Radio Controlled Soaring Digest

December 2005 — Vol. 22, No. 12

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R/C Soaring Digest

Managing Editors, Publishers — B^2 Kuhlman

Columnists
Jay Decker
Lee Murray
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Mark Nankivil
Steve Richman
Dave Register
Jerry Slates
Gordy Stahl
Gregory Vasgerdsian

Contributors
Dave Garwood
Don Bailey
Mark Drela
Philip Randolph
Kyle Saltzman
Peter Wick

Photographers
Dave Garwood
Dave Beardsley
Mark Nankivil
Gregory Vasgerdsian

Contact
rcsdigest@themacisp.net
<http://www.rcsoaringdigest.com>
Yahoo! group: RCSoaringDigest

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In the Air!

Welcome to the last issue of *RC Soaring Digest* for 2005. As you read on the web site, this issue is quite a bit larger than usual, with more than 50 pages. We hope our readers with dial-up internet service were able to do something constructive while this PDF downloaded.

You'll notice three new authors listed on the adjacent contents page — Kyle Saltzman, Philip Randolph, and Peter Wick.

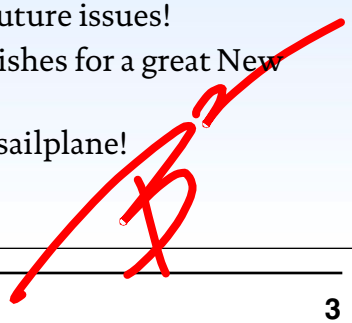
Kyle's review of the Windrider Aviation *Bat* was written over a period of several months and is a well balanced evaluation of a relatively little known tailless sloper.

Philip is a fellow member of the Seattle Area Soaring Society, and his servo testing article is the result of our request that he put into writing a visual presentation he gave at a club meeting earlier this year. We think you'll find Philip's writing style to be both informational and entertaining.

Peter contacted us in relation to placing his airfoil data on our B2Streamlines web site, then gave his permission to place this information in *RCSD* as a way of announcing the download availability on <http://www.b2streamlines.com>. Additionally, Peter mentioned he had written several articles on planks and plank airfoils for *Aufwind*, the highly acclaimed German aeromodeling magazine AND he was willing to translate them into English for publication in *RCSD*. *Aufwind* has given its approval, so watch for Peter's articles in future issues!

Enjoy the Holidays and accept our best wishes for a great New Year!

That's all for now. Time to build another sailplane!



SZD-24-4A *Foka 4*

Standard Class Sailplane

Text and Photos by Mark Nankivil, <nankivil@covad.net>

The *Foka 4* was the final production development of the SZD-24 series manufactured by SZD Bielsko in Poland. Approximately 200 of the SZD-24 series were manufactured starting in 1961.

Developed as a Standard Class sailplane, the *Foka 4* is of mixed construction with a fiberglass composite forward fuselage section and the remainder of the airframe being made of wood. The ailerons, elevator and rudder are fabric covered and the wings were fabricated with plywood skins, being built up in concrete molds which resulted in excellent surface accuracy and finish.

The SZD-24-4A *Foka 4* featured in this walk around is owned by Gary Busk of the Dallas-Ft. Worth area and is flown from Caddo Mills airport just east of Dallas.

Gary flies his Foka 4 regularly and we were lucky enough to be at the airport when he returned to the field from a successful cross country flight.

Gary's *Foka 4* is the only one flying in the U.S. to his knowledge though he knows of one presently being restored in California.

Gary was kind enough to loan me the sailplane's service manual from which the accompanying drawings were copied.

A few points of interest when looking over the photos and drawings of this classic sailplane are the canopy and the way it rolls forward when opened and how the wing is attached to the fuselage. Note too the fixed main wheel located behind the CG which is a nice feature for scale aerotow and simplifies the overall layout for a scale model.

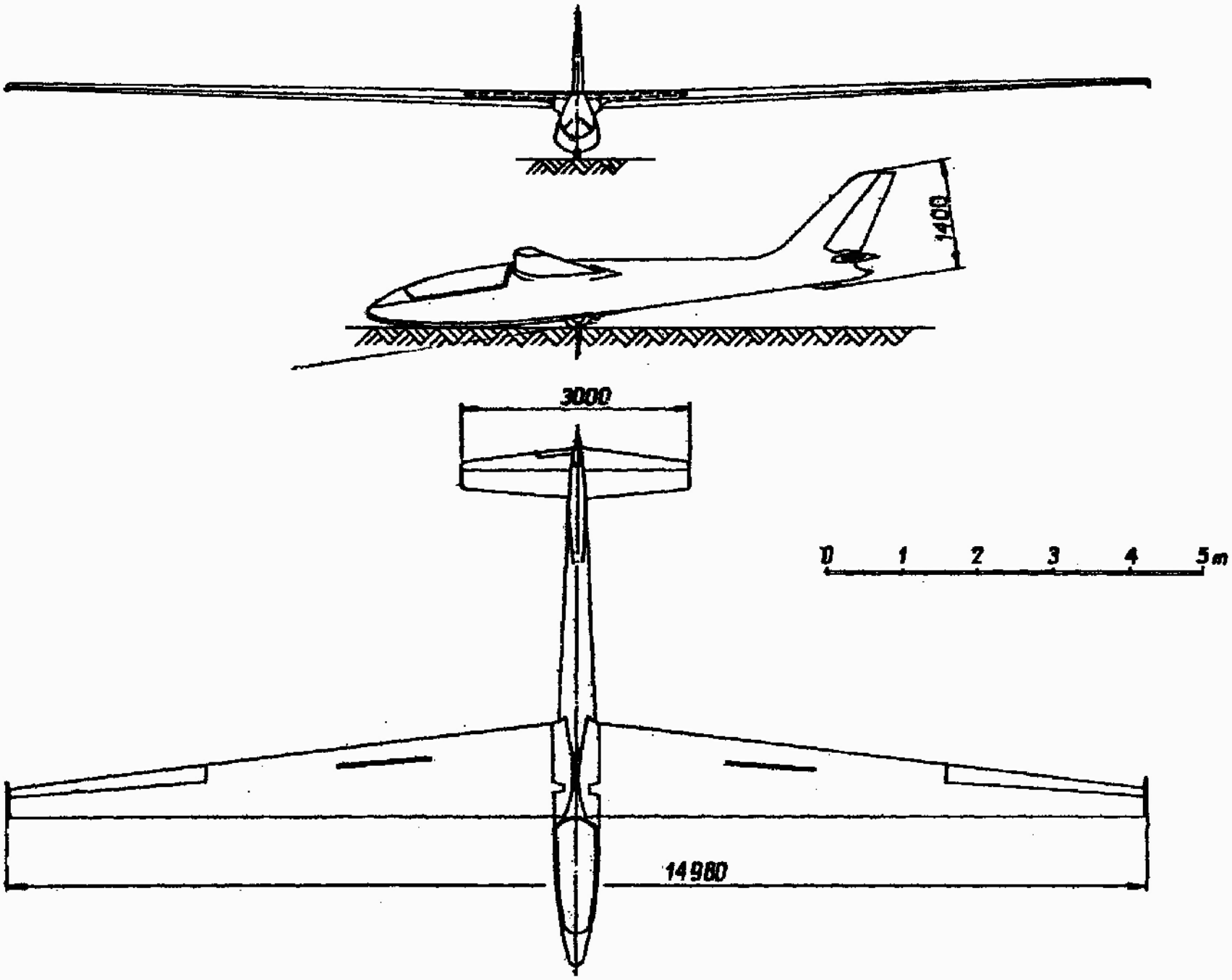
It's pretty amazing to realize this is a 40+ year old sailplane design and it's to Gary's credit that the *Foka 4* can still be seen thermalling over Texas.

Thanks to Gary Busk for the time taken to allow us to photograph his sailplane and loaning the service manual to me.

Thanks also go to Dale King for taking me out to Caddo Mills, Texas, to see the sailplanes of the Southwest Soaring Association.

SZD-24-4A Foka 4
Standard Class Sailplane
Specifications:

Wingspan - 14.98 m
Length - 7.0 m
Height - 1.7 m
Dihedral - 2 degrees
Wing Area - 12.16 sq m
Aspect Ratio - 18.5
Wing root - c = 1.218 m, NACA 63-618
Wing tip - c = 0.39 m, NACA 4415
Weight - 245 kg, 385 kg max., loaded
Max speed - 260 km/hr
Stall speed - 70 km/hr
Min. sink - 0.7m/s @ 79km/hr
Max. L/D - 34:1 @ 94km/hr.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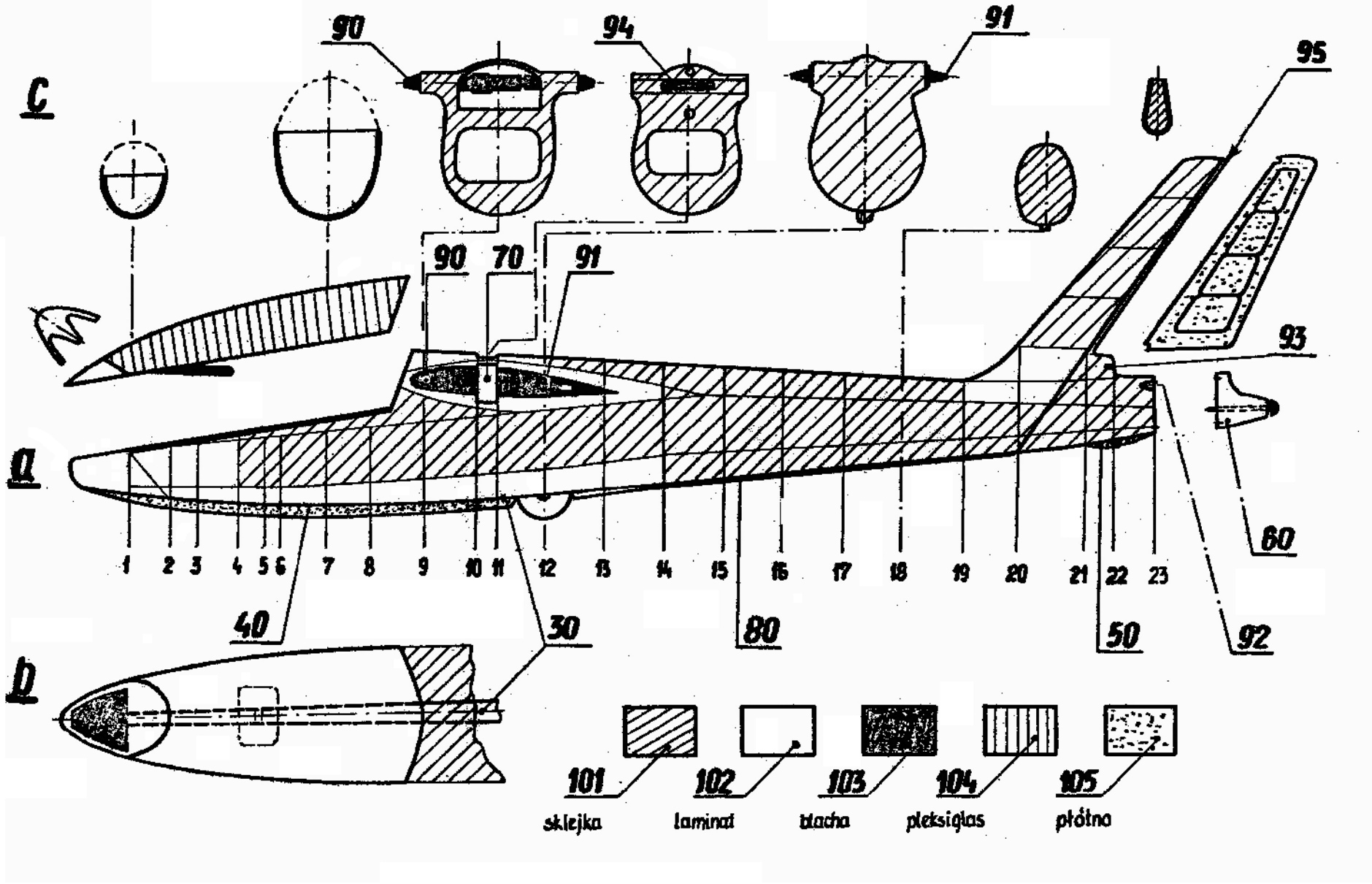
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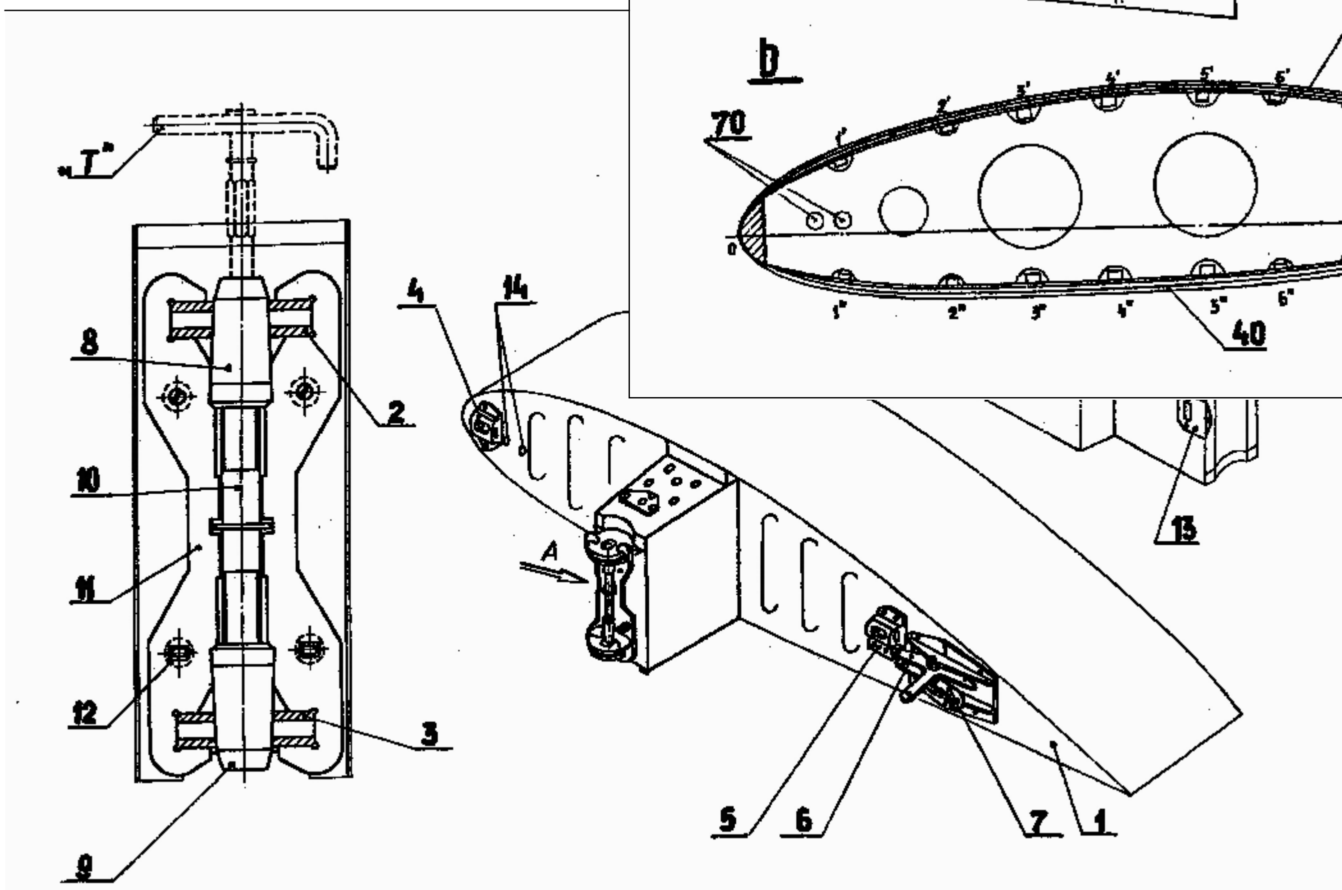

