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R/C SOARING DIGEST

Radio controlled

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About RCSD

R/C Soaring Digest (RCSD) is a reader-written monthly publication for the R/C sailplane enthusiast and has been published since January, 1984. It is dedicated to sharing technical and educational information. All material contributed must be exclusive and original and not infringe upon the copyrights of others. It is the policy of *RCSD* to provide accurate information. Please let us know of any error that significantly affects the meaning of a story. Because we encourage new ideas, the content of all articles 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.

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The Soaring Site

RCSD on the Web

This month, for their contribution to the electronic version of *RCSD*, special thanks go to:

Joel Lefkowitz, CT
A.B. Lyles, TX

As of June 11th, according to coolstats statistics, the June 2004 issue was downloaded 966 times. To date, the May 2004 issue has been downloaded 1187 times. This is a significant increase in readership, and can cause some irritating problems for some of you from time to time. Should you experience problems downloading please bear with us. For anyone that has a crystal ball, please let us know the magnitude of downloads that will occur in the next six months. For everyone else, your guess is as good as mine! We hope all of you continure to enjoy *RCSD* and special thanks go to those that have encountered difficulties and let us know!

One of the top referring sites is Michael Shellim's and he has a "Site of the Month" on his links page, which linked to *RCSD* this past month.

http://www.rc-soar.com
http://www.rc-soar.com/links.htm

This site contains a trememdous amount of information. For those of you with time to spare, which I don't have a lot of, you'll likely find this a site to bookmark for future visits. Thanks also go to Michael for his support of *RCSD*.

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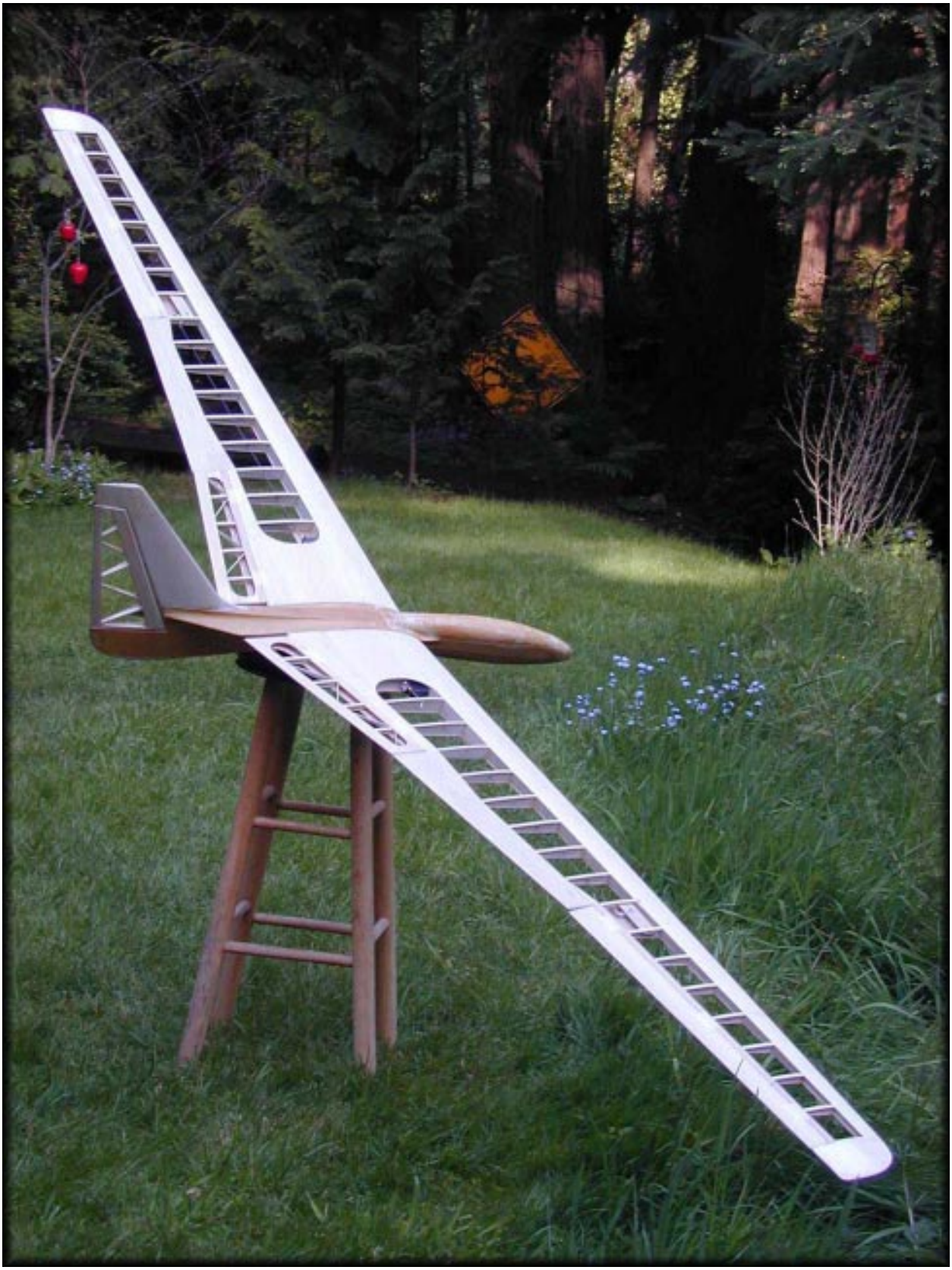
Wizard Compact 2x

Mirko Bodul's Wizard Compact 2x crankin' at the Bijou Hills near Chamberlain, South Dakota.

Photo by Greg Smith.



11. The completed Diva airframe, ready for final painting and covering.

Diva, Part 4

1. Diva's basic rectangular fuselage, ready for shaping.

on the Wing

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As mentioned in last month's column, construction of the Diva airframe has been completed for some time. As we receive so many questions about how to achieve a smooth aerodynamic fuselage from basic sheet and block construction, this month's column is primarily devoted to explaining how we accomplish that task. We've also included some photos of the completed framework just prior to painting and covering.

