Radio Controlled Soaring Digest

October 2006
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Front cover: Andy Page, Seattle Area Soaring Society, readies to launch his Samba Model Pike Perfect at 60 Acres South. A review of the Pike Perfect by Andy and Jim Laurel begins on page 4 of this issue. Photo by Jim Laurel. Canon EOS-1DS, 1/250 sec., f16, 16mm.

Back cover: Taken at the Mississippi Valley Soaring Associations Gateway Soaring Open.It was quite windy with a quartering crosswind coming in from the right of the winch. As D.O. Darnell started to tension the winch and commit to the launch, Johnny Berlin got hit by a gust that lifted the right wing. D.O. had committed to launch and the left wing tip tapped the top of Johnny's head and the model smacked into the ground about 15 feet in front of the photographer, Mark Nankivil. "I was laying on the ground for the shoot, and as I took the shot, I started rolling towards the winch line as the wreck was dragged a ways. It wasn't too close to me, but after that, I stayed on the upwind side of all launches!"
Canon EOS Digtal Rebel, 1/320 sec., f11, 50mm

R/C Soaring Digest

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

In the Air

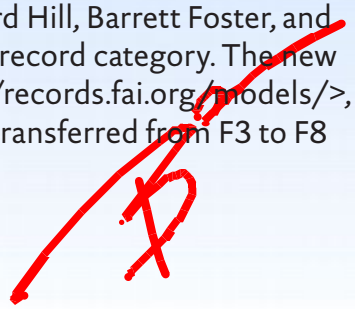
We've upgraded our computer systems, and the upgrade has forced us to abandon Adobe FrameMaker and adopt Adobe InDesign for publishing *RCSD*. After using FM for nearly 15 years, the transition to an entirely new creative tool has been a challenge. On the positive side, InDesign offers a number of exciting possibilities for magazine layout in comparison to FrameMaker, which focused on the technical writing environment. It may take a while for us to mentally transition to the new software, but InDesign promises to open new vistas for *RC Soaring Digest*.

In response to a recent *rcsoaringdigest* Yahoo! group survey, we've altered the way we use typefaces, starting with this issue. If you read this issue on a computer monitor, you should see a big difference.

Dave Locke's description of the development of his Yeti sloper provides *RCSD* readers with another example of molding techniques, and acts as a complement to Phil Pearson's series on production of the Maple Leaf Designs Encore. We believe we've already talked Dave into writing a full description of his CAD and CAM techniques for future issues.

In the news, FAI has officially recognized autonomous flight (as the trans-Atlantic flight by Maynard Hill, Barrett Foster, and David Brown), and has created a new record category. The new category, F8, is now available <http://records.fai.org/models/>, and two previous records have been transferred from F3 to F8 (7882 and 7883).

Time to build another sailplane!



SAMBA model

Pike perfect

A review by Jim Laurel and Andy Page

For years we've wondered what Samba Model would do to improve on its already outstanding Pike line of sailplanes. The Superior is a true champion, helping its pilots earn sweeping victories in contests across Europe and North America.

But while the Superior excels in windy and turbulent weather, many feel that it leaves something to be desired in the light lift conditions of early morning and late afternoon.