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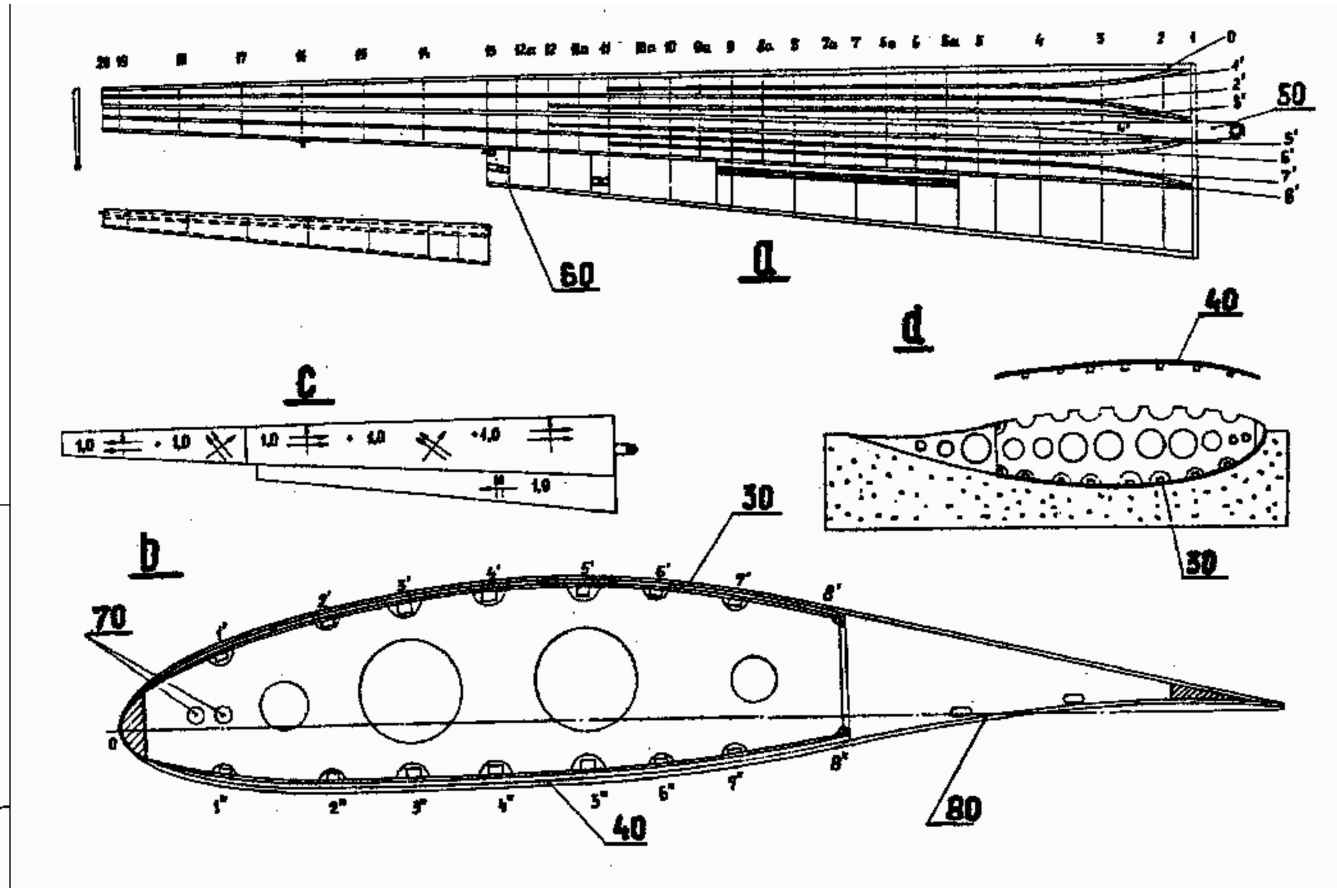

