R/C Radio controlled SOARING DIGEST

THE JOURNAL FOR R/C SOARING ENTHUSIASTS

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

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The Soaring Site

Michigan Soaring Sites

We received the following e-mail request this past month from Mike Kriesel in MN.

"I was wondering if you could help me? A friend and I were planning a camping/flying trip in the upcoming month to the U.P. of Michigan. A person I know said he would fly at Grand Sable Dunes and has been doing it for years, but when I contacted the visitor's center for that area the ranger there said that it is not allowed and there is a substantial fine for doing so. I'm sure there are some clubs in the area but don't know which ones they are and whether or not they will let us fly there. If not, is there any place in that area that is legal to fly at? Any info. would be greatly appreciated, thanks."

I sent his request on to Greg Smith at <greg@slopeflyer.com>. Greg's response follows.

"Sorry, I am not sure of the rules at Grand Sable Dunes. I have flown at Sleeping Bear Dunes and the rangers there have a sign in form if you are going to fly. Maybe they would have some info. on the other park.

"There is info. on Sleeping Bear at:

http://www.slopeflyer.com/artman/publish/article_86.shtml

"I also got this from Chuck Young who lives near Houghton:

"Near Houghton, MI on the Keweenaw Peninsula, my suggested site is Great Sand Bay, in the Keweenaw Peninsula. It faces Northwest, looking over Lake Superior and has a cliff 50 to 100 ft. high. The site is about 25 miles north of Houghton and Hancock. The nearest towns likely to be on a map are Eagle River and Eagle Harbor."

Balance

Our traveling reporter, Gordy Stahl, received a very nice e-mail regarding the subject of balance, covered in several of Gordy's recent columns. Thought I'd share it with those of you that may not have had an opportunity to test Gordy's ideas out.

"Just wanted to drop you a note to say thanks. I am a newbie to sailplanes and received a Thundar Tiger Windstar arf for Xmas last year. After assembling it and getting some tutoring from some club members I felt confident to launch on my own. Though I could maneuver the plane easily I never could get it to thermal or come off the hi-start and not begin an immediate downward decent and, in fact, was beginning to feel it was a boat anchor. I then came across some of your articles in *RCSD* and on Yahoo newsgroups about balance. After reading your articles I proceeded to the flying field and began testing. To make a long story short, I removed 2 oz's of weight from the nose, the plane actually floats, and I can now actually thermal it. It will actually float off the high start without starting down immediately. Though I know it is not a floater, thanks to your articles I now feel confident enough to enter my club's contests with it. I may never win but I am enjoying flying it now."

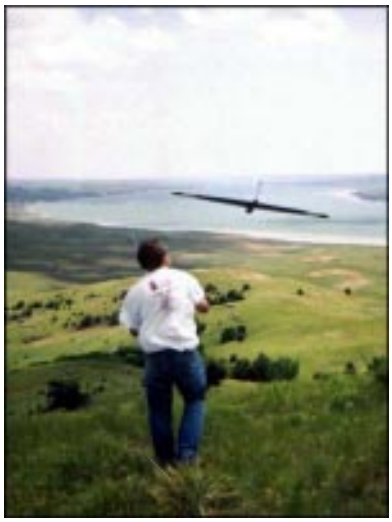
(signed) Steve

Happy Flying!
Judy Slates

House of Balsa 2x6

Alyssa Wulick just finished building her first wood sailplane. It is called the 2x6 and it's a kit made by House of Balsa. Initial test flights at Howe Farm in Port Orchard.

Photography courtesy of Bill & Bunny Kuhlman.



Back Cover

Sloping South Dakota

Bill Kuhl launching flying wing. Saga by Lee Murray and Emil Weiler included in this issue.

Photography courtesy of Lee Murray, Wisconsin.

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Diva, Part 1

Alyssa loves to fly the Blackbird XC.3, primarily because she's discovered that she really likes flying large sailplanes. Driving home after a recent day of flying, she asked if we could build a Blackbird XC for her. We told her she could fly the Blackbird XC any time she wanted to do so and went on to suggest she look for another design for a building project.

Basis

We encouraged Alyssa to go through some of the material we have in our files to see if there might not be another large sailplane which would take her fancy. She worked her way through an old Dave Jones/ Western Plan Service catalog, then began looking at some magazine articles we have on file. She gravitated toward Deiter Paff's PN9f, a model we've covered previously in this column. After explaining that the planform looked good, but the structure would need changing, Alyssa announced she'd like to help draw up construction plans. She immediately had a name for the new creation — Diva!

The only "plans" we have for the PN9f consist of a three inch by four inch two-view published in *The White Sheet* "Flying Wing Special." It's reproduced here for reference. Luckily, most of the dimensions can be discerned. The first task involved converting the dimensions from millimeters to inches for our construction drawings.

The White Sheet article which accompanies the PN9f plans states the wing was constructed using an obechi covering over a foam core. The total weight is given as just under 60 ounces and the wing loading as 9.5 ounces per square foot. This is heavier than we'd like, so one of our goals during both the redesign and construction processes will be to build lighter than the original. We very much enjoy building with wood and using D-tube construction, so our initial concept gravitated toward a spruce spar system, balsa ribs, and 1/16th inch balsa sheeting. We settled on a rib spacing of three inches.

The original PN9f has a span of 3080 mm (just a bit over three meters, 121 inches) and a fuselage length of 920 mm (36 inches). The wing is of triple taper with a straight leading edge. The root chord is 370 mm (14.5 inches) and the tip chord is 125 mm (five inches). As we had chosen three inch rib spacing, the wing was set up such that the inboard panel spans 15 inches, the second spans 18 inches, the last spans 24 inches for a total of 57 inches. Adding three inch wing tips gives a single wing panel span of 60 inches. A fuselage width of two inches makes the full span 122 inches.

For ease of plotting, the root chord is set at 14 inches. The other panel breaks have chords of ten inches, seven inches, and five inches for the wing tip. This planform area is almost exactly 1000 square inches, 6.94 square feet. If we can keep the weight to 50 ounces, the wing loading will be 7.2 ounces per square foot.

The fuselage side view of the PN9f is not in keeping with what we now know about winch launching and landings on slippery grass. The original required a tow hook under each wing. We're going to use the MB Raven style fuselage, where the single tow hook is mounted a short distance below the bottom of the wing. Additionally, we're adding a rather large ventral fin. This provides directional stability at high angles of attack when a portion of the upper area is blanketed by turbulent air. The added depth at the rear of the fuselage tends to drive the wing to a negative angle of attack once contact with the ground is made, preventing ground looping.

Off to the drawing board

After formalizing the various dimensions, a large roll of plain paper was opened and a long length attached to the drafting table. A horizontal line down the length of the paper served as the leading edge for both wings. Vertical lines were then dropped at three inch intervals to mark the locations of the wing ribs. The vertical lines associated with the panel breaks were identified and marked for placement of the trailing edge. It should be noted that nearly all of this measuring and line drawing was accomplished by Alyssa as she crawled back and forth across the flat surface, pencil and four foot straight edge in hand.

