew Jamieson's AC-4 Russia. Based on a Gene Cope fuselage and Dale King built obechi/foam wings, this model is 1/3rd scale, spans 4.5 meters and weighs 22.5 lb.

# TECH TOPICS

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## Hobby Lobby's "WHISPER" 2 Meter Sailplane

Ever since Mark LeVoe stopped making the 2M Super-V, I've been looking for a good 2M sailplane. Small fields, convenient transport, etc., all make the 2M size something that would work well for some flying at the end of the work day. Hobby Lobby's 2M WHISPER sailplane looked like it had some very interesting design ideas so we decided to give it a shot.

Construction of the wing is a bit different. Although it's a hollow core with a beautiful finish, the skins are a balsa laminate (glass/balsa/glass). Compression and flex strength seem very good with this architecture.

The wing itself is a double taper with small reverse Hoerner tips. The airfoil is reported to be a SD7037 and that appears to be accurate. The finish is very well done with the color feathering from yellow to red at the tips. The lower surface is solid red with rounded cutouts for the servo cans (supplied with the kit). These are placed inboard of the respective control surface.

A wiring harness with Deans connectors (4 pin) is supplied along with horns and linkage for conventional servo installation. The wing also has cut outs for tubes for ballast (not supplied) located near the CG. The wing rod is straight with a slight angle to the wing tubes to provide a very modest dihedral angle (about 3 degrees).

The fuselage is glass with the color applied in the mold. Although this is becoming more common for kits, I'm still impressed with the quality and durability of the surface finish produced by this technique. There are a couple of carbon strips along the base of the fuselage which extend to the tail (on the interior surface). The wing roots are square to the wings with a brass tube through the fuselage for the wing rod and two indexing holes near

the LE and TE to align the wing mount.

The servo cutout in the fuselage is already done and only requires a little reinforcing ply or basswood to drop in your servos. Metal pushrods are already installed with a screw fitting soldered on the servo end for the clevis. Mine had a cold solder joint on one fitting which was easy to fix with a low wattage iron. Ample space is available ahead of the servos for a 500mAh battery. A compact 7 channel Rx goes at the aft end of the servos.

A nice feature in the fuselage is a sealed area in the nose (ahead of the battery). This can be drilled from the top and lead shot added to get the balance just right. After balancing, simply tape over the hole and you're done.

Final note on the fuselage, the tow hook is pre-installed. The location is ahead of the CG on about a 45 degree angle which is very conservative for a winch launch.

The WHISPER V-tails are built up geodesic structure. These are pre-covered, requiring only that the control surface be taped and the linkage attached. The V-mount uses two metal rods at the root of the tail that are inserted in metal tubes in the fuselage. The tubes are staggered so the ones from either side won't intersect. The WHISPER V-tail included angle is 120 degrees.

A complete hardware set came with the kit: Hitec servo cans, threaded post linkages for the wings, angled V-connector for the tail, etc.

Since this is the Tech Topics guy, let's take a look at some of the design numbers. I've captured a few measurements in Table 1 and calculated some of the associated design coefficients as well.

The first thing to note is that the volume coefficient for the equivalent horizontal surface (TVC) is in the mid-range of what I like, while the vertical volume coefficient (RVC) is pretty low. I also note that the dihedral angle is very shallow which may provide issues with yaw and roll stability. With the large included V-angle and the low wing dihedral, this could be a problem for yaw-roll response as well as roll stability while cruising between thermals.

The wing planform comes close to the Scheumann ellipse calculation done in this column a couple of years ago. It gives a good approximation to an elliptical distribution, which can be confirmed by running the planform in the Lift-Roll spreadsheet. Where there is a discrepancy, the tips are a bit wider than elliptical. As we discussed a few columns ago, this is an appropriate direction for both Re corrections and to minimize tip stalls.

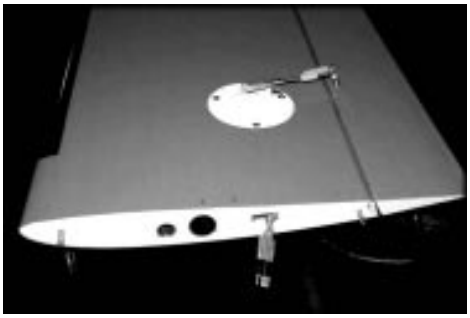
One final note, the numbers also indicate that the tailplane angle is low. This simply means that the distance between quarter-chord of the wing and quarter-chord of the tail is a bit shorter than a typical 2M design. Coupled with the low RVC, this ship could be both yaw and pitch sensitive if not trimmed carefully.