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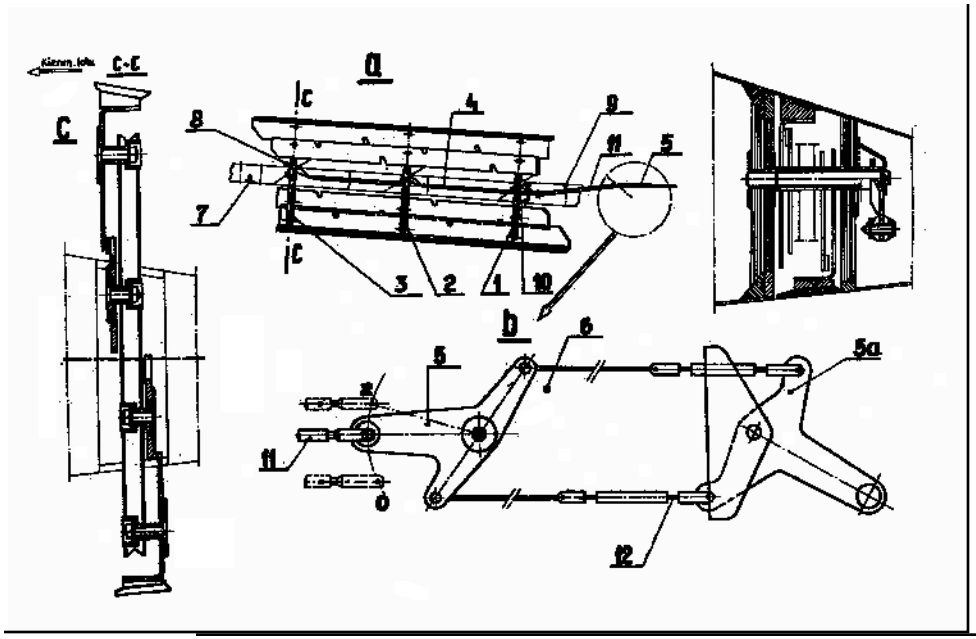
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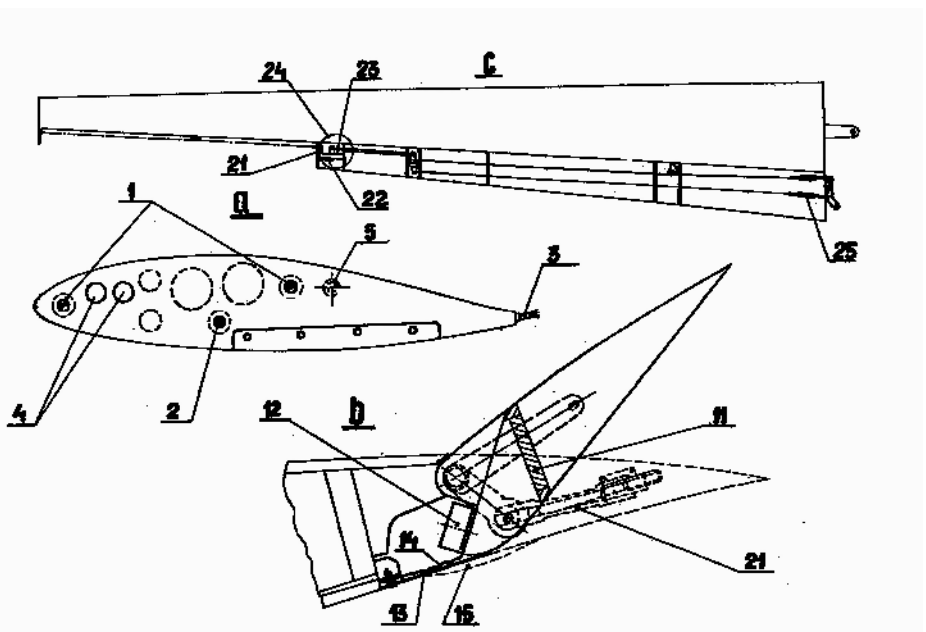
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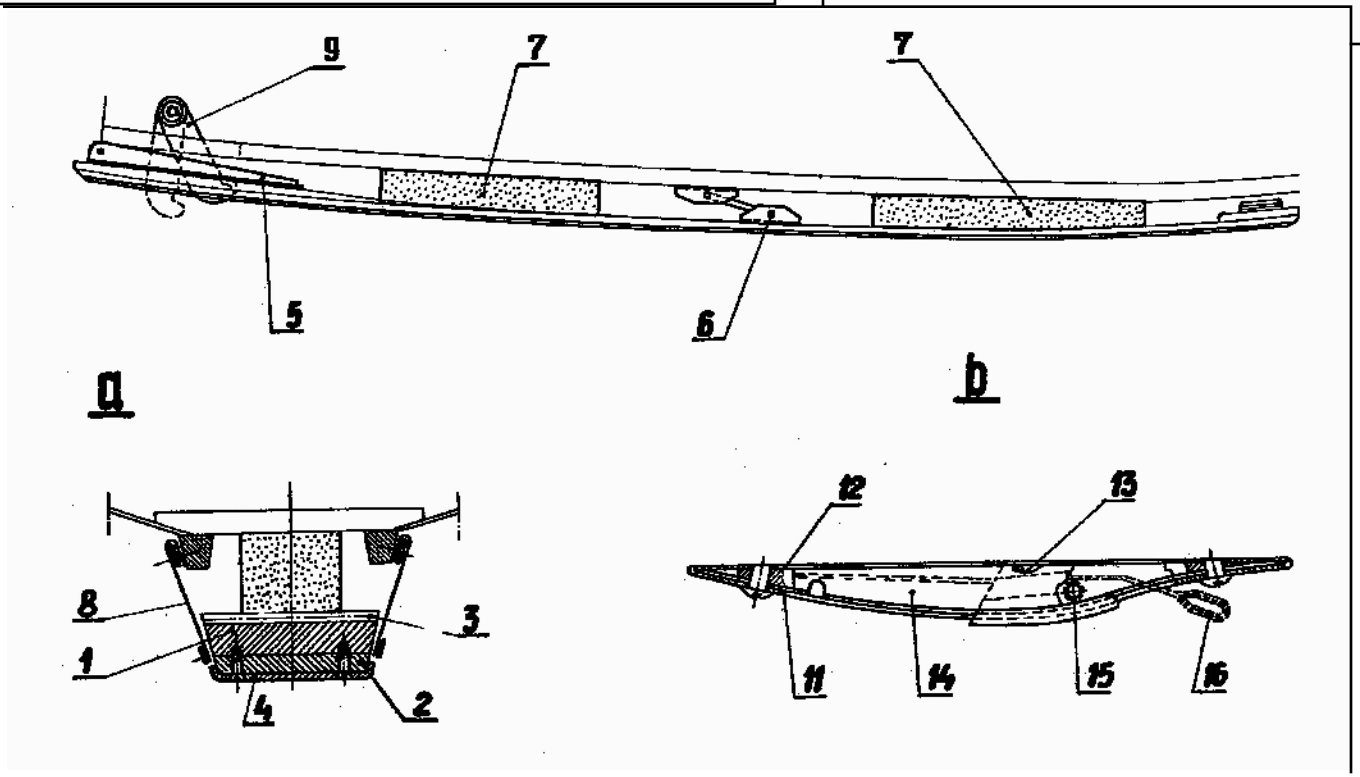
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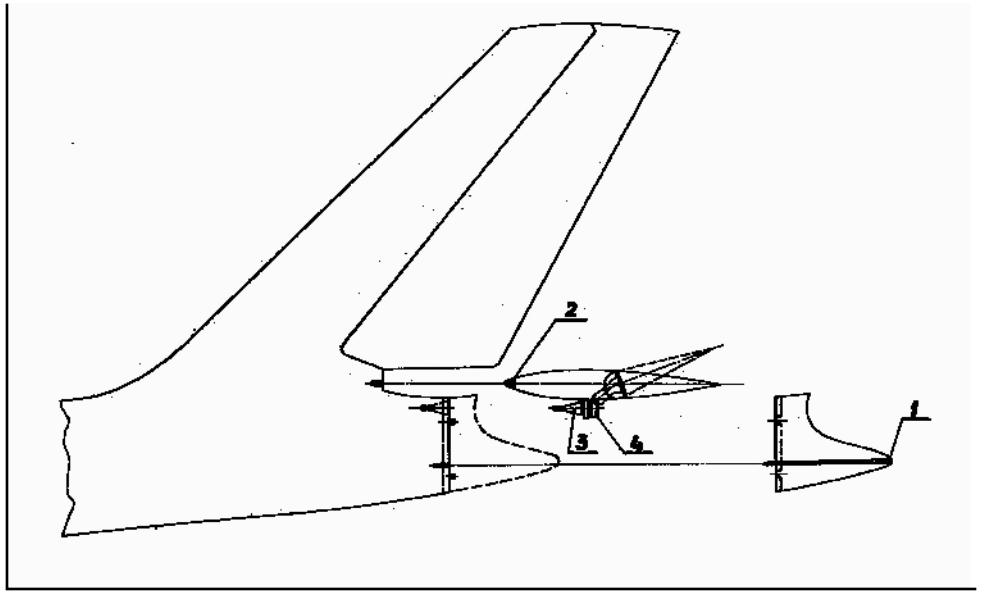
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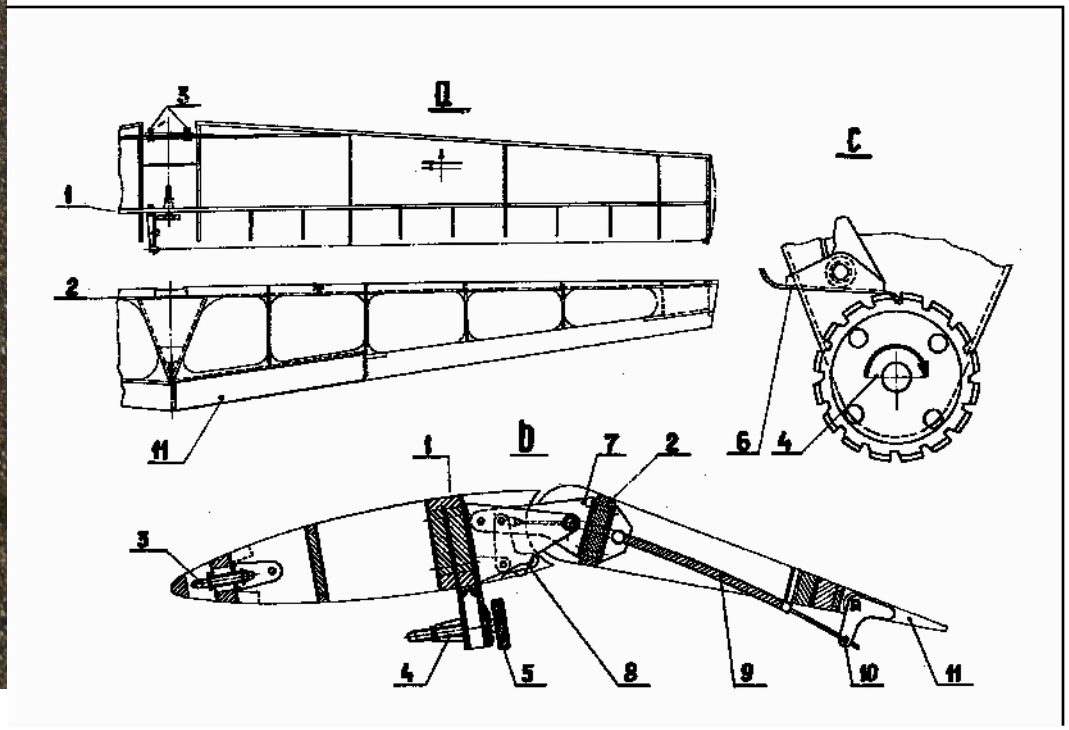
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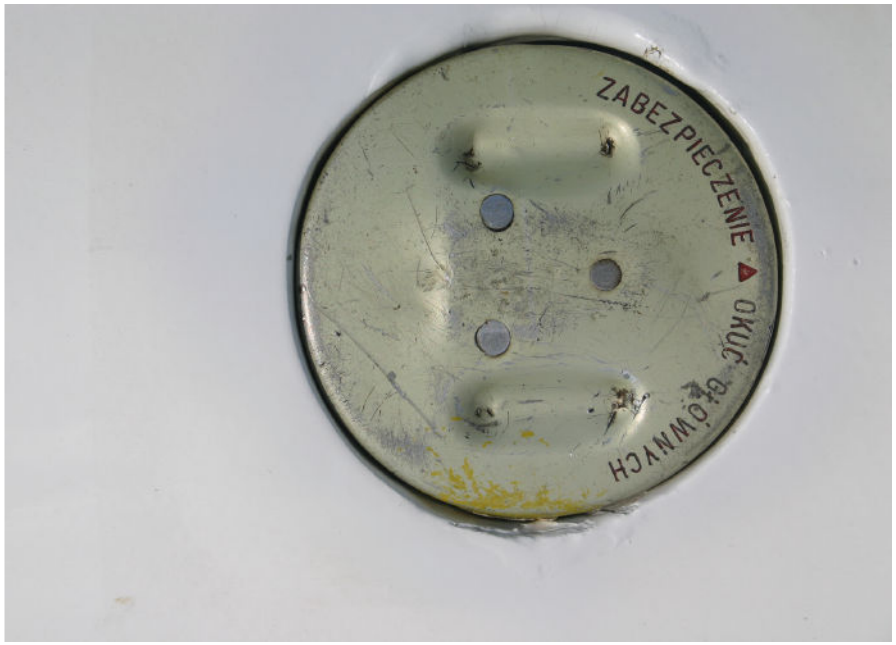
Zakres użytkowania szybowca
Typ SP-
Maksymalny ciężar ładunku kG
km/h
km/h


ZAKŁADY SPRZĘTU LOTNICTWA
SPORTOWEGO NR.
POLSKA
TYP
SERIA
Nr. FABR.
ROK BUD.


SZD FOKA 24-4
Sailplane Empty Weight 563 lbs.
Minimum Pilot Weight 145 lbs.
Maximum Pilot Weight 242 lbs.
Maximum Gross Weight 849 lbs.
(with equipment and ballast)
Limit Load Factor 6.0+ / 3.0- G´s
C.G. + 38.5% M.A.C. / - 27% M.A.C.
SZD FOKA 24-4
Stall Speed 39 Kts.
Minimum Sink (138 FPM) 43 Kts.
Best Glide L / D (34 / 1) 51 Kts.
Max. Auto / Winch Tow 65 Kts.
Max. Aero Tow / Rough Air 70 Kts.
Max. Diving / Rough Air 90 Kts.
Dive Brake Open Rough Air 90 Kts.
Dive Brake Open Smooth 139 Kts.
Max. Diving / Smooth Air 139 Kts.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The Natural Side of Thermal Soaring

by Lee Murray, <lmurray@athenet.net>

Lee, wishing it were his *Speed Astir.*

I'm going to wander from my regular topic to expound on the comment at the end of my last article about my visit to a sailplane port in Nevada.

A decade ago I decided that I loved flying RC sailplanes so much that I wanted to learn to fly the real thing. Getting my sailplane license didn't seem like a good idea since I would have to drive about 80 miles to the nearest glider port or arrange for a week or so at a glider camp and then be looking at long drives each weekend when I wanted to fly.

Waiting until retirement seemed the right choice. In the mean time I resolved to fly sailplanes when travel took me to an area with a glider port with instructors and I could include a weekend in my travel.

The best full size flying experience I had so far was in 2001 when I made my third visit to Sky Sailing at Warner Springs Ranch, California in San Diego County. The wife and I were celebrating our 35th anniversary so we stayed the weekend at Warner Springs Ranch Resort and combined it with a glider flight duet.

I launched first with a young enthusiastic commercial pilot, we found a thermal and climbed several thousand feet and then my wife launched with her instructor to fly together. My house and office are adorned with pictures of that memorable event. If you want to hear more about that you might check the *RCSD* column on the subject (*RCSD* V18, #9, Sep. 2001, pgs 1, 10). This September, business took me to Las Vegas. The Internet made it easy for me to locate a soaring club near the city that could accommodate my desire to fly with the safety of a licensed instructor or pilot on board.

The Las Vegas Valley Soaring Association club house.

The Las Vegas Valley Soaring Association web page <www.lvvsa.org> was well organized. I contacted an instructor by e-mail. I'm partial to Grob 103s so two instructors, Bill Tisdale and Jay McDaniel worked with me to make an appointment for the two place 'glass ship.

I showed up about 10 AM on the cloudless day and had visions of the thermals popping up and supporting a long flight. I learned that due to the date (September 25th was later in the season than when I had done this before) and the wind direction, we would be scratching for lift.

Because of some other commitments, Bill was busy checking pilots out, giving pre-paid SSA rides and being the flight operations officer, so I had some time to walk around and actually become useful.

Jim, a former modeler, looked busy assembling his Grob *Speed Astir* by himself. I offered to help and got to learn more about assembling the full size glider like plugging in the wings, connecting the control linkage, mounting the stab and even taping the joints just the way we do with our models. Jim even used the same white vinyl tape that I do. You can see Jim's pride and joy in my photos.

There were a few delays having to do with the equipment. While RC glider clubs have winch line breaks, retriever problems, and bird nest tangles, they had the battery go dead in the Pawnee tow plane and some brake repairs that had to be made on this day.