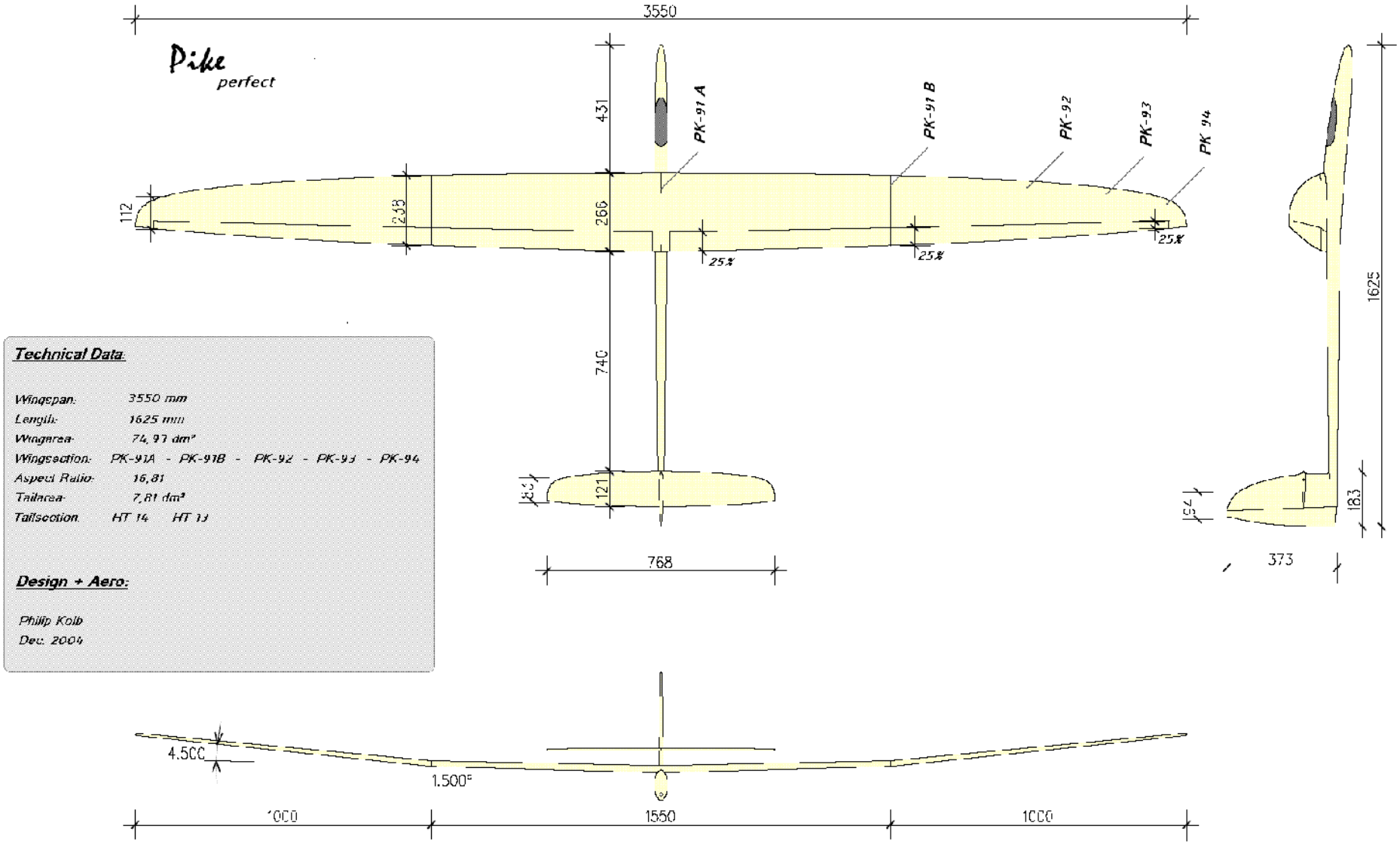
Designer Philip Kolb set out to create a model with optimal performance over a wide range of conditions, combining the floating abilities of large sailplanes like the HKM Sharon, with the maneuverability and launching capabilities of smaller planes like the Pike Superior. The result of his efforts is Samba Model's newest addition to their lineup: The Pike Perfect.

We purchased our Perfects from Bob Breaux at Soaring USA. Bob is setting a new standard for customer service and all around excellence. This isn't just hype. Those who know us will agree that we don't throw praise around lightly. The Soaring USA crew are friendly and efficient people who will make your buying experience fast and painless.

Our shipments arrived as promised and we were immediately impressed with the care with which they were packed and shipped. The planes were bubble wrapped inside heavy cardboard boxes reinforced with 1x2 wood stiffeners along their entire length and height. The boxes were well marked with large colorful stickers and markings to help ensure proper handling.

The Pike Perfect is a typical molded model, with little to do aside from mounting the radio gear. If you're familiar with the Pike Superior, you'll be right at home.