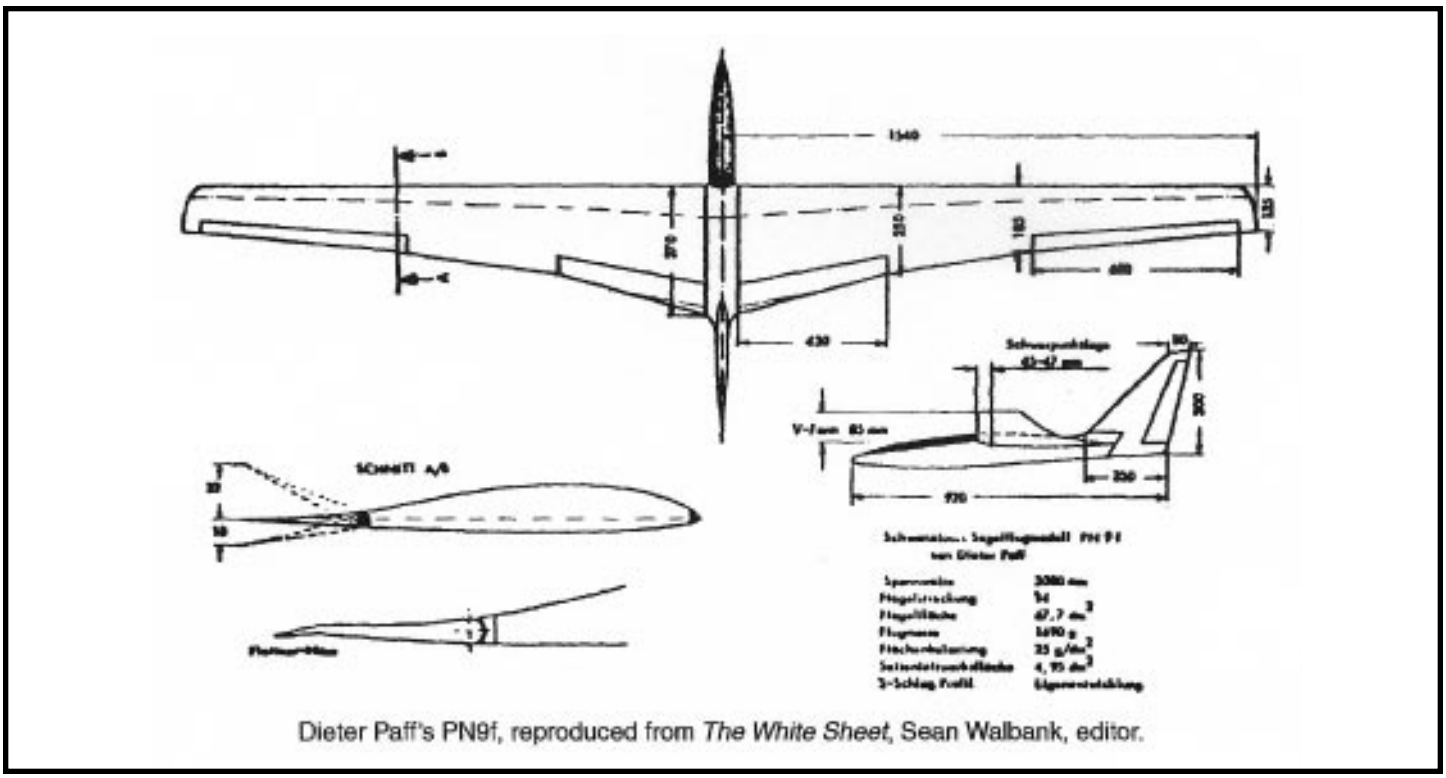
The elevator and ailerons were marked out using 25% of the local chord as the hinge line. We debated about installing flaps on the lower surface of the wing. In the end, we decided flaps would greatly complicate the construction process. Flaps must be located at 40% of the MAC and away from both the ailerons and elevator surfaces. On Diva, this forces the flap location to the rear of middle wing panel, not an ideal location. Additionally, there is the problem of extra weight. The flap structure and two additional servos would do nothing to help us achieve our flying weight goal.

The fuselage turned out to be fairly easy to lay out, due in major part to our experience with the MB Raven and R-2. It will consist of balsa and plywood sides, thick balsa sheet for the upper and lower surfaces, and balsa block for the canopy area.

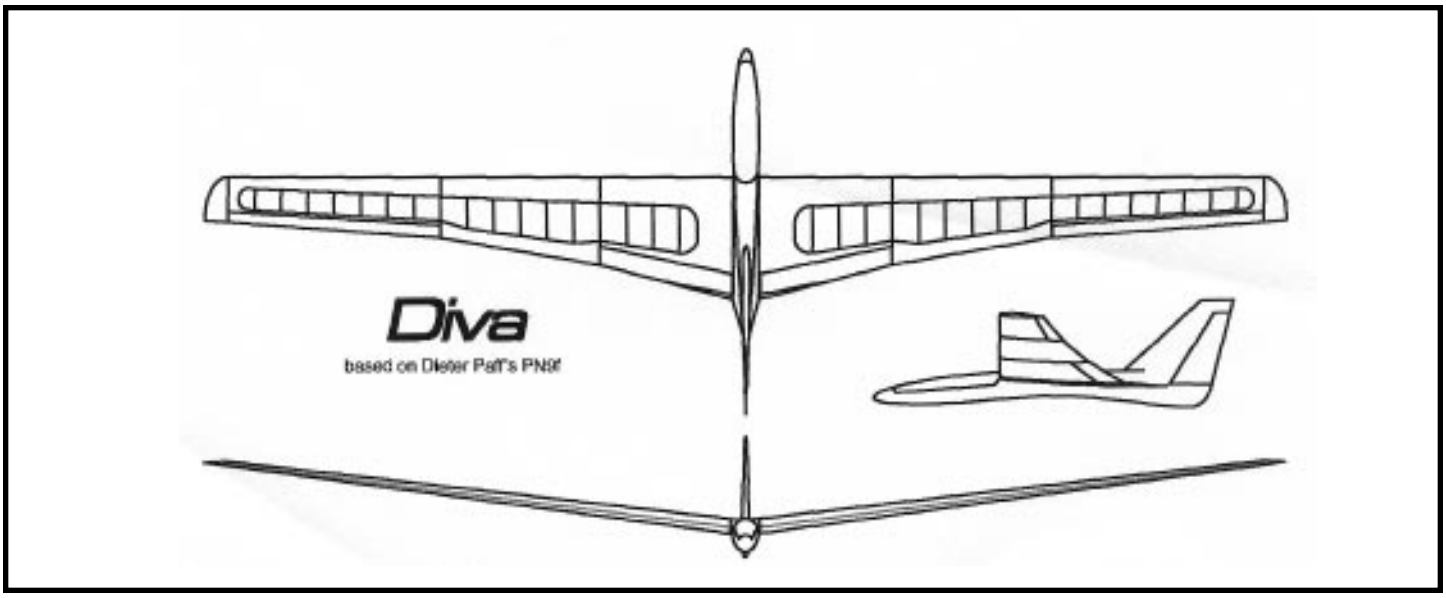
Modifications and preliminary decisions

Another change to the basic PN9f design involves a preliminary increase of the geometric dihedral angle. Dihedral angles of just a few degrees are sufficient to provide the requisite levels of lateral and spiral stability, but dihedral angles of five to ten degrees have been shown, theoretically and in practice, to assist in maintaining well coordinated thermal turns. We've tentatively set the dihedral angle at seven degrees per side pending further research.

All of the control surfaces are rather large, so the chosen servos must put out substantial torque. The servo selection is as follows: the elevators will be driven by a single Hitec 605BB (76 in.oz.), the rudder by a Hitec 300 (42 in.oz.), and each aileron by one



Dieter Paff's PN9f, reproduced from *The White Sheet*, Sean Walbank, editor.



Hitec 225BB (54 in.oz).