Keith Colmer and Lee Murray in front of the Grob 103. The hill that provided lift for Lee's flight is directly above the nose of the Grob.

The Grob 103 on tow.

Jim and his *Speed Astir*.

Since Bill was busy, I teamed up with member Keith Colmer, a commercial rated glider pilot, Air Force test pilot and new member to LVVSA. He had compassion on me and agreed to take me up for the customary charges for a visiting pilot.

The lift had been pretty weak and other pilots had been coming back down without any altitude gain after release. I believe we had the honor of being the first to work some lift from the face of the highest hill that can be seen over the nose of the Grob in the shot with Keith and me.

We don't know how much of the lift was slope lift and how much was from thermals off the side of the hill facing the sun, but we worked ~6 knot lift for a while.

Without much stick time, I was clumsy and didn't get as much as Keith could have gotten out of that thermal, but the point is that I got to thermal the beautiful 'glass ship, mix with glider pilots, and got the feel of being a member of a glider club.

So my recommendation to you, an RC sailplane enthusiast, is to try full size soaring.

HAVE SAILPLANE, WILL ~~TRAVEL~~ RECYCLE

Tom Nagel, <tnagel@iwaynet.net>

Resurrecting a GWS Spitfire *as a Power Scale Sloper*

About a year and a half ago I won a door prize at Terry Nitsch's JR Indoor Electric Fly-in — a GWS *Spitfire* kit, a little electric powered war bird. The box said "For Advanced Flyers." I decided to build it anyway.

I had built a GWS Tiger Moth, so I had previous experience with translating instructions from GWS-speak into English. My aileron flying experience was limited to flying wings however, and I had absolutely no experience flying relatively fast little airplanes that actually had wheels and were designed to take of and land on hard surfaces.

I am glad to report that I learned how to fly the *Spitfire* before totally destroying it, and had a lot of fun with it over a year and a half. (If you are planning to build a powered version of the GWS *Spitfire* or any of the other similar GWS war bird kits, I have some tips for you. Can't discuss that here though. Gordy is watching.)

Then one day this spring I glanced away from the plane just as the GWS receiver glitched. I looked just in time to see the plane smack into the ground a hundred yards away. I took a bag and walked over.

The wing was intact but the fuselage was definitely tact. It was tact in pieces actually — five big pieces and a few smaller bits. The prop shaft was bent and the plastic motor mount was fractured. It looked like I had to find a home for some used servos. And a new name for the plane, too. Maybe the *Splatfire*.

The mess lay on my workbench for a couple of days, and then I went back and had another look at it. Gee, that wing really looked good. In the fuse, none of the pushrods had gotten bent, and all the servos looked OK. All those adhesive decals that GWS gives you with their kits were kind of holding the pieces together. The five big Styrofoam fuselage pieces fit back together pretty well. I decided to take a shot at piecing the fuse back together with 5 minute epoxy, and see if I could make a sloper out of the remains of the *Splatfire*.

GWS makes slope versions of many of their models, but I get the impression they don't sell many kits that way. I have never seen any on the shelf. This would be a great chance to experiment. On one occasion I had flown the powered version in light slope lift, cheating with the motor as necessary. Maybe without the drag of a prop and landing gear it would be a decent sloper.

It is amazing what you can do with epoxy, rubber bands and clothes pins. Two nights later, the *Splatfire* was back together. I found the old four cell 250 mah nicads from the Zagi THL, and popped them into the nose where the electric motor had been. I clipped off the landing gear, both main and tail wheel. I glued the motor mount back together and used it to hold the prop shaft in place so I had a place to mount the spinner.

As an electric prop plane the *Splatfire* had been in dire need of nose weight, so I had gooped some fishing weights inside the rubber spinner and epoxied a big flat iron washer to the front of the fuse right behind the spinner. I left those items in place. Even so, as a sloper, with the small 4 cell battery, no motor and no landing gear the *Splatfire* was suddenly 4.8 ounces lighter. The CG was pretty near the same. It was kind of ugly, but people expect that of slopers in general and my planes in particular.

I experimented with mixing a batch of 5 minute epoxy with some balsa filler compound and a shot of green acrylic paint, to make some epoxy spackle to fill up the cracks in the fuselage. It worked pretty well.

The postal scale at work showed that the *Splatfire* now weighed 12 ounces, pretty much what the GWS manual said a *Spitfire* sloper should weigh. Wing loading was down from about 10 ounces per square foot to 7.8 ounces per square foot. The *Splatfire* used to feel like a doorstop. Now it felt like a sailplane. We'd see.

My first chance came mid-week, while I was recovering from April 15th. I played hooky for a couple of hours and drove over to Newark to take advantage of a warm day and 20 m.p.h. winds from the southwest. The *Splatfire* flew pretty well from the very start. I had felt that I had the CG a little further back than it had been as a power plane, and indeed the elevator was very sensitive. I dialed it back to 40% on dual rates.

The *Splatfire* is fairly fast. I had a Cavasos Boomerang along for comparison purposes, an all-EPP 48" flying wing. The GWS seemed faster, though a little less floaty. The *Spitfire* seemed to fly better with rudder, and I tried to remember to keep the rudder/aileron coupling on. I didn't get around to any aerobatics on the first trip.

The lighting conditions made it a little tough to keep orientation. I need to add some light colored decals on the bottom of the wings. The all-foam GWS fuselage seemed up to handling slope landings. The new lighter weight probably helped in that regard, too.

A rough landing after several flights popped the metal nut out of its plastic socket in the wing hold-down system, and I had no glue with me, so I was done for the day It would be easier to make that part stronger, but then the next weakest thing would break. I needed to design a way to let the wing pop off during hard landings.

After the first outing I had only three minor fixes in mind:

Some light colored decals on the bottom of the wings, to help with orientation.

A little more lead in the nose to make the elevator less sensitive.

Redesign for the wing hold-down system to make it just a little stronger.

It was about 15 minutes work and the *Splatfire* was ready for its next outing.

Well, it is fall now, and the west winds are picking up. I think I'll have some fun with the *Splatfire* before it gets too cold to fly.

If you have the chance to pick up a GWS war bird sloper kit, give it a shot. If you have a beat up old GWS war bird, or see one at a swap shop, take a shot at converting it to a sloper.

Cheap fun.

Windrider Aviation

Bat

Kit Review

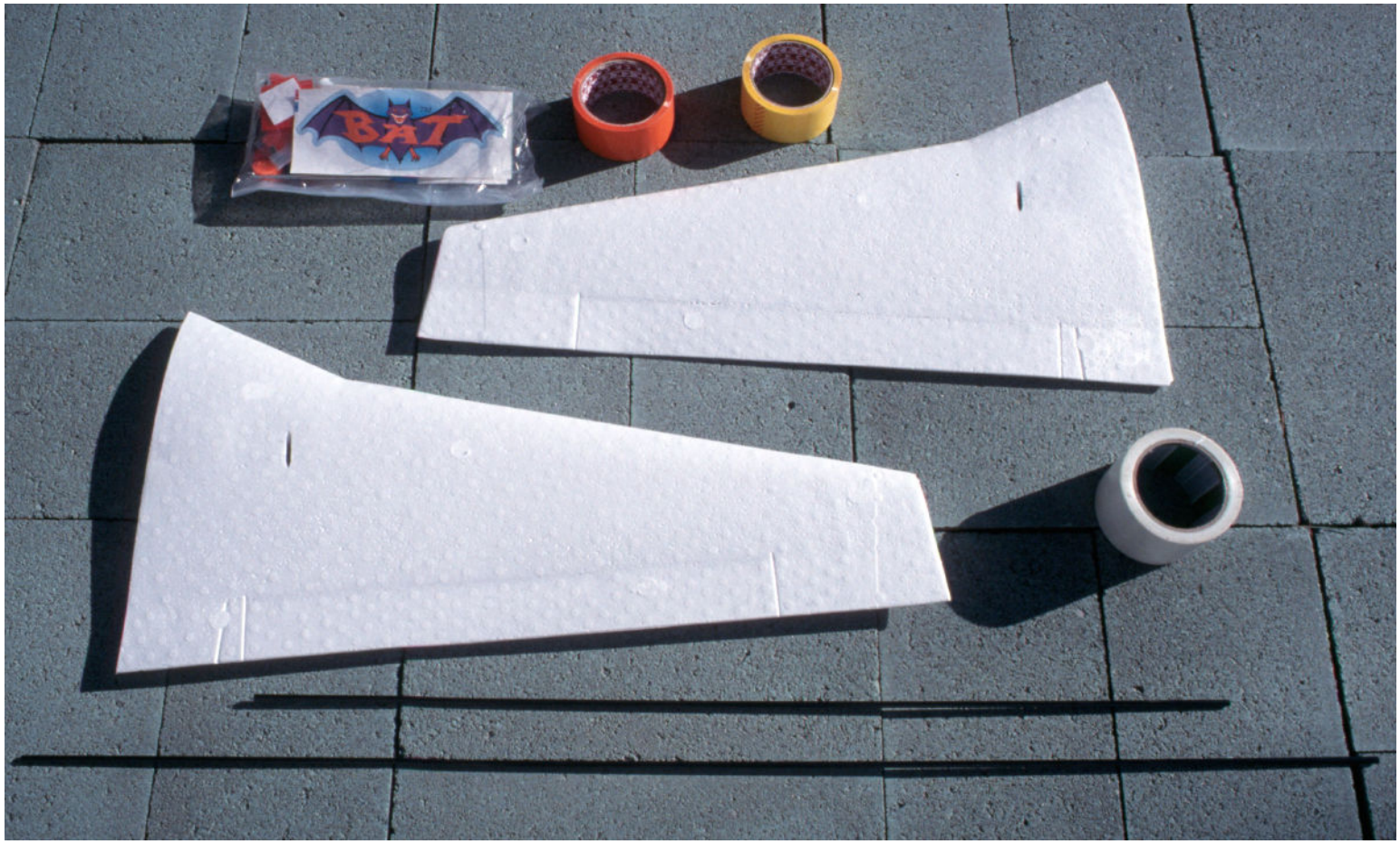
by Kyle Saltzman, <aulethemaker@hotmail.com>
photos by Dave Garwood and Kyle Saltzman

Like other Windrider Aviation products I've tested, the *Bat* is a well-designed sailplane. A durable slope soarer that is easy to build, economical, and fun to fly, the *Bat* comes with everything you need to start building fast. One needs only to pick out a two-channel radio with elevon mixing functions.

As the *Bat* is a flying wing, a simple design with no fuselage, the elevons are responsible for all the movements of the plane. Elevons combine the individual functions of ailerons and elevators, the controlling flaps found on conventionally designed planes.

The kit comes with the pre-molded wing halves, balsa elevons, control linkages, pre-cut vertical stabilizers, carbon fiber rods for the securing of the stabilizers, pre-cut hatch coverings, strapping tape, covering tape, and an instruction booklet.

Dave Garwood photo



The most important components of the *Bat* kit are a pair of EPP foam wing halves, shaped by injection molding. The mold includes tight-fitting servo pockets and pockets for the radio receiver and the on-board battery pack. The kit also contains a pair of carbon fiber tubes to stiffen the wing, three rolls of colored packing tape for the outer finish, a decorative sticker, and a bag of small parts and hardware mentioned in the article. Photo by Kyle Saltzman.