Pushrods are preinstalled and attached at the rudder and elevator. The servo tray is installed and precut for servos. We used the JR DS-3421 for the elevator and the JR DS-368 for the rudder, which fit perfectly. In the parts bag you will find brass horns for the flaps and ailerons, pushrod end fittings and clevises for the rudder and elevator, hollow carbon wing joiners (very cool), wing servo covers, wing bolts, and allen wrenches for assembly and towhook adjustment. Our Perfects also included the optional ballast kit and wiring harness.



There's an old adage that says that "if it looks right, it will fly well". In a market crowded with outstanding molded gliders, saying that the Pike Perfect looks right is an understatement. We'd been drooling over the photos on the Samba website for months, and when we finally got them assembled, we found ourselves saying "Now this is how a sailplane should look!" With its gorgeous planforms, generous vertical tail area and dihedral, sexy fuselage lines, and a long drooped nose, the Pike Perfect is the hot chick at the party.


Pike Perfect

The Perfect exhibits the excellent fit and finish typical of Samba products. It could just be the new molds, but our planes seemed a cut above the Superior in terms of finish quality. We did find a few minor imperfections, but some of these are always inevitable. Ours had a few rough edges around the wing saddle and servo wells. Paint on one of the fuselages is a bit light on one side.

Manufacturers of these high-end models walk a fine line between finish quality and light weight. But we think Samba has struck a good balance with the Perfect and the quality is outstanding where it really counts, such as the wing leading edges, the fit of mating surfaces, etc. However, we both found out the hard way that our planes had some hardened carbon shards inside the nose – ouch!

The wing joiners are hollow and very lightweight. Each wing panel joint has two incidence pins and the fit is extremely good.

The ballast system is interesting. At first, the rumors were that Samba would be using the Icon style ballast system of concentric tubes. The Icon's ballast system is so simple, sensible and foolproof that it's a wonder manufacturers bother with anything else. The Perfect's ballast system consists of two solid rods, one made from aluminum (6 oz.), the other from copper (20 oz.). This gives you three possibilities: no ballast, light ballast (aluminum, +0.75 oz/ft^2 wing loading), and heavy ballast (copper, +2.5 oz/ft^2 wing loading).

The Perfect comes with three pages of simple instructions, which mostly cover servo requirements, kit inventory, and detailed setup guidelines.

The only omission from the instructions that has been an issue concerns the proper insertion of the joiners. They must first be inserted into the tip panels to ensure proper alignment of the joiner kink with the wing panel end. Putting the joiners in the center panel first can result in small cracks in the non-structural fill around the joiner opening on the end of the center panel. Though these cracks are not a practical issue, they are unsightly and Samba should really consider adding this bit of detail to the instructions.

The Perfect is an advanced plane for advanced pilots, so most people who purchase this plane will know exactly how to proceed. Getting the plane in the air only requires installing radio gear and programming your transmitter. But even seasoned moldie builders can mull over things like optimal linkage geometry and servo choices for days.

We color-coded the hollow carbon wing joiners to eliminate confusion at the field. This is a good reminder to put the joiner into the tip panel first.

The two incidence pins provide an extremely good fit between the outer wing panel and the center panel.

We mounted all the wing servos with servo frames from Craig Greening.
<http://www.servoframes.com>

Adequate flap deflection is not a problem on the Pike Perfect. The control system is completely internal, and although the hinging may be tight, the servo load at full deflection lessens with use.

Rudder JR DS-368 and elevator JR DS-3421 servos installed. There's sufficient room for all the control system mechanics to remain clear of the fuselage sides. Wiring from six servos comes into the receiver compartment at the front. The front open end of the ballast tube sits right behind the servos.

We installed the following gear in our Perfects and this equipment turned out to be darn near…well…perfect.

Equipment complement:

Aileron servos: JR DS-168
Flap servos: JR DS-3421
Elevator: JR DS-3421
Rudder: JR DS-368
Reciever: JR R790 PCM Scan Select
Battery: 4-cell (2x2 stick) GP2000 from Hangtimes Hobbies
<http://www.hangtimes.com>

We mounted all the wing servos with servo frames from Craig Greening (http://www.servoframes.com). Craig's servo frames are well worth the money and the few extra grams of weight (4 grams per servo including screws). They make servo mounting quick and easy and permit servo changes in the field. Best of all, they eliminate the need to custom fabricate plywood mounting plates.