There's not much to say about the equipment installation in the fuselage. I used a couple of S133 servos (Futaba) and they were very tight on the servo arm length. I'd recommend a smaller servo. The HS80/85 and JR341/351 would also be tight on the arms so you're either going to have to install these with care or go to an S90, HS55, CS21 or similar size. Since this is a 2M I'd recommend the higher torque gear sets for the CS21.

Battery and Rx in the fuselage are straightforward. A trick learned years ago is to wrap a piece of electrical tape around your battery after installation. There's no way it can inadvertently exit the aircraft other than a fatal interaction with the ground. The Rx used was a standard Futaba 7 channel.

## Table 1: Whisper 2M Summary

| Wing | | V-Tail | |
|---|---|---|---|
| Span (in) | 78.5 | Avg. Span (in) | 10 |
| Area (in^2) | 573 | Area (in^2) | 100 |
| Avg Chord (in) | 7.35 | Avg Chord (in) | 5 |
| AR | 10.6 | AR | 4 |
| Moment (in) | 25.75 | RVC | 0.029 |
| TPA (Deg) | 33.44 | TVC | 0.464 |
| Fuselage Area (in^2) | 182 | | |



Wing servo installation has problems. I wanted to use the servo cans supplied but there were a couple of issues. The holes are precut in the wing so there's not much you can do about them. However, they were all cut about 3/8" too close to the trailing edge which allowed the TE side of the can to stick out of the hole by ~ 1/16" while the LE side of the can was about 1/32" below the lip of the hole, I glued a 1/8" piece of balsa to the back side of each can and then hit it with a belt sander. You have to sand the taper through the bottom of the plastic can at the TE end but after a little work it came out OK. Each well was glued in with Goop and allowed to sit overnight.

The next problem with the wing linkage was the hinge line on the flaps. Both the aileron and the flap use a molded in hinge (part of the skin). It looks like it's glass or release cloth; it's definitely not Kevlar. But both hinges are cut on the TOP of the wing. There's no way to get a 90 degree flap deflection with this set up. Even 30 degrees is a stretch. There was even a nice gap seal structure for the flaps, but it's all wasted with this hinge location.

I cut off the flaps, filled the gaps with balsa and then sanded and tapered until it worked right. However, both the location of the servo cans and the flap hinges are avoidable problems if the manufacturer/supplier used a little foresight.

After sorting out the flaps and servo mounting, the wiring harness and connectors supplied with the kit worked out very nicely. I used Futaba S133 servos for the ailerons and 351's for the flaps (metal gears).

A problem also cropped up with the linkage supplied with the kit. The aileron and flap horns are brass screws which allow fine adjustment of the connection height. However, they require a large, angled hole in the control surface which is awkward. Also, the slop in the threads leads to a lot of play in the control. I glued the threads (CA) to eliminate the excess play after properly adjusting the servo end points. Bill Masserang (SLNT) suggested getting some metric nuts and jamming them down to take out that slop.

**Off to the field for flying.**

First day out was very windy and cold. Launches on my mini-winch were true but erratic due to the wind gusts. Release from the hook was fine. The zoom was outstanding. Even from short launches the plane carried energy very well. Aileron control was very slow this day. Turbulence was high and quick response was needed. Rudder coupling was ineffective probably due to the low dihedral, RVC and TPA.

Next day the wind was a lot more forgiving. Launches again were very good with excellent zoom at the top. It was now noted that the ship had a pronounced bank to the right. This was corrected by either aileron trim or a lot of left rudder. Thermal turns were flat and efficient without rudder coupling; too much rudder coupling caused the inboard wing to spiral into the turn. Aileron throw and differential were increased to handle both adverse yaw and a higher roll rate.

A close look at the setup at home indicated that the left V-tail incidence was about 1 degree off from the right thus explaining the tendency to bank to the right. Additionally, the right V-tail had a warp going in the same direction. The warp was ironed out while the indexing was fixed by relocating the mounting wire in the stab and then gobbing up the oversize hole with epoxy. These fixes cured the banking problem.

Another day of flying in calm weather seemed to have things about right. A sport winch or hi-start launch is fine with the tow hook as installed. However, like most 2M ships, this one does not really excel at launch by pulling a lot of tension and running it fast. They work better with a fair amount of camber and a pull that tends to kite them up the line. Use the final third of the launch for speed and you'll get several hundred feet more altitude on the zoom.

**Now, for the rest of the story.**

I tried hard to stick to this design as shipped. As you might infer from the write-up to this point, there were some frustrations. I wanted to address those at the time but played it by the book to see how it would come out. After a session or two with a full power winch on a windy day I finally threw in the towel and decided to fix the problems.