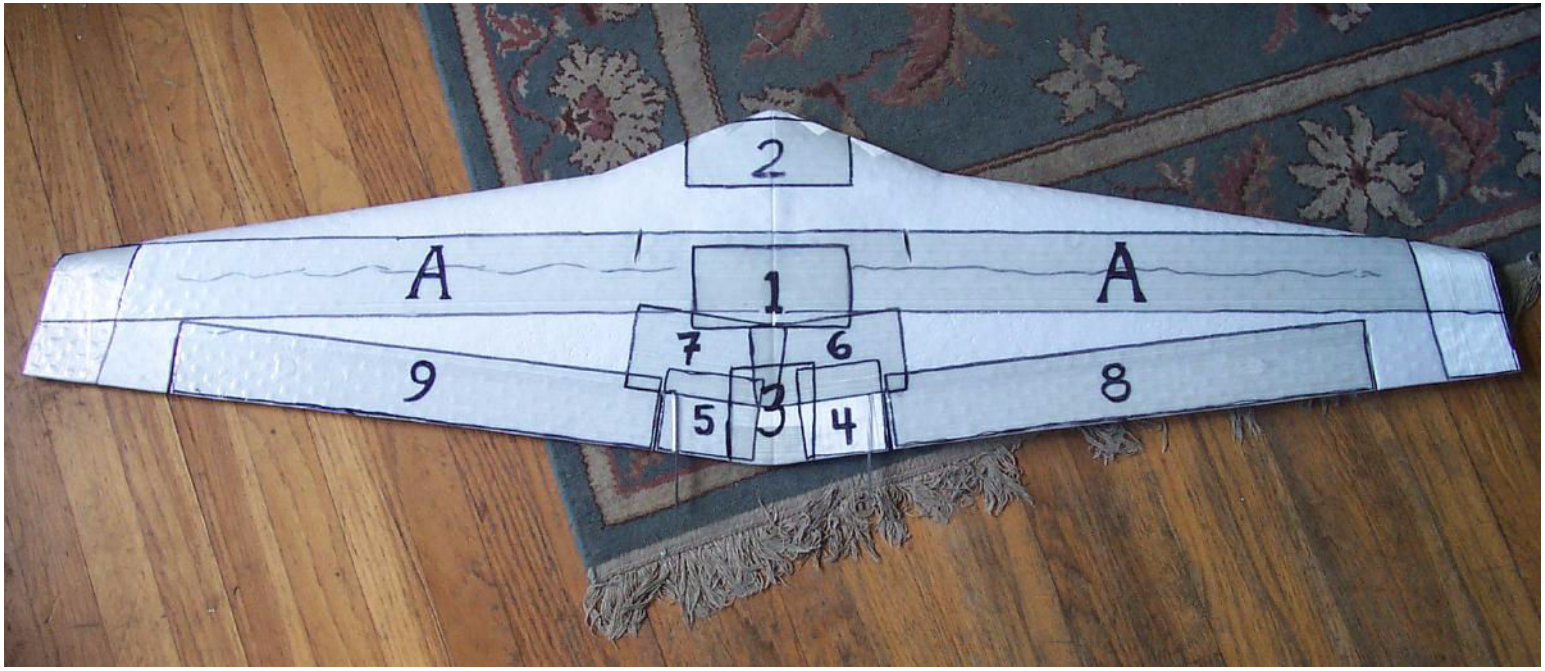
Construction

Building this plane is very easy. Into the pre-cut holes in the wing-halves go the radio components: servos, battery pack, receiver, and connecting wires. I stuffed some extra foam in the cracks to secure everything and to prevent any movement within the guts of the plane. Once everything is laid out, the wing-halves are securely taped together with the strapping tape. In the booklet are instructions for the wing-taping diagram.

Balancing

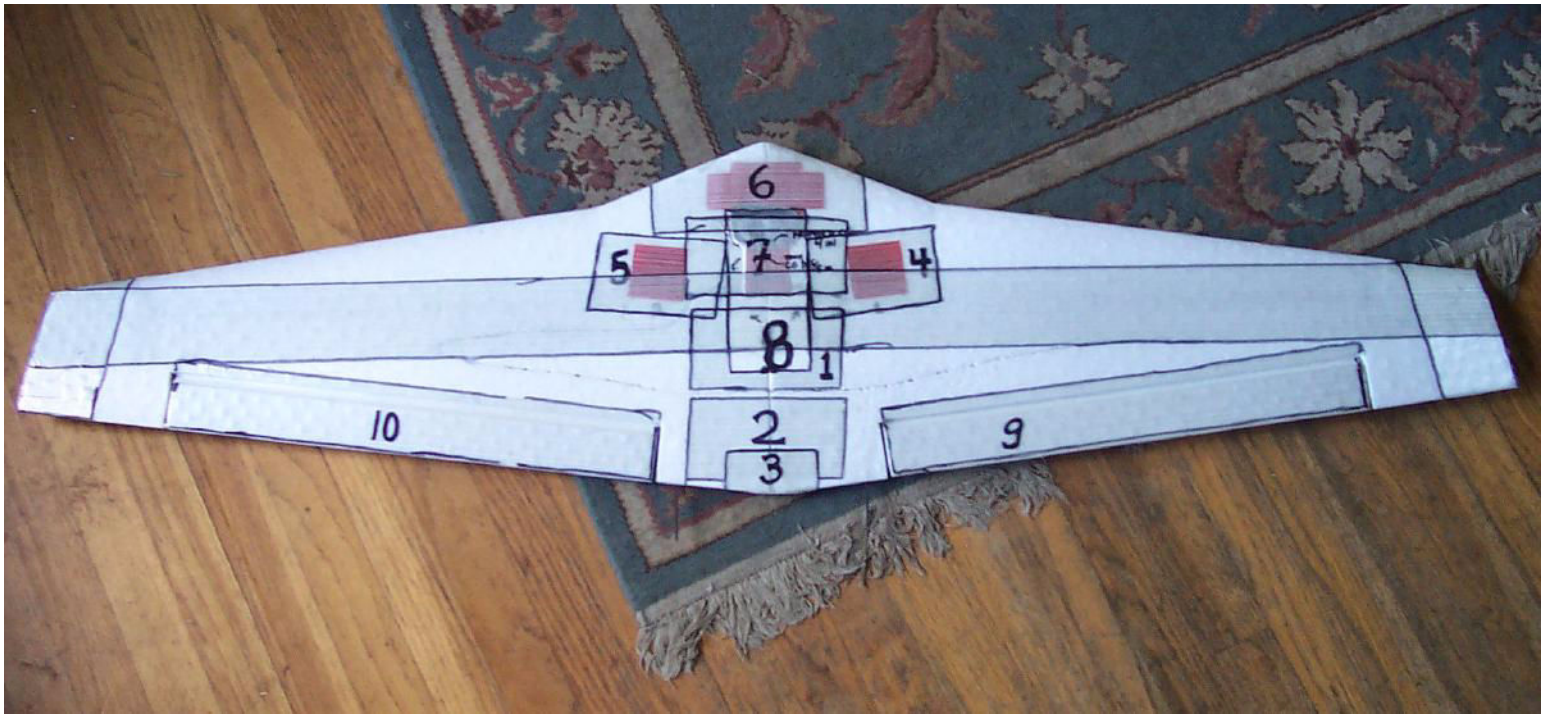
Once taped, the plane needs to be balanced. This was a tricky part for me as the *Bat* had an insatiable appetite for balancing weight. I didn't have everything balanced properly until I had crammed approximately ten ounces of lead into the front of the plane, making for a very heavy wing. I

The wing-taping diagram for the top of the Windrider Aviation *Bat*. Photo by Kyle Saltzman.



The wing-taping diagram for the belly of the *Bat*.

Numbers 4 and 5 are servo hatches, 6 and 7 are the receiver and battery pack hatches. Photo by Kyle Saltzman.



Kyle and his completed Windrider *Bat,* ready for some test flying. Photo by Dave Garwood.

Kyle test flying the *Bat* using a bungee launch. Because of the high speed of the launch, over-controlling was easy. Easing up on the stick made a big difference. OK, off to the slope! Photo by Dave Garwood.

was skeptical about the *Bat*'s performance in all but the heaviest winds. Those fears proved to be unfounded however, as I'll explain later during the flight testing. Once balanced, the builder needs only to cover the plane and go fly.

Radio Gear

One aspect that I love about soaring with simple sailplanes is low cost. So much fun for so few dollars. Radio gear is no exception and for the *Bat* I used a Hitec Neon SS FM 2-channel radio with elevon mixing functions. This radio actually serves double duty. It also controls my Windrider *Bee*, one of my other flying wings.

In the plane itself sit a Hitec multi-channel receiver, two standard-size Hitec servos, and a four-battery flat-pack. I have

found that Hitec hardware is durable and comparable to other big brands in value.

Initial Test Flying

I first tested the *Bat* using a bungee launcher in a soccer field.

I had a little trouble at first because of the great speeds that occur during bungee launching. I found that the *Bat* would flip violently when I attempted to bring her up into the air.

After a few tries it became apparent that I simply needed to apply less movement on the control stick of the radio. Once I eased up on the stick I was able to guide the *Bat* in fast, graceful arcs after the release of the bungee.

I attribute this instability to the lack of a swept-wing design. The *Bat* has less stability than other planes because it has a relatively short tip to tail length. This is analogous to the wheelbase design on a motorcycle; a very short wheelbase results in an agile and flickable bike with less stability at speed, while a longer wheelbase is more difficult to steer in tight corners but has a greater overall stability.

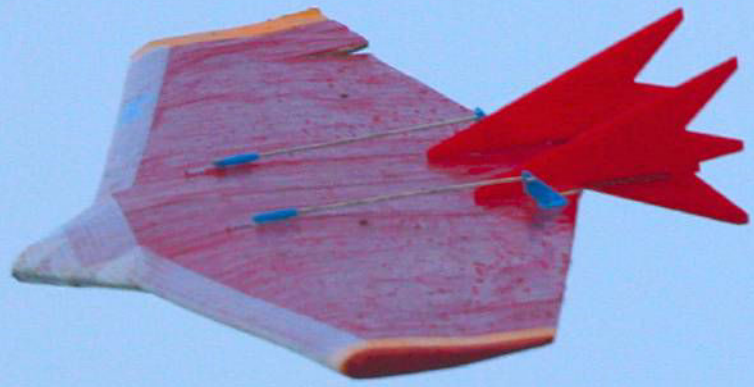
Slope Flying

At Cape Cod this October the *Bat* got its first real taste of slope-soaring action. Nervously, I threw the *Bat* in very heavy winds and low light. There were a few reasons for my apprehension; the wind was very powerful, it was almost dusk, the *Bat* had never been flown off a slope before, and the dunes were almost two hundred feet tall, thereby guaranteeing a long hike if I lost control. The wind was moving at thirty plus m.p.h., a little heavy for any foam plane. Still and all, I was able to keep it aloft and get a taste for the way that it handles. I say a taste because I was afraid of losing the plane before I really got to fully test it, so I landed and hoped for wind the next day.

The next day we woke early to find the wind coming straight into the hill by our hotel, the Seascape Motor Inn in Truro, Massachusetts. Wasting no time, I grabbed the *Bat* for some early morning gliding. The twitchiness was still there but the *Bat* performed beautifully, exhibiting good stability, excellent handling, and good aerobatic ability.

Loops and rolls were performed easily and although I'm not much of an inverted flyer I believe that in the right hands the *Bat* could easily handle this as well. Because of its weight, the *Bat* is not the best plane for very light winds.

So there you have it, a well designed plane that flies well in all but light lift.



Dave Garwood photo

Suggested Modifications

Nobody's perfect however, and here follows the list and explanation of my complaints about this kit.

First and foremost is the lack of quality of some of the kit contents, specifically the control linkages and the covering materials.

Control linkages The control linkages are made of cheap molded plastic which will break at any given opportunity, leaving the pilot with little recourse unless they are prepared with extra components. It is my advice to get higher quality parts from a hobby store and use those from the start.

Covering material The covering materials also fell way short of the quality mark for a few reasons. First, they come in rolls about three inches wide which forces the modeler to lay many strips of covering down resulting in a striping effect and plenty of seams. Second, the material itself is translucent and so any marks on the wing itself will show through. In my case these marks were the wing-taping diagram marks. Also, where the tape overlaps you get a darker strip which just doesn't look right.

I opted for some iron-on covering material from a hobby store, a deep, dark red for the top, silver for the bottom and yellow for the wing tips. I was able to use fewer individual pieces of the material because it comes in large rolls that you cut to shape yourself.

Vertical Stabilizers From an aesthetic standpoint I also have to admit that I disliked the vertical stabilizers on the *Bat*. These consist of these funky little "bat feet" that simply slide onto two rods that come out from the central part of the trailing edge of the plane. To me, they are ugly and childish in appearance.

One plan I have is to move these stabilizers to the wingtips and attach them with velcro for a sleeker, more grown-up appearance. My final complaint is that the design of the *Bat*, combined with its weight made for difficult one-handed launching. There was no really good place to firmly hold the plane; it was awkward and difficult to throw.

The *Bat* is a well designed plane that flies well in all but light lift.

Aside from these very easily modifiable issues, I found that the *Bat* has everything that I would want in a simple, yet high performance slope-soaring wing.

Conclusion

Despite the aforementioned problems, the *Bat* by Windrider Aviation is a great slope plane. The kit is easy-to-build, inexpensive, and durable - all qualities desirable in a foam glider.

Windrider has perfected the simple do-it-yourself kit. On a scale of one to ten I would rate the *Bat* at eight, the only thing taking away from a perfect score being the finishing materials, covering, and control linkages.