(Continued on page 14.)

Setup and Flying
Andy Page

Setup

I won't claim to be expert enough to tell you how to set up your Perfect, but here is what works for me.

I've never been one to use expo or dual rates. I've just never felt the need for it. I like large control throws. I just don't move the sticks as far when I want small inputs! With flaperons (flap throw 1/3 of aileron throw) the Perfect does nice axial rolls but doesn't feel too twitchy for thermalling. Sure, it handles like a sportscar, but there is nothing difficult about it. With zero aileron differential and about 50% rudder mixing, there is little adverse yaw. I like to turn off rudder mixing in sustained turns such as when thermalling, and even in this mode coordinated turns seem easy and natural with zero differential.

I'm using a JR XP-8103, and find it completely adequate. Maybe I'd miss flight modes if I used them for a while, but I don't mind working the elevator trim and flaps as needed. I'm also the kind of flyer who feels confident enough to get the setup "close enough" and then just adjust the stick movements to whatever it takes. Admittedly, there are some features of the 9303 that could be handy on any high end sailplane, but potential Perfect owners need not be concerned about using an 8103.

Where to put the CG?... isn't that always the burning question? Without the benefit of another model at the field for comparison, I scoured the web for comments on some of the early pre-production Perfects and arrived at a rather large range of reportedly acceptable CG locations. The most conservative is in the instructions, at 105mm. The most aft location found was 121mm. I simply marked a 110mm-120mm range on the fuselage right at the wing intersection and did my usual low tech fingertip balance to ensure that it was within this range. With my choice of equipment, I'd guess that the Perfect needed about an ounce of lead shot in a small ziplock. I was able to easily make a few adjustments at the field to get the handling how I like it. I typically don't measure my final CG location. Once it flies the way I like it, I stop adjusting. The number is inconsequential. I have to say that the model behaved very well in steep turns at all CG's tested – I just found straight line cruise to be more settled at my final location.

The towhook location looked reasonable right out of the box on my model, so I did the initial flights without adjustment. After a few sessions, I felt that the launches could be a bit steeper. A tiny move aft, and a click of downtrim during launch, and I am now getting very steep climbs right out of the hand.

Flying impressions

The handling is simply outstanding. In steep turns or slow speed maneuvers, you have to try to get it to stall. No kidding, there just is no tendency to drop a wing. When you finally yank it hard enough to stall it, the result is gentle. This is the sweetest flying plane I've ever flown. With my less than spectacular eyesight, great handling is worth a lot when working distant thermals. Up close, great handing is a joy to fly, and a joy to watch.

I've only used the ballast once just to see what it was like. With the 20 oz. copper bar installed, the top end speed was blinding, and the low end didn't seem to change as much as expected.

The Perfect slows way down for such a large plane. It seems slower on approach than my Superior did. The crisp, predictable handling makes it easy to land accurately even in gusty conditions. In my first contest with the Perfect, my landing scores were well above my typical average (well ok, that inverted downwind landing wasn't so hot… but it was accurate!). The SK-5 skeg from http://www.superskeg.com/ fits, er, perfectly.

I find myself ranging much farther with the Perfect than with anything else I've flown. No doubt this is due to a combination of factors such as increased confidence due to the excellent handling and visibility, as well as the Perfect's inherent outstanding efficiency and top end speed. Whatever the cause, the effect is a better soaring experience.

I love this plane!

Setup and Flying
Jim Laurel

Setup

My usual approach to setting up a new sailplane is to follow the manufacturers recommended specifications as closely as possible as a starting point. From there, I make changes to the programming iteratively, until I arrive at what works best for me. Your final programming is a matter of personal preference, but I think it's only sensible to at least use the manufacturer's specs as a baseline.

Looking at the setup specifications from Samba, it was clear to me that the designer intended for this plane to be set up with flight modes. The specs call for differing levels of differential and rudder mix for each flight mode. For example, in cruise mode, the specs call for zero aileron differential, while in launch mode, they call for 100% differential!