Fuselage structure

As previously explained, the fuselage consists of eighth inch plywood front sides, eighth inch balsa rear sides, and eighth inch top and bottom sheeting. The fuselage sides change from plywood to balsa in the area of the main spar. The initial rectangular cross-section is held together with triangle stock at the box corners. The plywood sides were cut to follow the eventual cross-section, the triangle stock was added, and then the top and bottom sheeting was glued on. See Photo 1.

The root of the wing does not meet the fuselage itself, but rather is butted against a fully sheeted root fillet. Creating this fillet was a task which involved a lot of 3-D visualization. The outer rib of course matches the wing root. The rib against the fuselage side is five inches longer (19") but retains the same contour dimensions as the wing root from the leading edge to the area of the section high point. The upper rear surface of this root rib is formed by a straight line from the high point of the profile to a new trailing edge point which is half way between the datum line and the airfoil high point. The

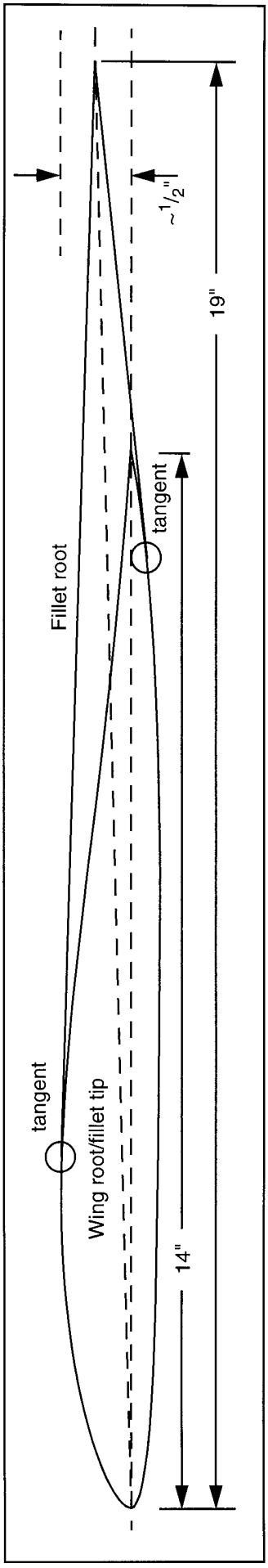


Figure 1. Diva wing fillet construction

lower surface is formed by a straight line from the new trailing edge point and tangent to the section lower surface. Figure 1 shows this construction process in graphical form. Photos 2 and 3 portray the completed fillet fairly well.

Fuselage shaping

The eventual fuselage cross-section from the nose to the maximum thickness point of the wing has a circular top and bottom. The nose is perfectly circular; in the area of the receiver and servos the cross-section has transitioned to flat sides and circular upper canopy and lower belly.

Transforming a rough rectangular structure into a shape with smooth rounded flowing lines is not at all difficult, just somewhat time consuming. We spent about six hours getting this fuselage into shape and ready to 'glass.

Our tools included a large X-Acto carving blade, #11 blade and a circular hollowing blade, a Stanley low angle plane, and coarse and fine PermaGrit attached to aluminum sanding bars with double sided carpet tape. The latter creates a lot of dust, so frequent use of our new Emerson Electric Stinger miniature shop vac was a necessity and worked extremely well. The Stinger also easily picked up the shavings created by the knives and Stanley plane.

Shaping the Diva fuselage is accomplished in a few simple steps. Maintaining the appropriate top and side views is a primary consideration. In the case of Diva, the plywood sides and attached triangle stock are used to get the balsa upper and lower sheeting to conform to the side view outline while the internal bulkhead and servo tray hold the structure to the top view outline.

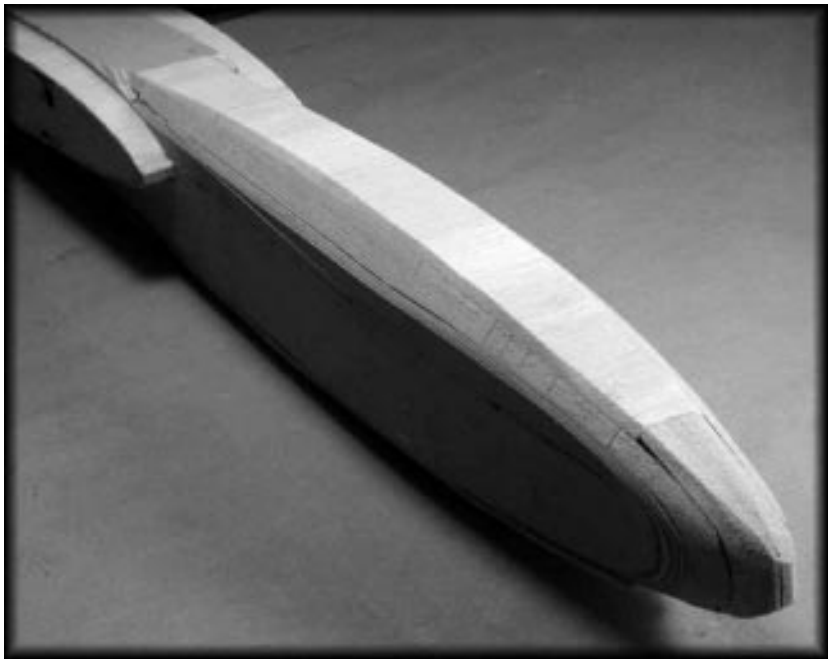
2. The wing-fuselage fillet viewed from the rear.