The White Sheet sketch shows a "Flettner flap" on the elevator. The purpose of the Flettner flap is to counter the downforce produced by the control surface due to airfoil reflex. Despite the extremely high torque of the Hitec 605BB, we're going to use the Flettner flap. Part of this decision was based on plots of reflexed sections found in Dr. Richard Eppler's book, "Airfoil Design and Data." Dr. Eppler's design of reflexed sections for full sized aircraft with trailing edge control surfaces includes a slight reversing of the reflex near the trailing edge. This camber line reversal does not substantially affect the pitching moment of the airfoil, but does reduce the mechanical load on the actuator while the control surface is around neutral. This is an important consideration, particularly when the aircraft is traveling at high speed, as in a prolonged sloping dive.

Because of the forward swept hinge line of the elevators, some sort of universal joint is need when using a single driving servo. Sullivan Products makes a specialty fitting to actuate anhedral elevators on aerobatic aircraft. We're going to use this fitting in conjunction with separate control horns to actuate the elevator halves.

Our most difficult task involved finding an aileron servo with sufficient torque which would fit in the wing ahead of the aileron inner edge. To give an idea of the difficulty, the thickness of the JR 341 (32 oz./in.) which Alyssa used in her 2x6 exactly matches the height of the interior of the wing at the mounting location, one half inch. The Hitec 225BB, with its higher available torque, would be the

ideal choice if only it would fit in the wing... Alyssa suggested we simply mount the Hitec 225BB servo closer to the fuselage, where the ribs are deeper. We quickly measured the thickness of a mounted Carl Goldberg 90 degree bellcrank and found that it would fit very nicely in the area ahead of the aileron. A music wire pushrod and bellcrank system much like that within the wing of Bob Dodgson's Windsong was sketched onto the plans. We can use a servo with relatively high torque to drive the large aileron surfaces, there will be no weight penalty over having the servo mounted further outboard, and we won't have to worry about long servo leads near the antenna.

The triple taper wing planform allows the inboard elevators to have sufficient moment while placing the ailerons close enough to the CG that differential deflection does not have an adverse effect on pitch. This allows aileron differential to be used, and the need for large rudder excursions is reduced.

The original PN9f used a specially designed section with a large amount of reflex. This section was used at the root, then progressively modified over the outboard portion of the wing to reduce the reflex and simultaneously achieve a near elliptical lift distribution. We've chosen Barnaby Wainfan's BW 05 02 09 section for this project due to its relatively low positive pitching moment and otherwise excellent performance on plank planforms. The low pitching moment should allow us to use the same section across the span, thus eliminating the need to modify the section and impart wing twist to account for various zero lift angles, and the lift distribution should be acceptable.

We've included a small 3-view of the revised aircraft along with a reproduction of *The White Sheet* illustration. Comments are welcome! We are especially eager to hear from *RCSD* readers who would like to have full size construction plans be made available.

Suggestions for future columns are eagerly received at either P.O. Box 975, Olalla WA 98359-0975 or <bsquared@appleisp.net>.

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Sloping South Dakota

by Lee Murray
Appleton, Wisconsin

Ib, Mirko, Emil and Lee in "dead air jail."

Mirko, a flier from Milwaukee, invited me to go slope soaring with him in South Dakota recently. Mirko and I have spoken and e-mailed on many occasions. He has invited me to go before but conflicts in my schedule prevented me from going. My interest was again peaked after viewing the beautiful pastoral vistas overlooking the Missouri River in central S.D. These pictures were from his last trip out and the opportunity was too much to resist. Since Mirko lives 100 miles south of my home in Appleton, I met him in Tomah, WI that was on the route to S.D. We loaded my planes into his GMC van, permanently equipped with wing and fuselage racks.

The traveling hours were filled with interesting discussions. I learned that Mirko was born in Austria, but moved to Milwaukee when he was three. His father was Croatian and that is wife is French. He reads extensively, has an outstanding memory for names and facts, and has traveled around the States as well as in Europe. All this gives him a rare perspective that he was willing to share.

We arrived at the motel Friday night about midnight. Mirko had phoned the friendly owners who agreed to leave our unit unlocked so we could simply walk in and sleep. We found Ib and Emil still up making repairs to models flown that day in the 45 mph winds. The next morning we met Bill, Pat, and Bob, the slope host and key man for making our landowner contacts.

Much of the flying Mirko and I did was on bluffs overlooking the Missouri River; Saturday morning was overcast but the wind was blowing 25-35 mph. Popular models I saw flown were the foamy Super Scooters, the JW flying wing* and the Airtech Pixel[1] . I didn't have any slope specific planes so I brought four planes including a Falcon 550e with heavy battery and a very light Chrysalis HLG just in case the weather got calm, which it did on Sunday. Mirko had a very beautiful molded glass slope racer, The Wizard, which came from Slovakia, that flew extremely well on the slopes. There is an adjustable tow hook that had been removed for slope flying.

Late Saturday morning we went to an inland grass covered hill in search of a good DS (Dynamic Soaring) location. A brown, narrow peak was located that looked like a potential DS site. The back of the hill had some pine trees which ended up snatching models out of the air when the models got into the rotor. Despite the problems, several guys occasionally found the right line to fly to make the models accelerate to incredible speeds. After the tricky DS activity, foamy combat took over.

Saturday afternoon, two young men saw us flying from the river and came up to check things out. Not long after that we had six men watching the activities. While Rob, Mirko and others talked, Emil and others flew demonstration flights to get their support, which I think was accomplished quite well. On this occasion Emil was doing high-speed dives with his Pixel down the slope followed by impressive energy recovery after the dive. The model would climb well even inverted and the roll rates were incredible thanks to the pivoting wings of the Pixel.

Rob and these guys have located what might be some of the friendliest slope soaring sites in the country. They know which sites accommodate which wind directions, have identified the owners, gotten their permission to use their land, know the owners restrictions and followed up with occasional expressions of gratitude.

I plan to add a slope soaring model or two to my collection of sailplanes and will be looking for opportunities to slope soar in the future including some local sites. Having the experience to see these guys flying brings me back to an earlier desire to do controlled aerobatics, achieve exciting speed and still find and use lift when needed. My many thanks to my companions, Bob, Bill, Emil, Ib, Mirko, and Rob for sharing their models and knowledge and showing me a very cool part of soaring that many flatlander glider fliers will never experience.

One of the participants, Emil Weiler, did a log for his club that I found really funny and at the same time does an excellent job of conveying the excitement and feel of the adventure. I hope you find it as entertaining as I did.

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[1]Both models sold by Bowmans Hobbies at http://www.bowmanshobbies.com/aircraft.html

Emil's Log of the South Dakota Slope Adventure

by Emil Weiler

Lee flying Chrysalis in nearly dead air.

DAY ONE - Thursday

When I worked in Wyoming back in the 70s, I heard many bar stories of people getting depressed and committing suicide because the Chanook Winds always blow in Casper. It hit me as an odd memory getting ready to drive home from SD Sunday. With me it was just the opposite. I was now depressed because after 3 days of solid winds, never below 25 MPH, it was dead flat calm! I could stand relaxed on the hill, hear the birds, drive with one hand, easily open the truck door, leave planes on the ground, my hat was on my head.... It was a strange and eerie sensation.

South Dakota has nice people and on any given weekend, howling South winds. Ib and I found Rob (our most excellent SD slope host) and Pat (the Master of all things backside) ripping ships around the North side of the hills Thursday morning. The DS was good but tricky depending on the SSE gusts and thermals passing over. Pat and Rob make it look soooooo easy, Ya Bastards! For every two DS ovals Rob did, Pat did three! I don't know how he gets his JW wing to go so fast? When I jumped into his pattern, he does two laps to my one. Clocked over 100 MPH when we could spot the gun. His runs are just so tight and fast you can't get a good reading. It sounds much faster.