I fly with a JR XP-9303, which is ideally suited to a plane like the Perfect. I was able to create the recommended flight modes easily and without any special Sherman Knight-style hacks. When JR designed this transmitter, they really paid attention to the needs of soaring pilots. Unlike Andy, I do use dual rates because I like to have a secondary mode with reduced throws for the ailerons and elevator, which helps me fly a little smoother in light conditions. I usually set the high rate position (switch position '1' for me) at the manufacturer's recommended throws, then dial back the low rate position (switch position '0') to 75 or 80% of max throw.

I measured my fin with a digital caliper and marked the "neutral" point as per the specs. The specs also give elevator positions for launch, landing, etc. I programmed all these into the various flight modes on the 9303. The elevator-flap compensation curve is always tricky and I use one that Sherman Knight helped me develop years ago. I have this curve saved as part of a generic template that I use for all my unlimited planes. It's usually close and just takes a little tweaking to get it just right.

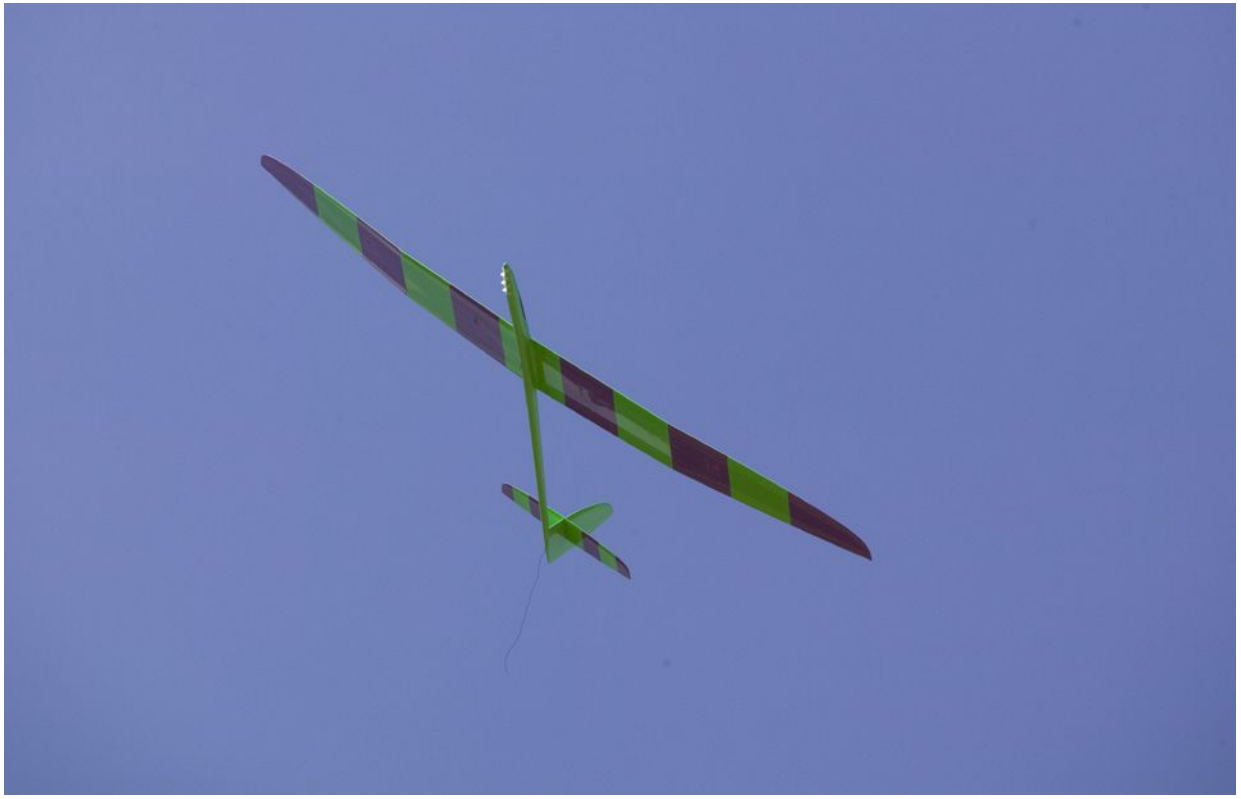
Using a Great Planes CG stand, I put the CG at the recommended 109mm, which I found much too far forward for my taste. I ended up back at 115mm and the plane required about 3/4oz of lead shot mixed with epoxy to balance there. (Note: Don't epoxy weights into the nose! I get the weight right, then mix lead shot with epoxy in a non-lubricated condom, which I drop into the nose and let cure. This gives me a nice weight molded to the inside of the nose that I can remove later) With the CG at 115mm, my plane recovers very slowly from a dive – maybe a little too slowly. Others who have flown my plane have commented that it's a little too neutral for them, but of course, it's a matter of personal taste.