3. Another view of the wing-fuselage fillet. The rudder pushrod exits the fuselage just above the fillet.

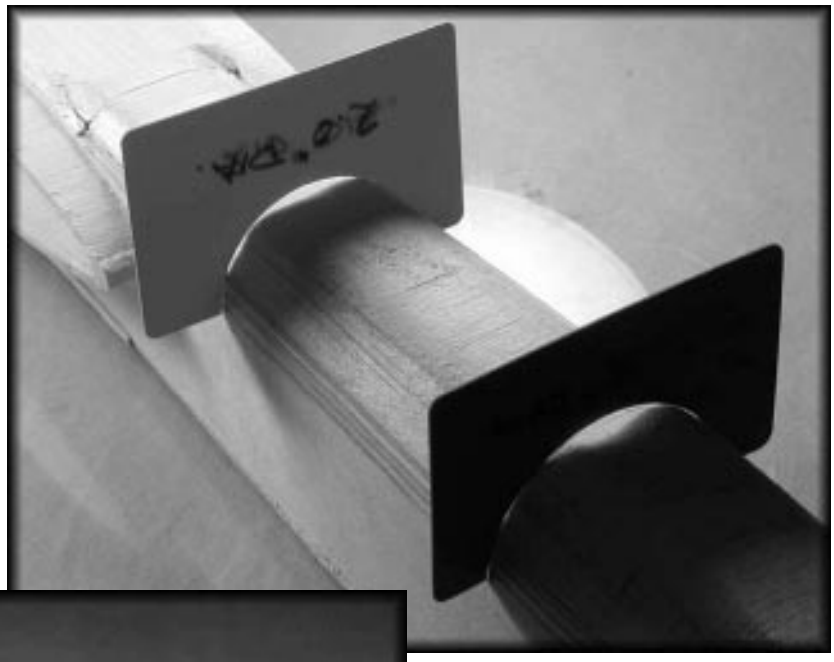
The first step in shaping the fuselage is to cut down the sharp corners at a 45 degree angle until the flattened crest is slightly higher than the eventual contour. See Photo 4. Progress can be judged by referring to the plans and watching the size and shape of the exposed triangle stock and seams.

The next step involves holding a rough sanding block at the appropriate angle and taking down the eight angles formed by the initial rough carving. Watching the shape of the shaded plywood layers and the exposure of the interior laminations is used to assist in getting the final smoothing just right. See Photo 5.

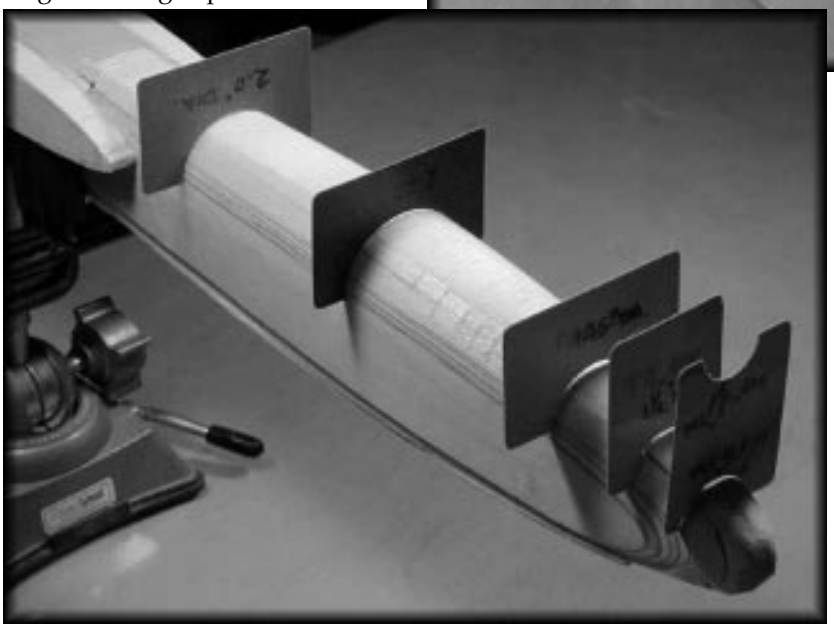
Templates can now be used to check progress. Our semicircle templates are made from plastic cards using brand new Forstner bits and are in eighth inch increments. Photo 6 shows several of these cards in position along the fuselage nose. In the cited Photo, the rear portion of the canopy near the wing is finished but, as can be seen by the sliver of light between the template and the fuselage, the front end still needs more work. A bare light bulb accentuates such differences, and creates shadows which assist in finding ridges and high spots.



4. Preliminary carving at 45 degree angle.



5. The initial template check following blunting of corners. A bare light bulb shows the gaps and creates shadows along the ridges.



6. Another contour check using the plastic templates. There's still some work to do near the nose.

The circular portions can be shaped to final contour with strips of sandpaper pulled over the surface, much as you would use a rag to polish the toe of a shoe.

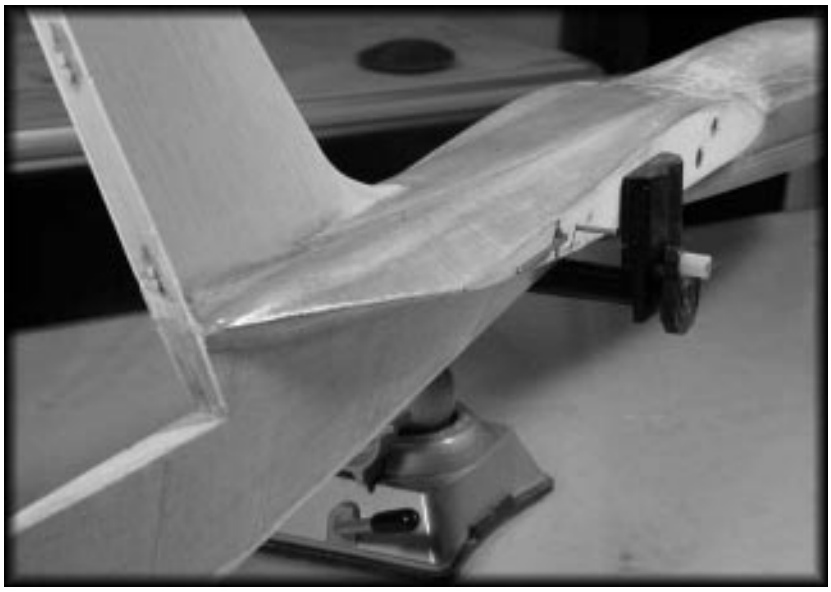
Once the fuselage met our template criteria, two layers of 'glass were glued to the fuselage bottom using thin CA. The first layer was relatively narrow, the second was wrapped up and onto the flat plywood sides. A single layer of 'glass was then glued to the fuselage top and wrapped down onto the flat sides. Light 'glass was applied to the bare wood sides and across the edge of the previously applied 'glass using clear butyrate dope. We usually use polyester resin for this task, but we found the dope to be a much more forgiving medium which held the gossamer weight 'glass to the balsa and plywood just fine. The thinned dope went right through the CA'd 'glass and bonded well to the underlying plywood and balsa. Because dope shrinks as it dries, it's important that any concave surfaces be CA'd so the fiberglass does not get pulled away from the substrate.