The late afternoon I'll call "setting the hook" in Bill Kuhl. With a bit a razzing from me, and coaching from Pat and Rob, Bill starts rocking in the backside. When he hit his first 2X pass the smile on his face was huge! We started to reel him in. Later when he worked up to three laps, he yelled in sheer panic, "I'm going too fast!" We just laughed ourselves silly.

Ib worked hard on his DSing, but it seems some planes will allow you to do it and some will not. His JW was just having trouble holding a tight line. He made a couple 3X passes that had him coming back for more.

I was surprised in what I consider very strong winds (25 MPH+), Pat had his 14 oz. Scooter just ripping in the DS. Rob flew a beautiful new carbon 60" Pixel wing on a Fun One fuse (PixOne) and my 16 oz., 48" Kantana wing did fine. The PixOne made an extremely cool jet turbine sound as Rob wound it up to speed. The sound of DSing is half the fun. When no one was watching I practiced Pat's figure 8 backside pattern. Any move you have seen on the front side, Pat does during the DS. It is truly an amazing thing to witness.

DAY TWO - Friday

Forecast calls for bigger, stronger and more South windsÖsunny, could hit mid-80s with clear blue sky. So we head to the hills looking to DS some more.

Yes, the wind is a true +40 MPH. DS is just doable by the experts. Too much wind blowing out the shear layer, Rob finds a vertical "Los Banos" line and works it great. Pat has snakes crawling around his leg and JW wing! "Snakes! Why does it have to be snakes?" Shades of Indiana Jones and The Temple of Doom. I have a "not this again" moment, but snake slips away unharmed and my karma is safe.

Pat does incredible front side rolls 3' in front of me in a full blow gale, then zips into a DS orbit. Ib has his Zippers doing giant laps around the valley. Bill's JW is dialed into the front side monster. We quit kind of earlyÖ, too windy, hot, getting edgy trying to stand up in the wind all day. Grasshoppers actually hurt when they hit you coming up the slope. Did I just say too windy? It's early to the showers for me.

DAY THREE - Saturday

I realized about midnight that if you bring enough rum and coke, Ib will basically work on planes till dawn. I had a cracked spar in my Katana; he fixed it in 15 min. He had pre-cut parts w/him and everything! It is scary - these type A engineers.

It's back to the hills. Wind is still blowing hard. The semis we passed have flashers on because they can only do 50 mph on I-90! All this consistent wind is getting annoying. Unload the handguns, this could get ugly.

At the hills we park in a sea of door handle high grass. We climb up the hill to see that DS isn't going to workÖtoo south, too strong now. I challenged Pat to a fly down contestÖhis two planes to my three. The 1st JW is not bad, about 10' right in front of the pickup. Pat puts his JW about the same off the tailgate. My 2nd JW falls inside the 1st JW maybe 6'. Then Pat puts his Scooter between my folding chair and tailgate! Like 2' from the truck. Ib had a JW in a winner spot on a normal day. Now, for my only chance to ever "one up" Pat, I put the Katana inside the chair, over his Scooter, under the tailgate, off the trailer hitch ball and it's a bingo!! The June 2003 fly down champion of SD. Damn it, I forgot to bet a case of beer. Life is sweet and all the snakes are happy!

Off to a new potential DS spot, we will call it "Hootview" for now. Rob has us escorted up in a three 4X4 pickup parade. The grass is up to the mirrors!

Mirko flying the Wizard.

I think I hear cows laughing. The ranch land is so goodÖsmall peak on a longer ridgeline, with a sharp steep backside. Danger! This backside does have trees! The front side has a nice view of the prairie-dog town. The pros give it a DS try. It works 40% of the time if you fly in the trees and cycle on thermals. Rob has on his "I'll show the Blond Beach Boy from CA how we go Dirty Dancing in SD" look. Oh, Nelly! This could get nasty. We pounded those trees till the cows came home, like semis thru a guardrail, cedar branches broken badly, sap-sucking cypress - stop me, this is awful! Finally, we put on the "Just say No to DS" T-shirts (Rob's classic line). I almost fell off the backside laughing so hard. Pat must have thought we got into the Peyote buds. No, just Midwest wind induced temporary DS insanity. I'm convinced Pat will never let us on Parker Mt. after that DS rodeo bull riding display.

This spot does have DS potential when the wind is under small craft warnings strength and deserves another try. Plus your planes come out smelling like a cedar closet when you are finished!

We wrapped up one hell of an afternoon at The Point along the river road; a super front side w/ a million dollar view. The lift was enormous, smooth, strong and only blowing a stiff 30 MPH. It felt like a tranquilizer dart hit me! Easy, fantastic conditions. Tall flat grass LZ, park and fly location and visitors. The locals seemed very nice and interested in R/C even after I Katana buzzed one of their pickups down the road; (I swear the head-man made me do it and I have witnesses) then I turned on my beeper in the Katana when they put it in the cab just for giggles. (I know my name got dissed around the big table at dinner time.) Mirko has the goods stuff out grooving great. Ib is racing his FunOne and Zipper. Lee is designing a new sloper and I think Bill found it boring after 3 days of craziness.

DAY FOUR - Sunday

Freak out! Quiet, no wind blowing, something must be wrong. The Point is overcast. The air is cool, heavy, so we are hand launching, some lift, but light. The Viking Fans and Cheeseheads go home early and the pros go fishing...

I'd love to go back in the Fall, if Rob will have us.

MRCSS Slope Coordinator, Emil

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My House of Balsa 2x6

by Alyssa V. Wulick

My name is Alyssa Wulick and I live in Gig Harbor Washington. I am seven years old (almost eight) and I just finished building my first wood sailplane. It is called the 2x6 and it's a kit made by House of Balsa.

Introduction

My name is Alyssa Wulick and I live in Gig Harbor Washington. I am seven years old (almost eight) and I just finished building my first wood sailplane. It is called the 2x6 and it's a kit made by House of Balsa.

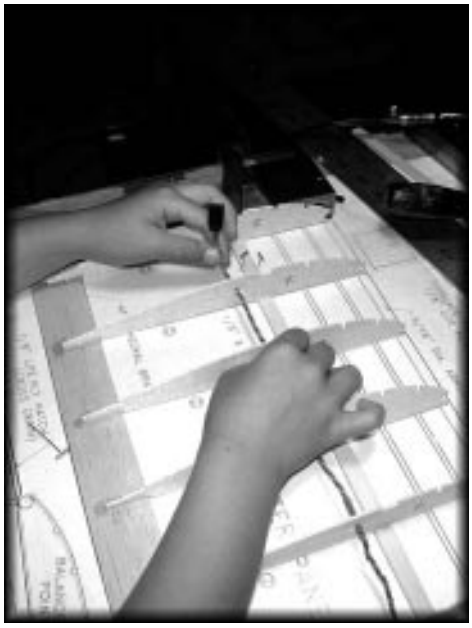
The 2x6 has a six foot wing span and is supposed to use two servos, so it's just like my Highlander. I have a hard time taking my Highlander to the flying field because it has a one piece wing, so I decided I wanted the 2x6 to have a three piece wing. I also wanted simple dihedral instead of polyhedral. I made some other changes, too. I used four servos instead of two because I wanted ailerons, and I also made the trailing edge straight so the wing tips sweep back.

What Papa did first

Before I started building the 2x6, my Papa cut an inch off the front of the nose and cut the top of the fuselage into a nice curve. Papa also drew the new swept back wing tips and square stabilizer tips on the plans.

I built the tail before the wing because I needed to learn how to cut wood with an X-Acto blade and a single edge razor blade, and how to work with CA glue.