Flying impressions

When I first saw the Perfect 3-views and read Philip Kolb's design essay, I was reminded of the Maple Leaf Icon. A legendary design by Joe Wurts, the Icon is one of the most successful unlimited class sailplanes of all time. To the layman's eye, the Perfect, with its large wing area, nearly elliptical planform, and moderate aspect ratio and long tail moment seems to have more in common with the Icon than with it's own stable mate, the Pike Superior. Indeed, the Perfect seems to echo many of the good ideas that Mr. Wurts designed into the Icon years ago.

And indeed, the Perfect's handling is reminiscent of the Icon. As an experiment, I tried some of the Perfect settings on my Icon. Zero differential for cruise, 100% for launch, increased rudder mix, etc. I was amazed that the handling of the Icon improved immensely. And while the handling is not as sharp as the Perfect, and it's not nearly as fast, the Icon holds up well in comparison and feels similar in character.

The Perfect is a dream to fly. Cross a Pike Superior with an Icon, add some wingspan and you'd get a Pike Perfect. The Perfect combines the Superior's speed and agility with the Icon's forgiving handling. Cambered up, it will hang in light lift almost as well a Thermal Dancer. You can stand this plane on a wingtip and circle in low thermals effortlessly. Stalls are gentle and progressive with no tendency to drop a wingtip. It pulls hard on tow and zooms are



Jim's green Pike Perfect turns overhead. The clean lines illustrated in the 3-view are even more stunning in three dimensions.

every bit the equal of the Superior. This is one plane that just seems to do everything well.

Approaches with the Perfect are smooth and predictable. The large flaps really slow it down and allow you to drop it right on the mark. In fact, the flaps are so effective that I rarely find myself using more than about 50 degrees of deflection.

One of the most remarkable things about this design is how little adverse yaw there is, even with zero aileron differential. It's there, but you almost have to look for it. A high degree of rudder mix helps, but I find that I prefer to actively fly my rudder manually, which eliminates the adverse yaw altogether.

Over the last few years, I have flown the Maple Leaf Design Icon and the Pike Superior extensively. I always loved the ability of a well-dialed Icon to hang out in light lift, along with its foolproof handling and low pilot load. But on windy days, I always reached for one of my Superiors. The Superior's pinpoint handling and ability to slice through turbulent air is a real benefit in these conditions.

I think Philip Kolb and Samba have hit a sweet spot with the new Pike Perfect. Though it was designed for F3J competition, it will also prove to be ideal for American TD contests, which typically don't allow switching planes during a contest day. For the first time, I'll be able to reach for a single plane at the start of a contest day and not agonize that the wind may come up or that the conditions may go light.

The evolution of the high performance RC sailplane? From left, the Pike Perfect, a Pike Superior, and an Icon. The wing and horizontal stabilizer planforms of the Pike Perfect appear to be intermediate to the Superior and the Icon. From a performance standpoint, the Pike Perfect demonstrates the best attributes of both.

Andy's antenna exits through a short length of shrink tubing glued to the fuselage side with thin CA. The tubing is not shrunk, allowing movement of the antenna when the receiver is moved.