How durable the doped 'glass will be as it slams across freshly cut grass is yet to be determined, but the dried dope is certainly lighter and easier to sand than polyester resin!

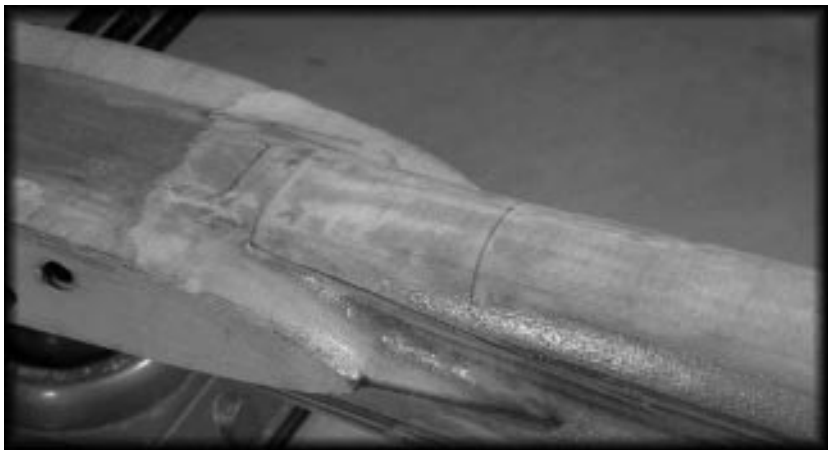
Now it's time to cut the access canopy free from the fuselage. We use the point of a single edge razor blade to penetrate a spot along the seam, then work the blade from one end of the seam to the other. In areas where the blade cannot make progress, we use a thin X-Acto razor saw which has been removed from its spine. It's important to work slowly with this tool, as it's easy to get off the seam.

Finally, we used the X-Acto

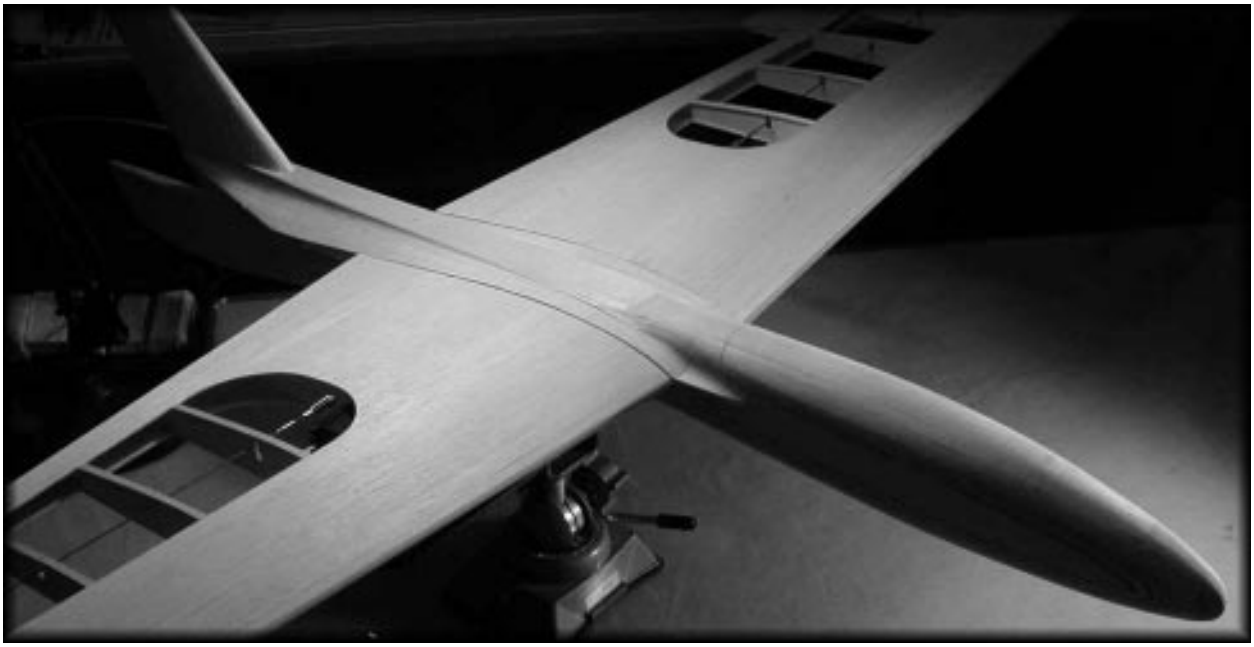
7. The preliminary wing-fuselage fit.



8. The completed fin and sub-fin framework.



9. The eighth inch plywood chines.



10. The shaped fuselage ready for 'glassing.

circular hollowing tool to carve out the excess balsa from the inside of the canopy, leaving a shell about an eighth of an inch thick. This interior hollowing provides clearance for the servo arms and room for additional protective foam around the receiver.

Details of the completed fuselage can be seen in Photos 7, 8 and 9.

Ready for painting and covering!