The aileron ribs were cut from the wing ribs, and the ailerons are fully sheeted.



Starting at the servo, the wiring goes out through the wing tip root rib behind the spar and connects to a Y-harness in the center section. The Y-harness wiring to the receiver goes through a hole in the bottom of the center sheeting.

Fuselage

The plans show a weird way of putting in the radio gear — battery, servo, receiver, servo. I decided to keep the battery between bulkheads 1 and 2, and put the receiver between bulkheads 2 and 3, and the rudder and elevator servos right behind bulkhead 3.

I used JR 341 servos for this airplane. These servos are much smaller than the servos shown on the plans, so I drilled holes in the bulkheads for the pushrods. After the servos were glued to the fuselage sides, the servo arms reached the pushrods just right.

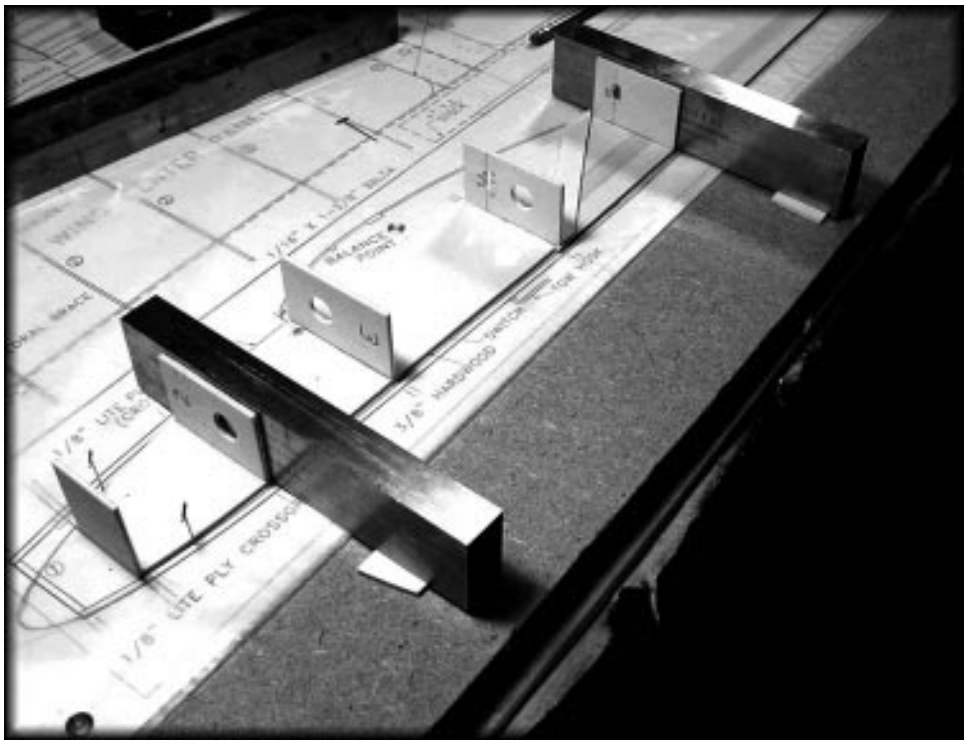
After marking the bulkhead locations on the fuselage sides, I glued in the bulkheads and used machinist blocks to make sure they were square. I used machinist blocks when I put the fuselage sides together, too.

Tail

I built the tail before the wing because I needed to learn how to cut wood with an X-Acto blade and a single edge razor blade, and how to work with CA glue.

I didn't like the style of the stabilizer and elevator. Papa drew lines for square tips on the plans, so I just followed the new lines while I put together the framework. Instead of

I painted the fuselage. I sprayed on a coat of primer first, and sanded it down with a foam sandpaper pad. Then I sprayed on two coats of white.



After marking the bulkhead locations on the fuselage sides, I glued in the bulkheads and used machinist blocks to make sure they were square.

balsa sticks, I used spruce sticks for the trailing edge of the stabilizer and the fin because spruce is much stronger than balsa.

Cutting the diagonal ribs for the tail was tricky because of all of the angles and different lengths.

Wing

The wing was supposed to be one piece with polyhedral and no ailerons. I thought a three piece wing would be easier to carry, and I also wanted ailerons. I had to build four wing panels - the two wing tips and two center panels.

Building the wing was complicated. I had to use the dihedral braces from the wing tips to make the dihedral in the center section. I also had to make four wing rods and glue brass tubing in the wing spars and near the trailing edge.

I used machinist blocks to make sure the ribs were glued in straight.

The most difficult part of the wing was the ailerons. The aileron servos are mounted in the wing tip, right behind the spar on a small balsa wood platform. The aileron ribs were cut from the wing ribs, and the ailerons are fully sheeted. The trailing edge of the wing in front of the aileron has three pieces of 1/16th inch balsa sheet — upper, lower, and vertical — so it looks like the letter C.

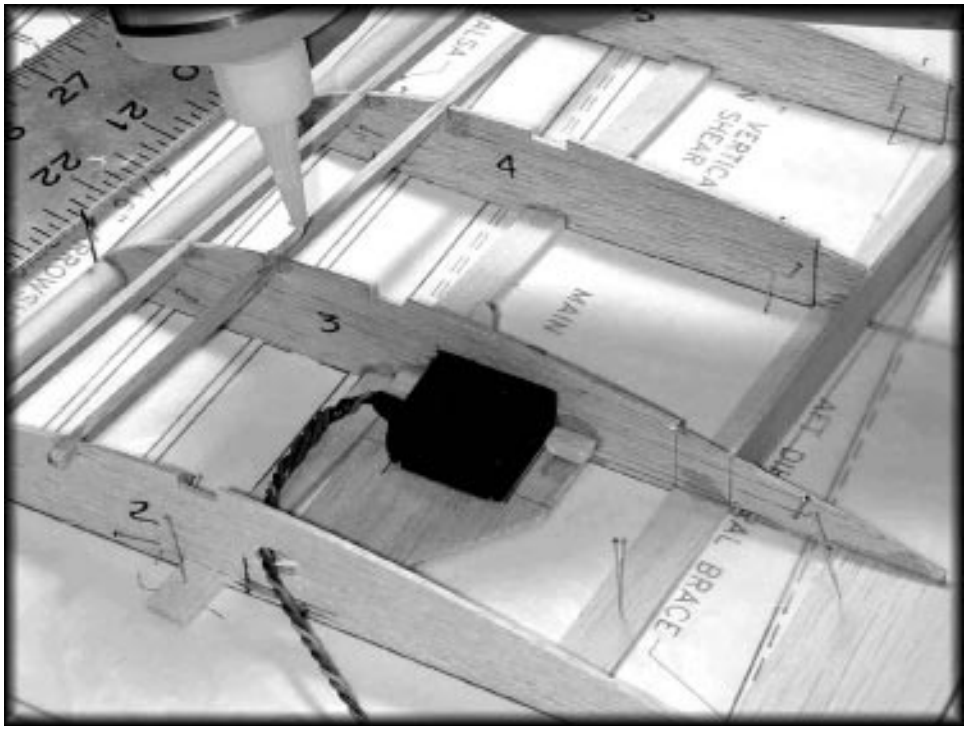
All of the wiring in the wing is twisted. Starting at the servo, the wiring goes out through the wing tip root rib behind the spar and connects to a Y-harness in the center section. The Y-harness wiring to the receiver goes through a hole in the bottom of the center sheeting. I use pieces of electrical tape to keep the loose wiring against the bottom of the wing and away from the elevator and rudder servos.

Radio

The battery just fits in the first compartment, but there's lots of room for the receiver and wiring in the second compartment. Papa had a small switch which I put into the right side of the fuselage next to the receiver.