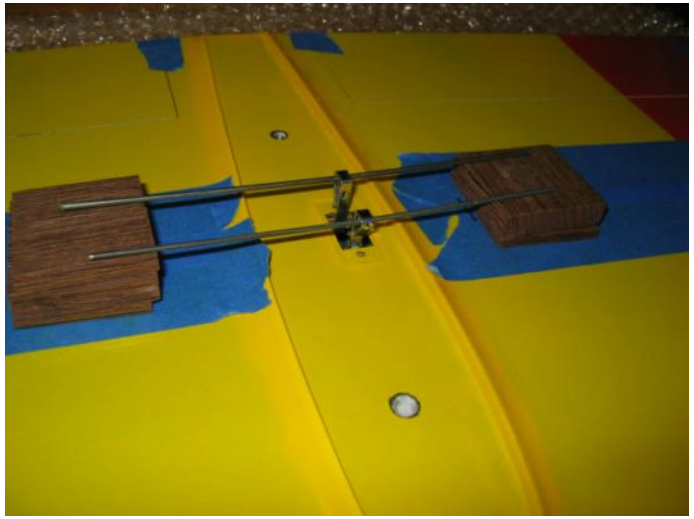
As with the Superior, the supplied wiring harness doesn't fit into the wing center section without bending the solder lugs on the DB9 connector. Bending those lugs gives an uneasy feeling, knowing that your shiny new toy is going to depend on the solder joints you are now stressing. It would be nice if the solder lugs could be bent before soldering, like on the Tragi 705.

Also, mounting the DB9 connector to the center section is tricky, as there is no backing material to screw into. You'll want to glue some small squares of 1/16" ply behind the screws to hold the connector in place, but getting them in there is a real bugger. Perhaps Samba could include ply backing plates during the wing layup.

The Perfect uses the same materials and construction techniques as on the Superior, with all the attendant radio interference issues. The fuselage is made from a carbon Kevlar weave, which acts as a Faraday cage, effectively shielding your receiver antenna from the outside world. We've tried lots of solutions, but the best antenna setup is as follows:

- Double your antenna length (be sure to shrink wrap the solder joint)
- Run the antenna down a long 3/32" shrink tube (don't shrink it) all the way down the fuselage.
- Exit the antenna through a small angled hole in the side of the fuselage at the base of the fin. Use a bit of 1/16" shrink tube as a strain relief and again, don't shrink it. You can glue this to the side of the fuselage or secure it with a small piece of tape.

This setup gives some protection to the antenna from sharp carbon shards inside the tail boom, allows the antenna to slide when the receiver is moved, and provides very solid range. Our Perfects range check to at least 60 paces with the antenna down



Installing the DB9 connector: Bend a picture hook to a little less than 90 degrees and use as a clamp for holding the ply backing plates in place while the epoxy cures. Scrap music wire and wood blocks provide the clamping pressure. Tack glue the ply to the picture hook with a drop of thick CA. Snap the CA joint after it all cures and pull the hook out.

and the model held one meter off the ground.

The servo tray is cut for tandem servos, aligned on the centerline, giving plenty of clearance for varying servo height. There is no need for shimming to keep the bottom corners of the servos from hitting the fuselage. The DS-3421 dropped right in, but the DS-368 required around 1/8" enlargement of the hole at the back.

While the bottom hinged surfaces with top mounted control horns are as clean as you can get short of RDS, installation can be a bit of a challenge. Tiny differences in linkage geometry can cause problems with flap travel or pushrod/wing interference. It is best to mount the servos as far forward as possible in order to get the pushrod angle low relative to the wing surface. This lessens the tendency of the pushrod to interfere with the hinge spar and servo well opening. It also puts the servo output arm in the deepest part of the wing and gets the servo close to the spar, which reduces the possibility of the top wing skin flexing under high servo loads.

The problem we've always had with this type of setup is that the servo just doesn't have much leverage at large deflections. The flap hinges on one of our planes were tight enough to make even those mighty 3421s complain loudly beyond about 70 degrees at first, though they loosened up after several flights. Furthermore, it can be difficult to make your linkages completely slop-free.

The two Pike Perfects used for this review came from the same batch and were set up with exactly the same equipment and techniques.