The wing root panels are very strong and rigid. This is not surprising considering the 14 inch chord, nine percent thickness, and the box spar system. The outer panels, on the other hand, are a bit more flexible than we had anticipated, but this is due to the relatively small chord - it tapers from seven to five inches - and will no doubt improve with covering. The entire aircraft can be easily supported by the two wing tips, and we're not planning to impose heavy flight loads.

The vertical fin and rudder are just as we had envisioned; the BTP8 airfoil worked out wonderfully well for this application. The rudder looks especially good, and is both light and rigid.

We're extremely pleased with the overall shape of the fuselage, particularly the fillet which provides the wing-fuselage junction. The small plywood chines at the leading edge provide quite an accent.

The fiberglassing with 0.6 ounce cloth went smoothly, due in no small part to the use of dope rather than resin to attach the cloth to the structure. There was no wrinkling of this light 'glass. The single layer of 1.5 ounce 'glass cloth made the removable canopy surprisingly rigid.

The last two photos, numbers 10 and 11, show the completed Diva framework with fuselage 'glass applied and just prior to painting and covering. For those interested, the weight of the airframe at this point, with all radio gear installed, was 50 ounces. We were aiming to have this be the ready to fly weight, so Diva is going to end up to be a bit heavier than we anticipated. But with 1,000 square inches of wing area the loading is going to be right around eight ounces per square foot.

Next time

The next installment in this series will cover painting and covering and initial test flying. Alyssa's already chosen the color scheme after looking at an automobile graphics pictorial in *Hot Rod* magazine, so finishing this sailplane is certain to be an interesting experience. The color photos she was perusing were sure impressive!

Don't forget, we're always available at P.O. Box 975, Olalla WA 98359-0975 or <bsquared@appleisp.net>.

TECH TOPICS

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Great Planes CG Machine Precision Aircraft Balancer

We've all been through it. You're at the field with a new creation and getting that anxious, gnawing feeling before the first toss. Even if it's an ARF, there's a certain amount of sweat equity, expense and pride at risk here.

Tall grass and level fields live only in the imagination of instruction manual writers. There may be a few guys raised on Guillow kits that believe that sort of terrain is out there somewhere. In our area, if there was grass on the field, Murphy mowed it the night before I got there. And under that grass are rocks and roots and cow flops.

The first flight (or toss) doesn't have to be a harrowing experience. There are tools that can lower the anxiety level. We discussed one of those tools a few months back: the Great Planes Laser Incidence Meter. This time we'll review the other half of the setup process getting the balance right with the Great Planes CG Machine.

Whether it's your own design, or a kit or an ARF, there is a preferred balance point for the aircraft/pilot combination. Once that's set to meet your flying preferences - and the decalage, warpage and wash-out are all correct - the first toss is much more likely to be successful.

I've used a homemade balancer for many years, a couple of pencils (eraser side up) stuck in a piece of 2 by 4. It's more accurate than the tips of your index fingers, but it's still not very good.

The Great Planes CG Machine determines the balance of your plane with a stable, accurate and relatively inexpensive instrument (~ $20). I've found it to be well designed and easy to use and it gives very repeatable results.

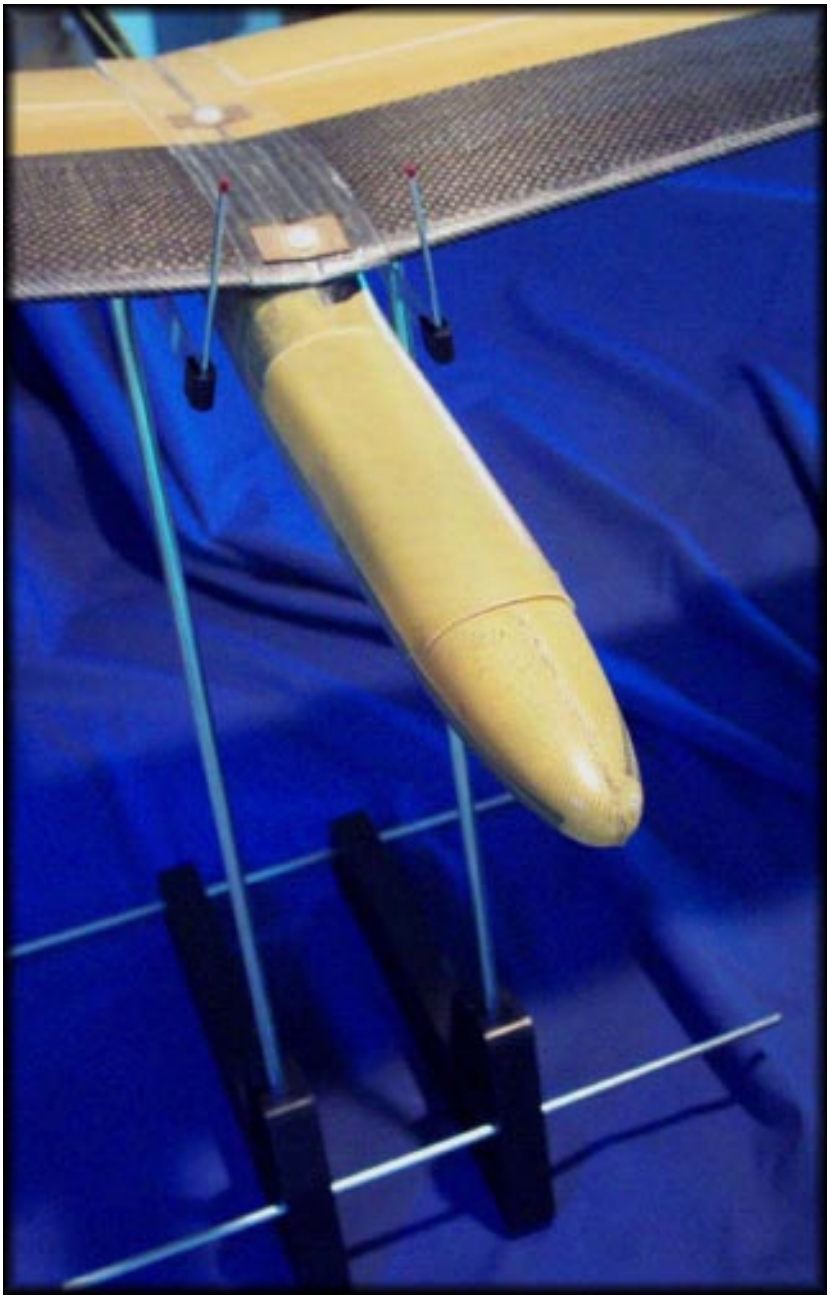
The parts out of the box are shown in Picture 1. Assembly is straightforward but I'd recommend reading the brief manual before getting started. Your knuckle-headed reviewer had to disassemble it to get one of the support arms going in the right direction.