I glued in all the servos with Goop. I had to take a servo out, and it just

I used machinist blocks to make sure the ribs were glued in straight.



The aileron servos are mounted in the wing tip, right behind the spar on a small balsa wood platform.

A note from Papa: Alyssa's 2x6 project turned out to be one of the most gratifying experiences I've had in a very long time. Mentoring her construction of the 2x6 was a fantastic experience. Not only did I get to spend a substantial amount of time with Alyssa, which I always appreciate, I watched her learn basic aircraft construction techniques and gain fundamental critical thinking processes (planning ahead and making decisions based on predicted outcomes). Witnessing the joy on her face every time her creation takes flight is truly indescribable. She already has her next construction project in mind, and I'm very much looking forward to the adventure.

popped off the Goop after I pried it with a screwdriver, so I think my way works pretty good.

Covering

I painted the fuselage. I sprayed on a coat of primer first, and sanded it down with a foam sandpaper pad. Then I sprayed on two coats of white.

The wings were covered in Monokote transparent green. The fin and rudder and stabilizer and elevator were covered in transparent yellow. I used the Monokote to make all of the hinges, also.

Flying

I checked the center of gravity and made sure it was where the plans said it should be. That's 1/8th inch in front of the back of the spar. Papa took us out to the Howe Farm in Port Orchard for the test flying.

Papa did the test flying. It flew down the slope in a straight line and just needed a few taps on the elevator for a perfect landing. When we tried turning the 2x6, the ailerons were really sensitive, so we turned the knobs on the transmitter so they wouldn't move so far. Papa threw it into the air and I flew it around in a big circle and almost landed at my feet, so I thought it was flying great.

At 60 Acres, Papa and I did some more hand tosses across flat ground. It turned out to be nose heavy, so I started taking pieces of lead out. The center of gravity ended up being a half inch behind where it's shown on the plans. I think this is because the wing tips are swept back two inches.

I wanted to put the 2x6 on the winch, but Papa said he didn't think it would handle that kind of launch. I finally talked Papa into launching it from the winch, and it went up just fine. After a few launches it was doing great zooms.

My 2x6 climbs in light thermals and turns in very small circles. Several Seattle Area Soaring Society club members have flown it, and they all think it flies very well.

The box for the 2x6 says "4 to 6 hours assembly time," but it took me almost four days to build the kit. I think it took a long time because of all of the changes I made, like using four servos, making a three piece wing with dihedral, and making ailerons.

I think the 2x6 would be a great trainer. I learned a lot about building with wood, it's a very sturdy airplane, it looks good, and it flies awesome.

The box also says the 2x6 has 590 square inches of wing area and should weigh 30 ounces with standard radio gear. This makes the wing loading about 7.3 ounces per square foot. My 2x6, ready to fly, weighs 31 ounces. I think this is pretty good.

I think the 2x6 would be a great trainer. I learned a lot about building with wood, it's a very sturdy airplane, it looks good, and it flies awesome.

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The wings were covered in Monokote transparent green.

GORDY'S TRAVELS

Gordy Stahl and his Pike Superior from Samba Models. Thermal duration ship, 130" span, molded carbon.

Gordy Stahl
Louisville, Kentucky
GordySoar@aol.com

There is no CG with a Tow Hook — Hooked!

Too often I hear guys talking about how they changed their CG's and its affect on their launches... And, of course, it drives me crazy!

Let's engage those little gray cells for a minute, turn the lights on, and get out the magnifying glass to make a close examination of what is going on during launch.

Let's say (just to be crazy) that your plane has a bunch of useless lead in the nose (of course it ended up there because everyone knows that makes a plane more 'stable'). That means that, in normal thermal duration flight mode, your model is flying around with a bunch of up elevator incidence in order to hold that nose lead from being pulled to earth in flight.

Since airspeed enables/empowers your elevator, on launch, your model will nose up hard on release. While that 'looks' really impressive it usually causes a model to end up heading over to one side or the other, generally crashing and being drug to the turn-around. Proof positive that 'CG' has a LOT to do with launching, so then why the title "There is no CG with a tow hook, hooked?"

"CG" has to do with the balance point of the airframe while flying. It is the teeter-totter point of the fuselage in the air. When a sailplane is on tow, that teeter-totter point is the tow hook that is hooked onto the line, extremely firmly. Regardless of where the model balances on your finger tips, during launch its only pivot point IS the tow hook.

So WHY do guys talk about adjusting their balance point to improve launches? Simply because they haven't thought about what does what. I pointed out that a nose heavy model (one that needs a lot of down stick to fly level inverted), will balloon with high airspeed. But what about a sailplane that is 'balanced'? Its stab set at zero, that sailplane flies flat and level at crawl speeds when landing and super sonic speeds on the zoom. On release that model rotates to vertical by properly placing the tow hook.

A forward tow hook causes a flat launch, the nose of the model being pulled down.

A properly placed tow hook allows the model to rotate with a clean aerodynamic profile. The wing can do its job which is to 'lift' the model away from the turnaround. You can tell a properly balanced and trimmed model with an

optimized tow hook location by the sound of the winch motor lugging, and the incredible energy carried after the release.

A balanced sailplane with a mediocre tow hook location needs lots of flap to lug the winch motor and to get an optimized launch height. That's different than an optimized launch. Flap causes drag, and drag slows airspeed; slow airspeed means less forward energy that can be converted to altitude.

I get a kick out of axioms like, "Your tow hook should be just forward of your 'CG'." A model poorly balanced puts the tow hook in the wrong location. Proof positive of this is Euro-moldie tow hook locations.

Euro's would never consider moving their model's balance point to anywhere but where the plan shows. That would be rude! And since they fly different than we do, their models are characteristically built with some up incidence in their elevator stabs (in the case of fixed stab V-tails) and show a 'CG' at about 40% of root chord (or less!). Those models are often flown at a single speed and their landings are never the trick tasks we have at our contests. So with lead in their noses, and tails tilted up, their tow hooks need to be forward to dampen the effects of that stab incidence to keep their sailplanes from over rotating on launch, going squirrelly and crashing.

When we get those models we pull a bunch of lead out and find that we need to either fly them with about 1/8" down elevator trim or need to shim their tail mounts, in order to get them to fly level at all speeds.

But I digress. The proof positive about having their tow hooks in the wrong location, is that every one of them has an adjustable tow hook installed and you will always find it adjusted as far back as the adjustment allows!

So where should the tow hook be? Right on the 'balance..d' point of the sailplane. Balanced! Not some theoretical measured point shown as the "CG".

If your sailplane is most efficient, has the least drag, indicates lift best, and flies level, regardless of airspeed, when 'balanced' then it only makes logical sense that is where your sailplane should be 'balanced' when hooked to the tow line.

Once balanced in flight, and when hooked to the tow line, LESS flap and camber are needed to generate lift. You don't need much, since the tow line is not pulling your sailplane's nose DOWN. Now that cleaner airframe can slip through the air faster, allow the airfoil and plan form to do the job someone spent a lot of time trying to optimize. Less trailing edge camber means less work for the servos and less drain on the battery, connectors, etc. Every component of the model is happier; launches use all the power supplied by the winch and its battery, and zooms PING off to rocket upwards, as clean as a needle.