My *Bat* flies excellently, though, and I am quite pleased with the plane as a whole. If you ask me whether I would purchase this kit, the answer is a resounding yes.

For more information on the *Bat* and other Windrider kits, see their website at: <www.windrider.com.hk> or the US importers at: <www.atlantahobby.com> and: <www.californiasailplanes.com>.

Information on Hitec radio gear is available at: <www.hitecrcd.com>.

Identical Servos? Make sure!

Tests of HS-81MG and HS-85MG servos plus Endpoint adjustment (servo rate adjustment) 101

by Philip Randolph, <amphioxus@juno.com>

I'm flying a 60" carbon winged plane up on Saddle Mountain, with Chris Ericson's Wild Arsed Mountain Slopers (CEWAMS). I don't realize I've made a mistake. I've trusted my HS-81 Metal Gear flaperon servos to be identical. Why not? They look the same. But this means I haven't set my endpoints. And that's partly because I still have some confusion about endpoints.

I'm having a good time bringing the plane well behind the ridge and then penetrating across sage to lift. But I decide to land. Low and just behind the ridge, I lower the flaps--I have them on the spoiler stick--to slow things down. The plane immediately spirals. Its nose impales soft dirt, narrowly missing rock.

I pretty quickly figure out that the left flaperon moves quite a bit farther than the right. Twenty percent more. Enough to put a plane into a roll. Bother.

The Tests: *Up to 1/3 difference in travel!*

Back home, I set up a crude test jig to test the throws of seven HS-81MG and two HS-85MG servos.

One after another, I plug each servo into the same channel of a JR nine-channel receiver. I switch on transmitter and receiver, so the servo centers, snap on a long servo arm, as close to vertical as possible, trim it to the line on my jig, and mark how many degrees it travels when I throw the spoiler stick all the way.

No, none of the servos hit their stops.

The good news: The two HS-85MGs were only a degree different.

The bad news: The HS-81MGs ranged from 53 degrees to 39 degrees of throw. That's roughly 4/3. Wow!

HS-81 responses: 39, 40, 43, 44, 48, 51, and 53 degrees.

The old hands know this. At a SASS (Seattle Area Soaring Society) meeting, I showed the test, and then set it up so the guys could see two servos, side by side, moving at different rates.

Sherman Knight said, "When JR 641s first came out, I'd get fifteen at a time. I'd put long skinny sticks of balsa on the servo arms, and match them up. But when the computer radios came out, I stopped worrying about it."

He stopped worrying, because he sets his endpoints.

Not everyone has endpoint adjustments.

However, one of the guys I'm flying with at Saddle is Damian Monda. I still haven't figured out why Damian thinks putting mixers in his planes is superior to using the elevon mixing in his transmitter, but he swears it's better. Plane carried mixers, electronic, allow elevon control with just

two channels, one of them elevator, which stops one from adjusting left surfaces independently from right surfaces.

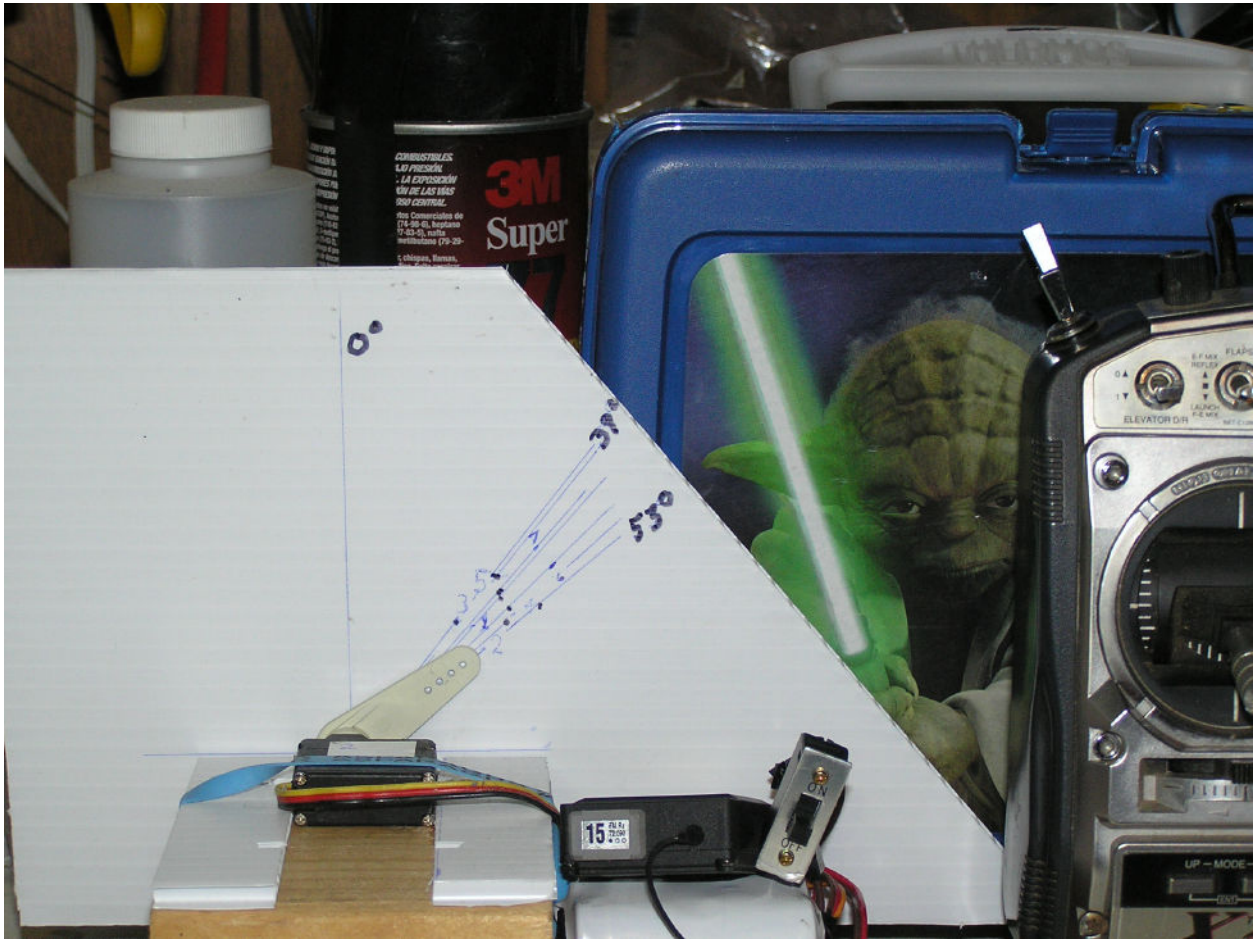
Similarly, pilots with very basic radios won't have endpoint adjustments.

The danger, and an explanation with a partial prevention:

So, WARNING: If you don't have a radio with "endpoint" (or "travel") adjustments (which are actually *rate* adjustments), check your servos for similar throw before you stick them in your wings.

Elevon servos of mismatched response could make a flying wing roll upon elevator input. Flaperon, flap, or spoileron servos of unequal response can make a standard planform roll, just when one is close to the ground, trying to land. (Bad.)

Sherman continued: "You're probably more likely to get servos that don't match out of different batches. They order a load of components from Korea or wherever, and the components are probably tested to be within tolerances of each other. But the next batch of components may be from a different supplier. So who knows whether they match the first set."



Philip's servo test stand. The servo to be tested is hooked up to a receiver and actuated through the transmitter function. The protractor attachment gives a direct reading of servo throw. This test bench allows matching of servos or use of transmitter endpoint adjustments to artificially match them before they're in an airplane.

Note: Yoda is not necessary, but his presence does add a certain ambience to the proceedings.

Ignorance 101. *A misnomer. Function adjustments versus individual servo adjustments .*

Flashback to the slope: I fly more, but give up on the flaperons. That's my second mistake. I could have adjusted endpoints on the spot, with my JR 388S. But I was carrying a false assumption.

Okay, I've been playing with these toys for a few years, and I got fooled for the whole time. I figured "endpoint adjustment" meant "endpoint adjustment."

How dumb! I figured "endpoint adjustment" was a limiter. I figured that if I set the endpoint adjustment at, say, fifty percent, it would move as before till the transmitter stick was about half way over, and then it would stop, even if I pushed the stick further. Wrong.

Well, I had a hint, because "endpoint adjustment" is also called "travel adjust," in my JR 388S "manual." Not enough of a clue for me. My "manual" says, "offers precise servo control deflection in either direction of operation." Pretty vague, as in "meaningless marketing hype."

"Endpoint adjustment" does affect endpoints. But it does so in the same manner as dual rates, exponential, and differential affect endpoints. They are all *rate adjustments.*

Technically, they adjust the proportion of servo movement signal to transmitter stick movement. That's why our radios are called, "proportional control.

Even counting fancy mixes, our radios only know one trick: All they know how to do is to change the proportion of servo movement to stick movement. When the stick hits its stops, it can't tell the servo to move further, so that does determine an "endpoint."

Q: *Yeah, right, buddy. The radios do more than proportion: What about trim adjustments?* A: Even servo centering and trim adjustments are just the transmitter fibbing about how much the stick is deflected. On many transmitters, the trim tabs mechanically rotate the stick potentiometers. It's kind of like the butcher putting his thumb on the scale.

Q: *So if they're all rate adjustments, and they all affect endpoints, what's special about the one labeled, "endpoint adjustment?"* A: Dual rate, exponential, differential, and trim tab adjustments are all aimed at *functions,* such as ailerons. They may affect more than one servo, or not. *Endpoint and sub-trim adjustments target individual servos.* That's the whole difference.

The good news about "endpoint" adjustments, but trim mechanically first

The good news is that "endpoint" adjustments work great! Unless you don't have them, or, as Bill Kuhlman said, "Unless you're using a Y-harness." (A Y-harness is one step simpler than an electronic mixer.)

Even if your flaperon, spoileron, or elevon (etc.) servos are mismatched in response rate, if you set the endpoints for equal deflection, they will be balanced across their range. You can indeed, "set 'em an' forget 'em." Well, provided you did everything else right.

If those wing servo arms aren't centered at the same angle to the wing, you'll induce unequal mechanical differential that you'll never get rid of.

Additionally, remember to make sure your servo arm is installed so that it won't hit its internal mechanical stop before it moves as far as you want it to. That's another reason to trim right mechanically before you fine-tune electronically.

Keeping the suspense in programming our radios

But please don't worry that you now possess the secret and esoteric knowledge that will take the suspense out of programming your radio.

Transmitter manuals (and manuals in general) will always give us half-intelligible directions, so guys like me will still start writing articles like this one recounting mistakes and misinterpretations.

And even if you do "endpoints" correctly, you can take trust in this: Being creative, we'll always find some other way to mess things up.

Andy Page and His *Bird of Time*

By Andy Page, <andypage37@hotmail.com>

My *Bird of Time* wingspan is 118", and weighs 54 oz. I built it in 2002 from the *RCM* plans, which show the original fuselage structure with the nose block captured between the fuselage sides.

Modifications were the built up rudder (plans show solid), .014/.007" carbon on the inboard panel spar caps, spoilers direct driven with HS81s (overkill), and two forward dowels for wing hold-down rubber bands rather than just one on the centerline.

The fuselage is glass over wood, and is painted with Top Flight paint to match the Monokote.

The skeg was added in 2005. It is a plywood core with shaped balsa cheeks, embedded into the 1/2" fuselage bottom, faired with epoxy/microballoons and glassed over with heavy cloth. I felt the extra work was worth it to avoid having to tape one onto the nicely finished fuselage. This makes it much more manageable in contest landings in case it is carrying a bit too much speed. It nearly eliminates any chance of a groundloop.

I love this sailplane! The performance is amazing considering the state of the art at the time it was designed. I often hear people talking about modifying the *Bird of Time*: changing the dihedral, enlarging the rudder, etc.... Well, it doesn't need it. It handles beautifully, just as designed. I was careful with the wood selection, though, and the extremities are very light, which no doubt contributes to the nimble handling.

I've done very well with it in the local club contests over the past three years.

The cover photo was taken at the end of a 65 minute flight, my last flight for the season at 60 Acres, the weekend before Visalia.

If I need another one, I'm ready... in the kit stack are a George Voss glass fuselage and laser cut rib set, an original Mark's Models kit (very nice wood selection), and one of the Dave Thornburg hand cut kits from the original run of about 80 that he kitted in 1979!

I wouldn't change much, except to use a 5/16" wing joiner. I've bent two of the 1/4" rods on winch launches.