Once you get the main struts pushed into the base pieces with the proper orientation, the rest of the assembly works fine. The unit is also supplied with a small bubble indicator for achieving a constant level reference while the plane is being balanced.

An example of the assembled tool is shown in the second picture. My XP-3 is pretty touchy on getting the balance just right. Based on the way it handles, it was probably a titch tail heavy. However, neither my finger balancing method, nor the pencils, were able to get the precision to better than about 2 to 3 mm.

After some trial and error, the CG Machine indicated that the balance was about 2 mm behind where I thought I had it set based on my pencil gauge. Although

that means a couple of more grams of lead in the nose, it did make a positive difference in the flight characteristics of the plane. For the record, my XP-3 balance point is now 69 mm from the LE at the root.



A technique I'll suggest for balancing sailplanes is to turn the support pads around on the CG Machine so the rulers are closest to the fuselage. This gets the reference point about an inch closer to the root than the standard setup.

For a Schuemann-Ellipse planform (tapered LE and straight TE), you could mount the rulers so they measure the distance from the TE. That's a more natural reference for this planform and is easily done with the CG Machine as long as the root chord isn't greater than about 10 inches.

In practice I've found it useful to set the rulers to the expected balance distance and then place the plane back in the mounts with the LE (or TE) snugged up against the ruler stops. This allows you to vary the balance position in 1mm steps to really fine tune things.

Why all the worry about balancing your plane, especially if you're happy with the way it works now? Well, if I damage the ship (highly likely) or change radio equipment, or build another one, I know exactly how to set it up. If I decide to add ballast, I also know where I should put it to maintain the aircraft's stability.

Knowing the static balance on your sailplane is also very useful for setting up the towhook position. I like my towhook directly under the balance point for good launch rotation. If the towhook gets about 0.25" or so behind the balance location, it gets real entertaining at launch time!

If you're setting up for a first flight, a rearward balance point is going to be a handful to fly at first. A forward balance will be more stable but less efficient in the air.

The Great Planes CG Machine does not have moving parts to wear out so it's going to last a long time. For the price, it's a small investment that will provide nice rewards for either fine-tuning your balance point or for taming down that first flight experience. But watch out for the cow-flops anyway!

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International Hand Launch Glider Festival
June 5 & 6, 2004
Poway, California

People & Planes

By Phil Barnes
(Reprinted with permission.)

The models flown at this year's International Hand Launch Glider Festival looked very much like the models flown last year. There has not been much new development.

My models this year were essentially the same as last year. The wing was an XP3 (Yeah, Denny, I know. I'm supposed to call them XP4 wings now.) core with just a slightly different layup and some other modifications. I use 1.0 oz. Kevlar instead of 1.7 oz. This saves a little weight which I put into stiffening the flaperons. I use Foamular 600 (higher density) foam aft of the hinge line. I use precured bias carbon (the expensive lightweight carbon) semi chord doublers on the flaperons and I install carbon torque tubes in the flaperon leading edges. Aerodynamically, the wing is just a stock XP4 wing. All the flaperon stiffening stuff I do is probably overkill even for me. My wing weighs the same as a stock XP4 wing, about 4.4 oz. (125g). The fuselage is the same Logic carbon and kevlar fuselage that I've used for many years with an Allegro tail boom. The tails are the usual DLG configuration with HT12 airfoils and a layup just like on the Supergee plan. All up weight is about 10.5 oz. (300g).

Paul Anderson may be the next guy to win this contest. At least he is just as likely to do so as anybody else you can think of. He was one flight away from winning it this year. last year he was the only pilot in the flyoffs to get all his times in all three rounds which propelled him to a third place finish last year. You have to see his demonstration flights during lunch breaks and before/after the contest to understand just how good his stick skills are. He was doing some 3D flying with a foam electric model that just defied belief. Paul's hand launch models this year looked like they might be Raptors. They were fiberglass over blue foam wings.

Joe Wurts is still king of hand launch in my opinion. He's been beaten two years in a row by interlopers from the East now, but that's a long way from erasing or overshadowing his eight wins. Joe still reads and flies air better than just about anybody, certainly better than me. I think there are some people around now who are close enough to him that he needs to fly real well without mistakes or he leaves the door open for someone else, having a good day, to walk through. I suspect that Joe will have his game face on next year and will be especially tough to beat. Joe, of course, flies Encores.

Bruce Davidson flew very well this year. He was actually in first place going into the flyoffs. If not for some difficulties in the first flyoff round, Bruce could have won the whole thing. Maybe it was those two nice new XP4s that Bruce was flying. Bruce also had a Photon as a backup model.

Speaking of Photons, those are some pretty impressive looking models. The craftsmanship is amazing. They may give up something on launch and/or penetration (at least I read that somewhere) but they certainly would be a good choice if you wanted to fly a poly model. I do know that they were good lift markers at this contest. They also have very strong wing leading edges, by the way. I mid-aired one of them on Friday with my number three model. Not a scratch on the Photon but my wing needed actual shop repairs to be flyable again.