For issues and issues of *R/C Soaring Digest*, I have been ranting and explaining, re-explaining and discussing the importance of balancing a sailplane in the air, not on the bench: why a full flying stab is so much easier for most of us to trim, why dive testing is goofy, and why testing balance inverted makes sooo much sense. I touched on tow hook location in the way most have in the past: "Set your tow hook so that you get a good but not too steep launch without camber, then dial in camber to get the most out of the winch energy." But all that was out of context. It assumed that there was some knowledge - the knowledge about why you have to have your sailplane 'balanced' before any of the rest can work. Now here is my confession about all the words I wrote:

> Balancing your model to its optimum, trimming it to its tweaked perfection, getting the tow hook and camber so well coordinated will NOT get you a full minute more of airtime from the settings you have right now. Having digital servos that hold your edges within a thousandth of an inch of the airfoils profile, having the most sophisticated computer transmitter will not get you 10 more landing points from using a simple 4 channel radio with 'Y' connectors to work the wing servos.

Truth!

However, YOUR efforts to understand these extremely common sense concepts WILL get you another full minute of flight time and hundreds of landing points, because it will cause you to start THINKING for yourself. Then and only then will you be prepared to take advantage of a balanced, high performance sailplane and its computer radio's functions.

Those functions are simply to make your sailplane more predictable in various task components and to take advantage of various air conditions. BUT without the understanding of the things I have been ranting about, you will never recognize what is what — and when. Because your model will be ballooning at speeds higher than the single speed your tail has been tuned (up) to hold that nose lead level, and your model will be dropping its nose when the airspeed slows to other than that very specific airspeed your elevator has been tuned (up) to hold that nose lead up.

Gibberish about how a neutrally balanced sailplane is touchy or hard to fly is from guys who want everyone else to stay where they are in their progression of improvement in the hobby.

Neutrally balanced has been made out to be a negative thing - a scary thing, something only 'experts' can handle. Well, duh!!! You only become an expert by practicing and learning to control models BETTER. I agree, it doesn't take much skill to 'fly' a model with lots of nose lead and up elevator trim; that model is set up to fly 'uncontrolled'. Why bother with a mega Transmitter if that is your goal - to let the model go where it wants and do what it wants. Thermal Duration Contest flying is about TAKING control. The score sheet doesn't reflect how the model did; it reflects what the pilot did WITH the model.

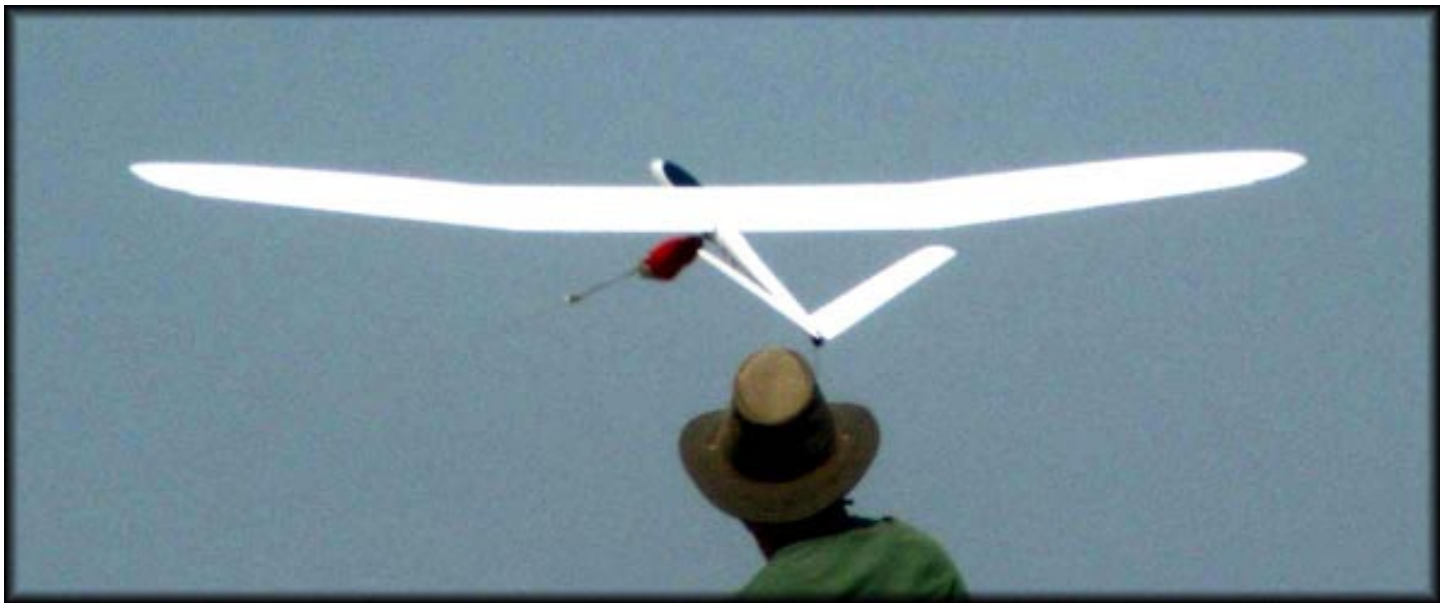
There is no CG with the tow hook – hooked. Learning more about balance through experimenting and learning about trim, launching, and approach regimes for landing, etc., will get you hooked... And your contest scores will be a lot more 'balanced'!

See you on my next trip!

■

TECH TOPICS

Dave Slinkher launching the Starling Pro.



Dave Register
Bartlesville, Oklahoma
regdave@aol.com

2-METER UPDATE

As readers of this column may recall, we did a review of the Whisper 2M sailplane a few months ago. Although this ship can be converted to a nice handling 2M thermal duration sailplane, it does take some work and modifications.

At the recent Mid-Missouri Modelers Soaring Regatta, Mike Frickey and Dave Slinkher had a 2 meter ship that appeared to address many of the issues with the Whisper. The Starling Pro is available from SOBOX. For product information, please check:

Zbigniew Sobolewski
Mississaugga, Ontario
905-279-0005
www.soboxplanes.com

The Starling Pro uses a similar planform to the Whisper. Direct comparison of the two designs indicates similar construction methods but with some important differences.

Although the wing area is quite similar, there is more relative area at the tips on the Starling Pro. The wing planform uses a flat center section (bolt-on) and dihedral at the tips. The effective dihedral angle (EDA) is obviously higher for the Starling Pro. The observed flight effect was much better roll stability with no obvious tendency to tip stall on either launch or at slow thermal speeds with the Sobox design.

Wing construction is hollow core molded using a glass 'sandwich' balsa skin. I believe the spar is a carbon tube. Both these methods provide a light, but very strong wing provided the tube is well joined to the skins.

The fuselage uses a formed canopy rather than a nose cone. The bottom of the fuselage has a generous layer of what appears to be Kevlar cloth so it should be pretty stout. The width of the fuselage is narrow and will require 'in-line' servo mounts. An advantage with this configuration is the longer nose moment, which should help get the CG right without nose weight.

The V-tail uses a molded airfoil section rather than the flat geodesic type used in the Whisper. Judging from the moment arm, area and included angle, the RVC and TVC are smaller than the Whisper but the higher EDA and more efficient airfoil section seem to work extremely well.

Although I didn't buy one of these ships, it was VERY tempting. I would encourage those interested in 2M to go take a look at this sailplane. There is also a 2 meter obechi design at this web site for <$200. At that price, there really shouldn't be a cost barrier to getting into a high performance TD ship. Time will tell if the Starling Pro design is rugged enough to stand up to full bore winch launches but it definitely appears to worth checking out.

V-TAIL TOOL

Also at the MMMR, Jim Frickey had a very simple and elegant solution to the V-tail ball link problem. Jim was gracious in allowing me to take some pictures and share this idea.