Andy

Dave Beardsley photo

Peter Wick's Airfoils for Plank Planforms

by Peter Wick

I wrote a series of articles about the design of flying planks for the German *Aufwind* magazine. My PW airfoils are very well proven and there are a couple of commercially available airplanes on the market which are equipped with these airfoils.

Some comments on the airfoils:

They are made for planks, but because of their pitching moment of around zero they will also have some application for swept wings.

In my opinion, the design of airfoils can not be seen independent of the design for the airframe, therefore some remarks, which should act as a guideline for airplane designs with those airfoils.

All the airfoils are made for slope flying, also DS, F3F, and so on, apart from the PW 1211, which is designed for a SAL plank flying wing, but for the design of the whole aircraft the aircraft should be designed the same way.

This means to me:

- low drag at $c_l = 0$ and a high c_{lmax} for sharp turning and aerobatics or thermalling with the PW1211
- the pitching moment curve should be as flat as possible, even with flaps
- the pitching moment should be around zero (not for the PW75, and the PW1211 which have a somewhat more positive c_m), so that the plank is flying at high speeds without flap deflection and with minimal drag. All other angles of attack need flap deflections.

These airfoils were originally designed for 20% flap chord, but in reality there was not a big difference for flap chords between 20 and 30%. The hinge should be on the underside!

PW51: mainly made for slope flying and aerobatics.

I made it in 2003 and is somewhat still my main design. It is made for planks as all the others, but the lift range is extended to c_l's below zero for aerobatics and a lot of fun.

It is well proven... 180km/hr in DS and was able to win the Danish championship in pylon racing. Pitching moment is around zero.

PW106: mainly for more thermal oriented slope flying, and

PW98-mod: more sophisticated slope flying, more accurate building required.

These are both modifications of the PW51. They have higher camber and therefore a higher c_{lmax}. On the other hand, the c_l range does not extend to negative c_l, so aerobatics is negatively affected. But for a DS model the PW98-mod looks very promising. Both airfoils should thermal very well. Pitching moment is about the same as for the PW51.

PW75: mainly made for slope flying and aerobatics with more positive c_m.

The PW75 is a modified PW51 with some more reflex. This gives a higher pitching moment, so planks will fly with a c_l about 0.4 with no flap deflections.

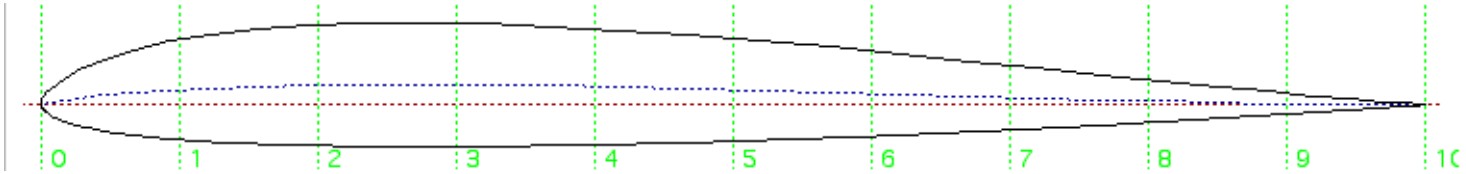
This airfoil is well proven and seems to work fine, both on the slope and on the flat field in thermals.

PW1211: made especially for a SAL plank project. The PW1211 was only published on the German forum "rclines" because there was a special need for a SAL flying wing plank.

The c_m is a bit positive and the airfoil will therefore need a tiny bit of down trim (+0.5 degrees) as a preset for the launch.

Coordinate files for all of these PW sections can be downloaded from: <www.b2streamlines.com/ PWairfoils.html>

PW51



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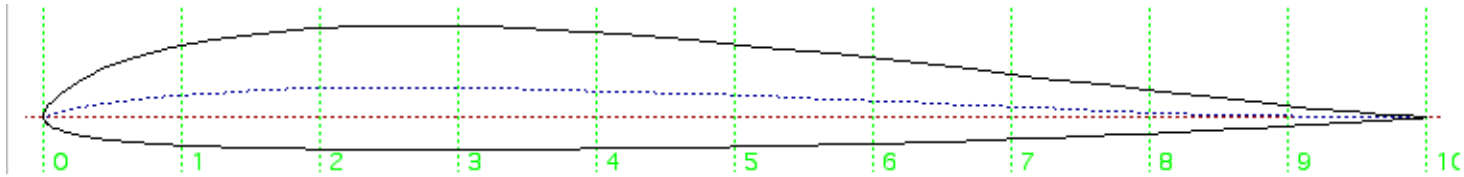
PW106



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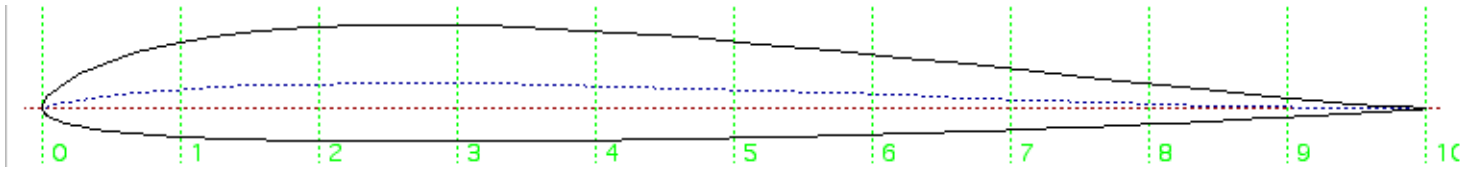

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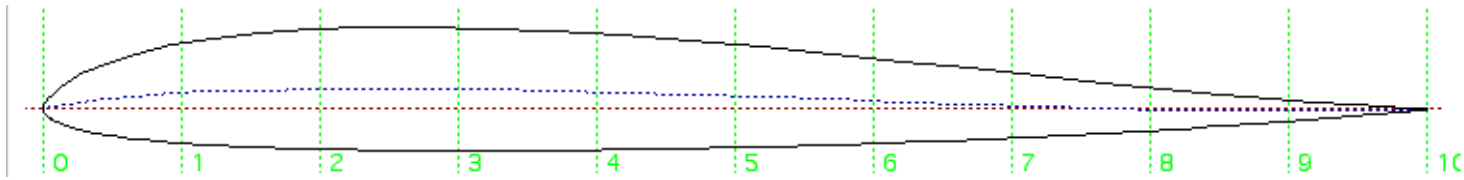
PW75



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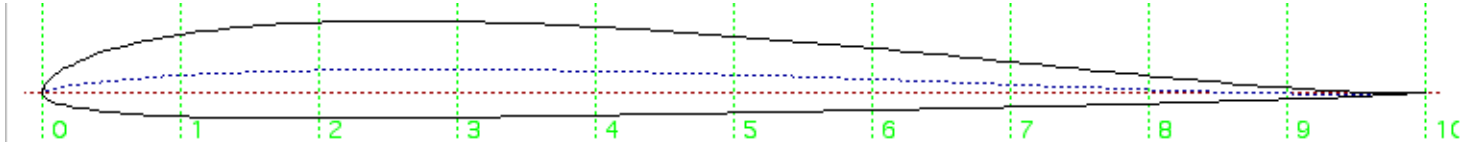

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Christmas and Gift-giving Ideas

by the *RCSD* Columnists

Jerry Slates

Well it's that time of year again. Have you submitted your Christmas wish list? Dropped any hints like leaving a magazine or catalog open to a certain page day after day? Well I have let my wants be known.

What I want is a small slope plane and a small thermal sailplane that will fit behind the seat of my Dodge pickup. So that if I'm out someplace and I run across a nice flying site I can stop, do a quick charge on my radio equipment, and fly.

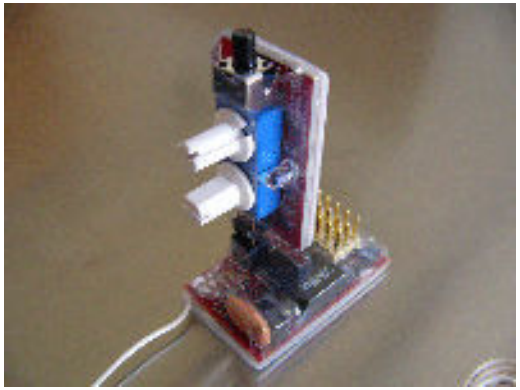
A slope model that I'm looking at is a 1/8 scale SGS 1-26. This is an EPP foamie from TMRC/Tom Martin Radio Control. The kit consist of a lot of pre-cut foam, miscellaneous hardware, carbon spars, butyrate canopy, laser cut ply and balsa parts, wing rod, hinges, and many more items too numerous to list. Price is $109.00. To see Tom's catalog go on line to <www.tmrcsailplanes.com>.

The thermal sailplane I'm looking at is a *Timon 2m* from Art Hobby. The kit features pre-sheeted wings with a modified HN 1033 profile, removable V-tail, fiberglass fuselage with removable nose cone, and a hardware package. For more information, go to <www.arthobby.com>. Price is $145.00.

The two above kits require micro radio equipment, so I'm looking at the Sombra *Shadow 3*, 7 channel, crystal-less receiver. This compact receiver is the smallest and lightest (8 grams with antenna), 7 channel in the world. Plus it's FM/PPM compatible. To program this crystal-less receiver, just plug the programmer into the receiver, dial in the channel that you want, power up the receiver, push the button on top of the programmer and you're done. Easy. If this receiver sounds good to you, contact Barry Kennedy at <www.kennedycomposites.com>. Price is $89.99.

TMRC's SGS 1-26

The *Timon 2m* from Art Hobby



The Sombra *Shadow 3,* a compact lightweight seven channel, crystal-less receiver. The lower photo shows the channel programming module in use.

From my local tool store I found some items that make really good stocking stuffers. These items are things that you may not use every day but are sure nice to have.

First there is the Coleman cordless ColdHeat soldering tool, for $19.99. It really works; I have already used mine.

Next there is a diamond needle file set at $9.99.

The next item is a pick and hook set for $3.99.

The last item, or items, is a set of four Quick-Jaw ratchet clamps, a must for any builder. $9.99 for a set of four.

Wish you all a very Merry Christmas and a Happy New Year.

Jer

ColdHeat soldering iron

Lee Murray

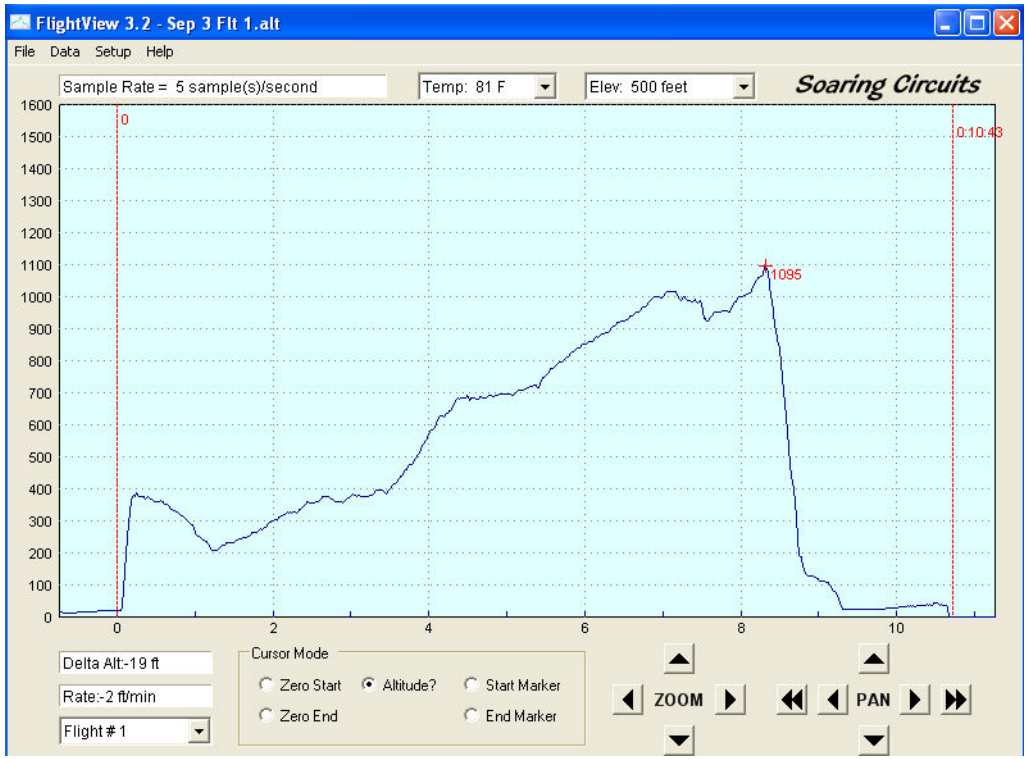
This summer I invested in the RAM 2 Altimeter–Data logger from Randy Brust at Soaring Circuits <http://www.soaringcircuits.com>.