Tom Kiesling has been steadily improving over the last three years. He has always been an excellent flier and air reader. He has been world class in those areas for a long time. His launch has kept him back in the past. At this point his best launches are high enough to be respectable. He still has moments of "low launch-itis" but he is getting more consistent and those moments are becoming more rare. When you combine Tom's air reading and thermal flying skills with even just a respectable launch, you get a strong contender. Tom has been my timer for the past two or three years. He has taught me a lot already about air reading; he's been trying to teach me about proper rudder usage in thermal turns and, lately, how to keep my thermal turns smooth by not "porpoising" the model with excess elevator inputs. He also tries mightily to keep me from doing silly, brain dead things like flying into power lines and forgetting the task while I fly. Tom flies models very similar to mine. Modified XP4 wings just

like mine on a Logic fuse with tails that Tom bagged himself. In fact I copied my tails from Tom's plane. Tom actually was the first person that I know of to fly the new Drela DLG airfoils. I bagged a set of wings for him early on and sent him a Logic fuselage. Tom built his own tails. I developed The XP3 wing from that first wing that I sent to Tom. When I built my first Drela foiled DLG model I just copied Tom's tails and have been flying that design ever since.

Art Markiewicz is a fun guy to have at a contest. He has a great sense of humor and keeps people smiling all day. He is also a great flier and scratch builder. He flies very distinct looking models with anhedral stabilizers and a fuselage with a drooped nose. I think these features are more style than substance but you always know when you are looking at Art's model. Art is one of those world class thermal fliers that you fear being in the same flight group with.

Mike Smith was flying XP4s.

Mark Drela was flying his Supergees, of course.

Gordon Jennings flew Encores.

I don't actually know what Jim Pearson was flying but you might expect him to fly Encores.

That finishes out the top ten pilots and their machines but I will not stop there. There is a sort of friendly rivalry that has developed between the East and the West coast pilots. So I must point out the performance of the rest of our East coast crew.

The East coast (we count Bruce Davidson as East coast) put four pilots in the top ten this year but we also had two "bubble boys" in 11th and 12th place.

Oleg finished in 11th place but you should not think that he is a "has-been." Oleg will be back next year. He had some bad luck this year on Sunday. On Saturday he was only about four points off perfect with a drop. We think he suffered from distractions this year because he was traveling with his family. He is a lock for a high finish next year. Oleg, of course, flies Taboos.

Don Vetter finished 12th. He is also a good candidate for a top ten finish next year. This year's conditions did not favor Don's flying style. I keep trying to get Don to fly more aggressively, his natural style is to be more cautious. This year's conditions required some very aggressive flying at times. I think Don will continue to improve and be even more of a threat next year. Don flies fully scratch built models with Supergee airfoils on his own Logic style fuselages.

Russ Bennett is one of our top East coast pilots. He finished in 19th place. Russ was the best in our area in the old javelin launch days. He has only flown DLG for a year or two and is still getting up to speed with that. This was his first IHLGF. It takes some time to get used to Poway conditions and to get over being overwhelmed or "psyched out" by the big contest. Russ will do better next year just because it will be his second year. He will probably also continue to improve with DLG in general. He has not yet learned to use his full potential and to use the full performance envelope that DLG launches give him. Russ has always been one of my favorite timers for hand launch and he did a great job timing for me in the flyoff rounds this year. Russ flew an XP4 and a Taboo I think.

Jan Kansky is a club mate of Mark Drela up in Boston. I know he is a good thermal duration pilot having flown with him on the ESL circuit. I've never seen him fly DLG before but I hope he sticks with it and returns to Poway next year. Jan flew XP4s to a 25th place finish.

The invasion from the east will continue next year and I think will only grow stronger. You west coast guys should think about recruiting. I have heard stirrings that maybe Daryl Perkins is thinking about DLG. You guys could use him.

The International Hand Launch Glider Festival is not all about flying. It is also a good place to meet people that you usually only get to talk to on the net. I've had great fun talking about scratch building with Encore builder Phil Pearson for instance. Aradhana Singh Kalsa was there with his family. He had some of the best looking, most authentic Supergees I've ever seen. He is new to DLG flying but is a great craftsman.

The IHLGF is an event that draws the best hand launch people (and scratch builders) from a very wide area and is something well worth the trip for anyone with those interests.

• • •

Calculating Servo loads

Mark Drela

Q: I have not been able to figure out the basis behind the Multiplex servo load calculator. It seems to sometimes give bizarre results.

A: I'm not sure what's the physical basis behind the Multiplex servo load calculator.

A very reliable way to compute a control surface hinge moment is with Xfoil. Alternatively, it can be accurately estimated. The only assumption which must be made is the pressure load $\Delta(p)$ on the surface. Almost without exception the loading is triangular, having some maximum at the hinge and decreasing linearly to the trailing edge. The maximum at the hinge will be some multiple of the flight dynamic pressure q:

$$\Delta(p)_{hinge} = dCp * q$$

where the multiplier "dCp" depends mainly on the flap deflection and somewhat on the airfoil shape. The maximum dCp which can be attained with maximum deflection is typically about dCp = 1.5, which might correspond to a 60+ degree flap. For typical aileron, elevator, or rudder deflections, assuming dCp = 1.0 is more reasonable.

In any case, with the appropriate dCp chosen, figuring out the hinge moment is a matter of algebra. It also necessary to know the airspeed, or equivalently, the level-flight aircraft CL. The final result is

$$M_{hinge} = W\, c_{flap}\, (S_{flap/S})\, (dCp/CL) / 6$$

W = aircraft weight
c_{flap} = flap chord
S_{flap} = flap area
S = aircraft reference area (i.e. wing area) CL = aircraft CL (i.e. wing CL)
dCp = load factor
= 1.5 for 90 deg flap
= 1.0 for large control deflections
= 0.5 for modest control deflections

The moment that the servo sees will typically be smaller than M_{hinge} by the ratio of servo/flap horn lengths.

As an example, here's the aerodynamic hinge moment calculation on the flaperon of a 1.5m HLG:

W = 8 oz
c_{flap} = 1.75 in
S_{flap} = 48 in^2
S = 350 in^2
CL = 0.05 (very fast 40 m.p.h. glide)

dCp = 1.0 (airbrake deflection)

-> M_{hinge} = 6.4 in-oz

With a 0.4" servo horn and 0.6" flap horn, the servo will see

$M_{servo} = M_{hinge} * 0.4/0.6 = 4.3$ in-oz

A stiff hinge will of course add to this. An HS-50 should work, but it won't have a very large margin.