Ball links are one way to attach the control linkage to a V-tail. In Jim's case, the ball link is soldered to the end of some music wire (looks like ~ 0.074") and then bent to install in the V-tail surface just like a strip aileron setup on a power ship. The ball link then forms a very convenient device to allow for the complex rotations involved in moving a V-tail assembly.

Removing the V-tail for transportation isn't too bad. Hook a fingernail or small needle nose pliers over the plastic ring and push down. Getting it back on is the problem. Jim solved this very neatly by using a small pair of 'duck-bill' pliers.

V-tail detail with ball links.

Jim ground out a u-shaped slot on the 'bill' of the pliers to fit snugly to the ball. This then allows you to snug the slot on one side to the upper part of the ball and the slightly wider slot at the bottom will push the ring up to the point where it snaps in place.

This is a very useful and cost effective solution to a sometimes troublesome problem. Thanks, Jim, for letting us share this in *RCSD*.

Jim Frickey's ball link attaching tool.

TIMER NOTES

Also at the MMMR, we ran into a couple of situations that again reminded me of the responsibilities of a timer. The first is help with tracking the airplane.

On Sunday, the Missouri guys had the most awesome lift I've seen in many years. The task was 75 minute add-em-up and 4 of the contestants actually made this challenging target. However, the unlimited ships were so specked-out that even the best eyes on the field had a hard time keeping track of them.

As a timer, you need to be checking around the field to look for other pilots, birds circling or maybe just some promising looking haze or dust. But when the plane is that far out (or up!), looking away for just a second may lose it. Your pilot can really use some help under those circumstances.

I can't count the number of times I heard the timer and pilot asking each other if they saw it. 'Yup, that's you. Just turning to the left. Now you're heading straight towards yourself. Got it now?' Having two sets of eyes on a plane that hard to see can mean the difference between a great flight and a real disaster.

The next item I'm reminded about is safety in the landing zone. The Missouri club did everything they could to make it safe but sometimes things happen.

In this case there were several planes coming in on adjacent lanes while we were standing well to the south of the lanes away from the landing pilots. Your pilot is fully concentrating on his flight at this point so the timer needs to maintain 'situational awareness' of the immediate area.

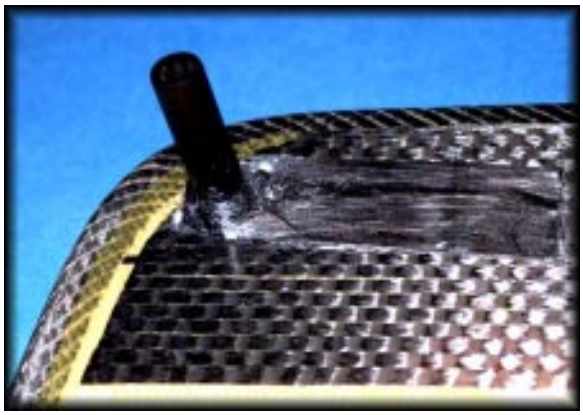
The plane in the far left lane was on approach when a thermal gusted through right as he was at the far end of the line. This unexpectedly popped the plane up about 15 feet so the landing was lost. The pilot turned the plane (as he should) to avoid complications with the other contestants coming in. That left a 3M ship soaring straight down the field at us.

Fortunately, I had been watching the landing area for just this reason. We were two minutes from landing with altitude to spare so I didn't need to concentrate on my pilot's plane at that point. It was more about setting him up for his approach when the other guys cleared the lanes.

Sometimes all you can do is react. Fortunately, the plane came in at waist height and was caught with no apparent damage to the plane or the catcher. Although a minor distraction to my pilot, it could've easily bowled him over since he was facing away from the oncoming plane and would have been blind-sided.

No harm – no foul. I can't think of anything else the respective folks could have done. Everything the club had set up for the event was safe by anyone's standards. If the landing pilot had turned the plane the other way, he would've definitely complicated someone's landing approach. We were well clear of the general landing area and in the location where flying pilots normally wait until the lanes are clear.

So the lesson I'll pass on here is that the timer really needs to watch out for things that the pilot can't attend to while he/she is flying. That includes spotting lift, keeping the plane in site, and the overall location and safety of your pilot while approaching the landing area.



XP3 peg construction detail.

In this case, Jerry Gross, the pilot I was timing, went on to win the whole thing

– unlimited and overall points trophy. Congrats, Jerry.

Thanks to the Mid-Missouri club for a terrific event. If you're anywhere in the mid-west next August, definitely plan on attending. This was the first major contest I've been able to fly since shoulder surgery last September. Just being back on a flying field again felt really good. To get back for a contest of this caliber and hospitality was truly GREAT!

XP3 REDUX

Some updates on the XP3 article are in order. The major problem I had encountered was with the FMA PS30 servos used for the flaperons. An e-mail to FMA brought a prompt reply and an offer to exchange the servos for PS20s - clearly FMA stands behind their products.

For the rest of the story, the Dymond 60 servos suggested by Randy McCleave arrived and are everything they were claimed to be. They're actually thinner than the wing and required a spacer of 1/64 inch ply to bring them flush. The gear train is very stout and centering is excellent. No sign of thermal drift so far.

The D-60s have plenty of torque and from the experience so far, I really like them. They are available from:

Dymond Modelsports Ltd.
Tel: 858 495 0092
www.rc-dymond.com

The AP200 pack (quad-A square NiMh) from Batteries America is a great fit for the XP3 (www.batteriesamerica.com/). This pack is smaller than a 110mah NiCd pack and has almost twice the capacity. It fits completely in the nose of the XP3 which allows both the M5 Rx and the gyro to fit under the canopy ahead of the servos.

It took about 6 hard charge cycles to build this pack up to full charge. That's not unusual for a NiMh pack. It now routinely produces 185mah capacity using my Sirius charger and Einstein battery analyzer. On this same equipment, my 110mah NiCd pack provides about 95mah.

With the servo and battery issues resolved, we've had some really nice flights on the XP3. During a recent early evening session in really dead air, the XP3 was turning in 1.5 minute flights. As more speed was built into the throw, another problem (and solution) came up. The peg broke loose.

An e-mail to Denny at Polecat Aero suggested a technique pictured on his web site. This involves wrapping both the upper and lower side of the peg with carbon tow and adhering the ends to the wing surface. I've normally used glass cloth or 1/64 inch ply for this function but Denny's idea sounded pretty good.

A picture tells the story better than anything. The upper surface of the wing is shown with ~ 2 inches of carbon tow making a loop around the peg and the ends glued to the upper wing surface. The wing surface was masked and sanded, 30-minute epoxy was used and peel ply was applied over all to remove excess adhesive. The bottom of the wing is done the same way

This system seems to work as well as my other methods and is probably lighter. For those of you on the contest circuit, this is probably a well known technique. For those of us out in the boonies it was a nice innovation.

That's it for this month. Next time we'll start on a long delayed series on optimizing a 2M design (which is the ONLY reason I didn't succumb to temptation and buy that Starling Pro from Mike!). 2 Meter is still a very handy planform size but it poses challenges that are different from both DLG and Open class. Hopefully we'll be able to shed a little light on some design trade-offs as we proceed with our own design.

■

Captured Towhook

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

Reference Material

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

BBS/Internet

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

International Scale Soaring Association

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

web site: www.soaringissa.org

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

T.W.I.T.T.

(The Wing Is The Thing)

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

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

www.twitt.org

Sailplane Homebuilders Association (SHA)

A Division of the Soaring Society of America

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

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

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

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

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

Send for your aspirant form, today:

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

http://www.silentflight.org

The Vintage Sailplane Association

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

Vintage Sailplane Association
1709 Baron Court
Daytona, FL 32124 USA

ESL

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

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

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

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

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