The unit sells for just under $100 and can be powered from a single Li-Poly cell or from your receiver (5 or 6 cell pack). It comes with a receiver plug that powers the altimeter when your receiver is on. It doesn't matter how many times you turn your receiver off. Every time you turn it on, it goes into a new flight log. The receiver can be adjusted to keep nine hours of data by recording once a second or for about an hour by recording every 0.1 seconds. The latter is useful for HLG models.

The included altimeter plot shows the dynamics of an interesting flight I had earlier this fall. A strong gust came through while several fliers were soaring in a thermal.

The gust picked up several models and chairs on the ground and blew them down wind. My *Organic RES* was up at 1095 feet when I turned to see what was happening. Bad idea! When I looked back I didn't see the sailplane I was flying. A few seconds later someone yelled, "Pull up – Pull up!"

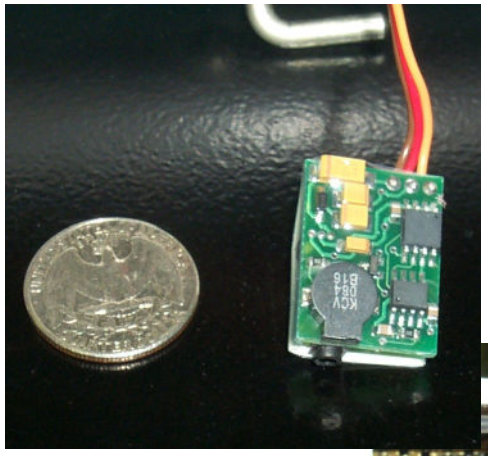
You can see the pull out at about 100 feet on the plot. I continued a shallow dive but I was getting back to the field and needed the speed. After crossing a road, I traded

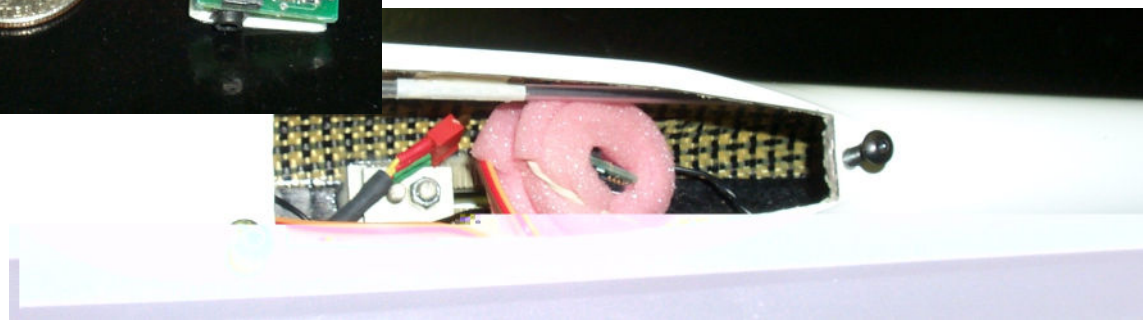


the speed for a little altitude and used a little lift over the field to land at my feet.

While the plot makes a good story, the real value is in your knowing how high your launches are, how long your flights were and how good you are at finding lift and avoiding sink.

The second item is a useful safety prize I chose. As a reward for our many years of not having a lost-time accident, every employee got to pick a prize. Although there were about ten prizes to choose from, 95% of the employees chose a Ray-O-Vac Head Lite. This LED based light provides a small illuminator that goes on your head to project a bright beam of light just where you have your head pointing. You probably remember those times when repairing something





Above: The computer generated plot of Lee's *Organic RES* flight. Note the steep dive from 1095 feet. Left: The RAM 2 Altimeter–Data logger from Randy Brust at Soaring Circuits with a quarter for size comparison. Below, the RAM 2 installed in the Organic RES fuselage.

Ray-O-Vac's LED Head Lite.

around the shop, house, or garage, when you couldn't quite see well enough to do the job. This is the fix for that for under $20. Here is a link to the Ray-O-Vac web site and the light.

<http://store.sundancesolar.com/ra3ledhewiba.html>

I am including a photo I took of this great idea. The web page has the best description of the several features shown in the photo. If that weren't great enough, the battery lasts 20 hours or more.

Lee

Tom Nagel

My contributions to the Christmas wish list. Fat lot of good it will do me. Last year the wife got me an electric park flyer that she bought at Bed, Bath and Beyond, and the instructions were in Mongolian or something. It had a nice battery, but otherwise was pretty useless.

1. Multiplex Easy Glider, and I'd settle for either the sailplane ($79.99) or the electric version ($89.99).

2. Graupner's $30 automatic LiPoly charger. Looks to be an inexpensive way to get into LiPoly batteries.

3. SLK Electronics $40 LiPoDapter, which AMA's Bob Aberle says will safely convert my peak charger to a LiPoly charger.

4. Tower Hobbies little park flying hotliner, the Ventura. One of our new club members showed up with one of these, and it is the fastest Rudder-Elevator electric I have ever flown. Lotsa fun for not much money. $119.97. Might even thermal on a good day.

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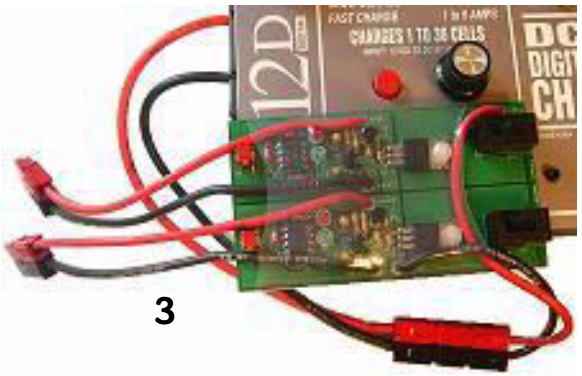

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The Spektrum DSM (Digital Spectrum Modulation) System includes a transmitter module (JR, KO, Futaba/Hitec or Airtronics) and a special receiver. Available now with three channels for "surface" use, it operates on the 2.4ghz worldwide band.

5. I saw JR's new spread spectrum technology transmitters and receivers demonstrated (at length) last weekend at the Columbus/JR Indoor Electric Fly. Operating indoors, flying brushed and brushless electrics, in a very noisy and crowded environment, they appeared to be flawless. I want one. And for once, it doesn't matter what channel. (Spektrum's DSM System, carried by Horizon Hobby <http://www.horizonhobby.com>, is shown above.)

Tom

Mark Nankivil

There are a few items out there that have been a staple of my Christmas gifts over the years as my stepfather is a retired sailplane pilot, having flown the Glasflügel *Mosquito* and Schempp-Hirth *Ventus* which he owned at different times. As he has also been a member of the Soaring Society of America, I am a happy recipient of their beautiful *Soaring* calendar every Christmas. The Soaring Society of America also carries a varied selection of other merchandise that may appeal to you as well. There are a number of videos/DVDs to choose from that would make for an excellent evening in front of the TV on a cold winter's night. And there is an excellent and often funny music CD by Ed Kilbourne called Cloudbase which is well worth having on hand. Be sure to check out their online store at <http://www.ssa.org>.

Another calendar my mother has given me over the years is the Segelflug Calendar which is available from Knauff & Grove Soaring Supplies. A larger format calendar than the Soaring Society of America's calendar, it fits well on my office wall and the images suitably framed make for excellent trophies at contests. Check out their website at <http://www.eglider.org>.

I am presently building a couple of new sailplanes which will be guided by my new JR9303 Transmitter. To go along with this fine piece of equipment, I'm eyeing the

Upper: JR Synthesized Transmitter Module (Part # JRPTXMS).
Lower: JR 10-Channel Dual-Conversion Synthesized Receiver (Part # JRPR2000).

new JR Synthesized Transmitter Module (Part # JRPTXMS), under $99.99, and Receiver (Part # JRPR2000), $199.99, which will allow me plenty of flexibility when attending contests and the like. You can find more on these items at <http://www.horizonhobby.com>.

Dremel has recently come out with a Lithium-Ion powered cordless rotary tool which looks like it would be useful both in the workshop and at the field for those unplanned repairs. You can find out more about this tool at <http://www.dremel.com/HTML/home_fr.html>.

A 12" disk sander would also be useful tool in my workshop and the Delta Machinery 12 inch Disc Sander with Integral Dust Collection (Model 31-120) looks to fit the bill. You can find these at Home Depot and other local hardware and home remodeling centers.

I want to wish for all of you the happiest of times this Holiday season and throughout the coming New Year.

Be sure to take pleasure in this great sport/hobby of ours and may you have the chance to share it with others throughout the New Year and beyond. Good Health and Good Lift in '06!

Mark

Left: Delta Machinery 12 inch Disc Sander with Integral Dust Collection (Model 31-120
Right: Columbian (Wilton Tool Company) 8 Piece Precision Mini Pliers Set.

Bill & Bunny Kuhlman

While sets of five mini pliers are readily available from the big home improvement chains, we recently found a set of eight high quality mini pliers (diagonal cutting, linesman, long nose, end nipper, bent nose, flat nose, needle nose, round nose) in a very nice leather case for around $40. These instrument have very comfortable handles, are easily manipulated, and of course all are self-opening.

The set is made by Columbian, the brand name for the new line of hand tools from the Wilton Tool Company. This set can be ordered through TOOL-CRIB.NET

<http://www.tool-crib.net/columbian_precpliers.html>.

We've been looking for a realistic flight simulator for some time, and finally settled on X-Plane because it is incredibly realistic, does not tie us down to one specific set of aircraft, and is cross-platform (Macintosh, Windows, and Linux).

Version 8 of X-Plane has enhanced landscape graphics. You can download specific areas of the world, or the whole

Left: The X-Plane flight simulator DVD. Right Mikro Designs' SPF-5 RXO receiver

world itself for that matter, from the DVD. You can also download real-time weather from the internet and use it within X-Plane simulations.

40 aircraft are included on the DVD, including the Hindenburg, Cessna 172, Bell 206 helicopter, the B-2 *Spirit* and SR-71 *Blackbird*, the SH-*Cirrus*, and the V-22 *Osprey*. But you're not limited to the included aircraft. You can download a large number of aircraft files created by other X-Plane enthusiasts, or create your own aircraft files for either existing aircraft or fictional designs. X-Plane reads in the geometric shape of any aircraft, including the airfoil and control surfaces, then figures out how that aircraft will fly. Yes, X-Plane can handle tailless aircraft. You can also create your own instrument panels.

As a result of this comprehensive programming, X-Plane is being used by aircraft manufacturers to test conceptual designs before finalization.

Being able to fly the Space Shuttle or maneuver an aircraft in the Mars atmosphere, while attractive, did not materially sway our purchasing decision. Rather, the final decision to purchase was made when we visited the X-Plane web site <http://www.x-plane.com> and saw that it was temporarily on sale, reduced from $50 to $39.

One caveat... before purchasing, make sure your current computer will handle the intense graphics demands made by X-Plane, and your computer can read DVD formatted data disks.

If you're looking for a very small lightweight five channel receiver, you owe it to yourself to investigate the SPF-5 RXO by Mikro Designs. Mikro Designs is owned and operated by Don McGlauflin. You may remember Don as the innovator who came up with the Sirius SmartCharge and Sirius SmartTest.

The SPF-5 RXO, while not dual-conversion, it exceeds AMA requirements and has proven itself to be a solid performer with exceptional resistance to interference and a range of over one mile on the ground.

It is digitally programmable for use with any FM transmitter brand, has five fully proportional channels, can be programmed so AUX can be either channel 5 or 6, and has built-in Elevon Mixing capability. The SPF-5 RXO can be used with lithium batteries. All this in a package just 1.00" by 0.65" by 0.40". Oh, yeah, it weighs just four grams with the GWS crystal. The price for this work of art is just $43.95. Watch for a complete review in an upcoming issue of *RCSD*!

Mikro Designs also puts out the same receiver with a 20 Amp ESC for $10 more. Be sure to check out other Mikro Designs items when you visit their web site at <http://www.mikrodesigns.com>.

B^2