First of all, the 120 V-angle just doesn't work for me. On a hard winch launch it's really squirrely. Yaw stability is poor and the forward towhook makes for some entertaining high speed

shallow angle launches. After much trial and error, the launch angle was compensated with a bunch of camber and about 40% up-elevator launch pre-set. That last part helped on the launch height but made the yaw problem a lot harder.

First thing was to fix the V-angle. Going back to the spreadsheet indicated we could get a decent RVC and a marginal TVC by reducing the V-angle to 100 degrees. This was effected by bending the mounting rods 10 degrees on each side and then gluing them in with 30 minute epoxy (roughen the rods for a good grab).

Next, the simple right angle bend for the control surface coupling on the V-tail blows off on a hard launch. These were converted to z-bends. If the rear mounting rod is cut about in half, the tails can still be removed even with the z-bend.

Next, move the tow hook back at least an inch. The tow hook screws into a metal plate inside the fuselage so this is pretty easy to do. It takes a little patience to catch the threads but after that it's OK. Basically, put it somewhere around the rear edge of the ballast cutouts. The exact spot depends on your experience and courage.

With the smaller TVC, the neutral point has now moved forward. A good rule of thumb is to keep the CG about 5% ahead of the NP so add some lead to that forward compartment until the CG is under the center of the ballast tubes.

For the ballast tubes, I glued in some thin wall 17/32" brass tubes. Then 0.5" ballast tubes fit nicely in the larger ones and can be added or taken out easily. The tubes length is restricted, so 8 oz. of lead is all you can use.

Next, I'd toss out the supplied wing linkage. Use normal phenolic or composite tabs by cutting a slot in the control surfaces and epoxy them in place. The brass fittings supplied are just too loose and bulky for this size plane.

Since I had already glued these in, I stuck with them but had to dial them in with a micrometer to be sure each post was at exactly the same height for the flaps. Same thing goes for the ailerons. Then use your end point adjustment to keep the servo from stalling against the forward edge of the servo can.

Nothing against Hitec; these are great servo cans. But they require huge holes in the wing and then stick out at the wrong places (as previously noted). Also, the fairing over the servo arm is too far towards the rear of the can so you can't get full forward travel within the fairing for flaps. Did I also mention the fairings are too narrow for a linkage keeper? I cut off the fairings just to get the linkage to work right.

Now it's back to the field to see what we've got. First thing is that launch rotation is a whole lot better without up trim. Noticeably less camber is required. Zooms are still great. The aileron throws can be cut back (about 50% negative exponential is good). Yaw stability is much improved with the tighter V-angle.

Interestingly, pitch stability is very good; maybe better than before. I suspect the original 120 degree V-angle has a lot of the tail section in the downwash from the wing which effectively blanks it on launch and crow. Crow pitch control is noticeably better as well.

I haven't figured out how to increase the wing dihedral but I'm working on it. With the other modifications, it's now flying pretty good, but improved roll stability would be desirable for getting out to the far end of the field for those hard to find thermals. Even so, several 15+ minute flights were made during the last outing.

With a bit of work on the CG location and taking out the rudder coupling entirely, this ship is starting to work out better. Exponential is a must for thermals. Although the initial roll rate for this plane is fast, after about a 45 degree bank angle it just seems to want to quit rolling. So if you want to hot dog, be sure you've got plenty of altitude.

**Here's the wrap-up on this project:**

The Whisper 2M is a reasonable value for the price, BUT:

1) Toss out the wing linkage and use something more reliable and convenient.

2) Toss the servo cans, fill the holes with Formula 150 or 250 and start from scratch.

3) The flap hinge is on the wrong side so you'll have to either live with ~ 20 degrees of flap or cut them off and re-mount.

4) Watch for warps and misalignment of the V-stabs. Another Whisper in our club had the same problem.

5) Decrease the included V-angle to 100 degrees.

6) Install ballast tubes. You're going to need them for windy days.

7) Be prepared to fly this ship. Even with the mods noted, the low dihedral angle and small TPA don't give you great roll stability and tracking. The reward, however, is extreme sensitivity to nearby thermals and very flat, tight turns.

Once you master all of the above, this is a pretty ship and quite responsive in the air. I particularly like the fact that it breaks down and can be transported in the original box. It also flies nicely out of small fields. Overall my guess is that this was originally a light wind sloper that has been applied to the thermal duration market. It can come close with a lot of work. But you WILL have to do some mods on this one to get it right. Mark's 2M Super-V is still king of this class in my book.

■

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

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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

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