Announcement

Team USA F5D
www.teamusaf5d.com

from Gary E. Freeman

<http://www.
teamusaf5d.com/news.asp>

San Diego, California

After grueling team trials, against top-notch contestants, the three most accomplished and skilled pilots were chosen to represent Team USA F5D at the World Championships to be held in York, England, in August 2004. Danny Kane, Travis Flynn and Troy Peterson were selected as the pilots for 2004 Team USA F5D, assisted by Tim Lime, team manager, and Gary Freeman, Jr., team caller.

Team USA F5D is seeking sponsors to cover expenses, approximately $3,000 per person, to make the trip to York, England this summer. Supporters will be recognized by name and company name on the official team web site, <http://
www.teamusaf5d.com>www.teamusaf5d.com>.

The team considers it an honor to represent the United States at such a prestigious event. Thank you for your contribution to help us bring back the gold. If you have additional questions please feel free to contact the team members listed below.

Travis Flynn, Burbank CA, Pilot
818.209.0791

Danny Kane, Chicago IL, Pilot
Troy Peterson, San Diego CA, Pilot
Tim Lime, Phoenix AZ, Team Manager

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THE WINCH SCENE

Winch Launching Sailplanes, The Throw

by Anker Berg-Sonne

Frame 1

Frame 2

Frame 3

Frame 4

Frame 5

Winch launching a sailplane has three stages: the throw, the tow, and the zoom. Of these, the tow is the easiest to master, and is easily learned with a little coaching. The zoom can be avoided entirely and learned gradually. But the throw is mandatory, and bad throws destroy more planes than any other part of the launch. Personally, it took me quite a few years to throw the plane properly, and I found learning better techniques for throwing counter-intuitive and intimidating.

With captured video tape frames I'll try to illustrate the most common throwing mistakes and also show the throwing technique that I have learned and now use.

If left to their own devices, right-handed pilots will pulse the winch with their right foot and hold the plane with their right hand, and lefties will use their left hand and foot. You can't do this and execute a decent throw. Frames 1 through 5 show me throwing the plane with the technique I used my first 13 years as a pilot. On frame 1, I have my right foot on the winch pedal and my right hand around the tail boom of my Mantis. Notice how I need to lean back to balance the winch tension. Imagine what would happen if the line broke! Also, all I can do to throw is extend my elbow. That's not going to give the plane a lot of speed. I am totally dependent on the winch line to pull the plane up to flying speed. Until the plane reaches flying speed I am at the mercy of any wind gusts. The last point I'll make is that holding the tail boom does not give me much ability to resist wind gusts that try to lift a wing. On frame 2, I am half-way through the "throw," and on frame 3, I have just released the plane. On frame 4 and 5 the plane is rotating into the tow. This was a windy day so the plane quickly reached flying airspeed. On a calm day the plane would not have started climbing before disappearing out of the picture.

The next six frames show the throwing technique I use now. In frame 1, I have just started tensioning the winch line. Instead of pulsing the winch with my right foot, I have my left foot on the pedal. This allows me to rotate my body to the right and extend my right arm behind me, almost parallel to the winch line. I can hold a lot more tension this way than I can by bending my elbow. I have also put my right foot way behind my left foot which steadies me and eliminates the need to lean against the winch tension. I can almost stall the winch without losing control over the plane. Lastly, I have my hand around the fat part of the fuse, which gives me a much better grip than before.

On frame 2, I have started the throw. I am rotating my body and my arm is beginning to come straight over my head. It is important to keep the arm straight and have it come over you head. Otherwise you may hit yourself in the back of the head with the wing. I have seen this happen, and it gets pretty nasty - pretty quickly. On frame 3 my arm is getting close to the vertical. The plane is reaching flying speed, and I still have a pretty good grip on the fuse. On frame 4 I have just let go. The plane is at flying speed and is just beginning to rotate. On frame 5 the rotation is well under way and the tail is still behind my head. On frame 6 the rotation is almost complete and the plane is climbing rapidly.

Frame 1

Frame 2

Frame 3

Frame 4

Frame 5

Frame 6

As I look at the video, I can see two improvements I could make. The major one is to point the nose a lot higher during the throw. The plane has plenty of speed to climb at release, and the time to rotate from the horizontal is a waste of energy and winch line. The other improvement is to extend further back and down as I tension. I feel like I am extending further, and am surprised to see how little it really is on the video.

The next few frames show an alternate technique, as executed by Fritz Bien. He is more comfortable throwing with his left hand and pulsing with his right foot, so he is turned the other way. Fritz doesn't extend as far back as I do, and he doesn't throw with a straight arm over his head. I believe he has a physical problem that prevents him from doing it, so he has to tilt the plane to avoid hitting himself in the neck with the wing.

Frame 12

Frame 13

Frame 14

Frame 15

Frame 16

Next, a few frames that illustrate some of the issues I have covered. The first two show the plane just after release and next when it starts rotation. You can see that the plane hasn't gained any altitude because it isn't flying. It is simply being pulled along by the winch tension.

Frame 1

Frame 2

The final frames are really interesting. On Fritz' first launch with one plane, none of the servos in one wing were working. You can see that the plane rotates violently to the right. But because the plane rotates quickly and has high speed on release, he has enough altitude to deal with the problem and save his plane.

Frame 19

Frame 20

If you are intimidated by a complete change in throwing technique, try changing one thing at a time. Start by pulsing the winch with the opposite foot, but without changing your grip and throw. You will be surprised at how easy it is. When you have become used to this, start gripping the fat part of the fuse and making the full turn. Just make sure you don't make a half turn and whack yourself in the neck. Think straight arm, over the head!

Once you have mastered this technique you will be rewarded with higher launches and fewer "interesting and entertaining" incidents at the start of your launches.

Frame 21

Enjoy / Anker