Although we failed miserably to weigh everything right out of the box (we couldn't wait to get them in the air!), the finished planes are 3 ounces differentm - one at 76 ounces, the other at 79. Is there enough variation in the amount of epoxy used in the manufacturing process to explain this? How much is due to the differences between green and yellow paint?

Does the Pike Perfect live up to its name? Well, we hesitate to call anything "perfect," but Samba's new baby certainly gets us another step closer to model sailplane nirvana.

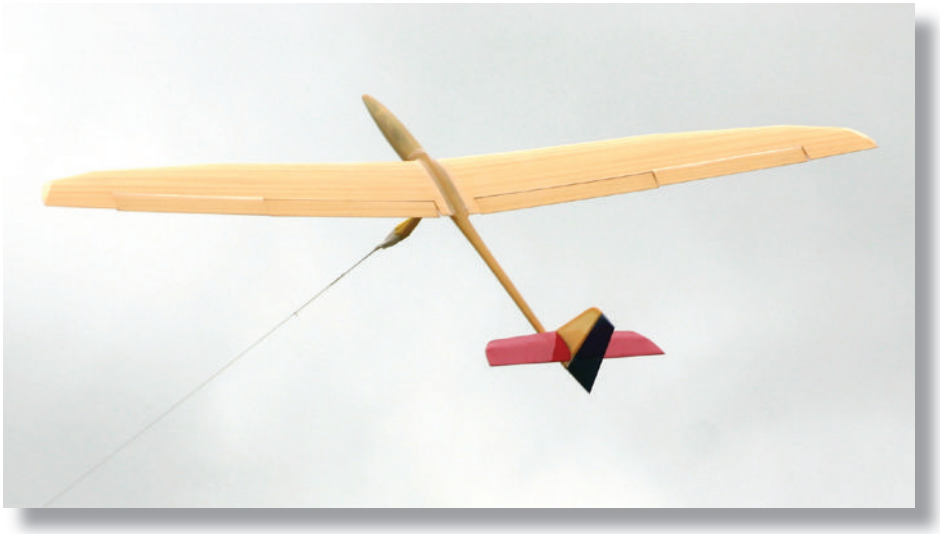
Online resources:

http://www.f3j.com/perfect.htm
http://www.f3j.com/perfect/settings_060306.pdf
http://www.f3j.com/perfect/perfect_instructions_pictures.pdf
http://www.soaringusa.com
http://servoframes.com/
http://www.hangtimes.com/
http://www.horizonhobby.com/
http://www.superskeg.com

LSF Soaring at the

AMA Nationals

Photos by Mark Nankivil




JOHN DEERE
GATOR


AIRTRONICS


SOPRANO

Page XX: Upper left, Bob Glover launching; lower right, Michael McKibben getting set; lower left, Tom Broeski timing and Mark Miller piloting.

Page XX: Winch line activity.

Opposite page: Upper left, Lee Atchison, age ten, with his Oly II; upper right, Adam Lawiki, age 13, with his Mantis; lower right, Robert Samuels and his Graphite2; lower left, Bill Rakozy.

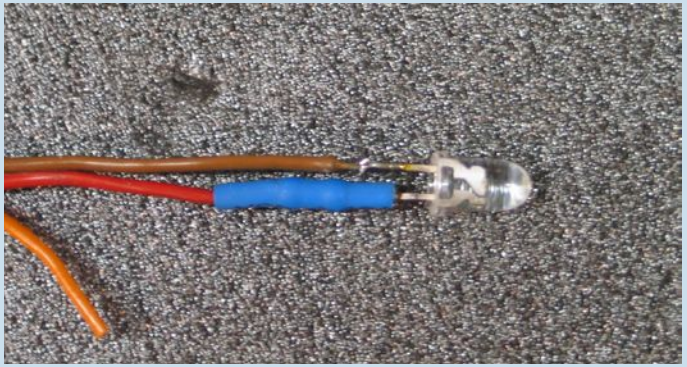
This page: Above, seven Soprano owners gather for a group photo. Right, Daryl Perkins applies some CA to his Insanity.

Constructing an LED light wand

Mark Stone, Mark.Stone@internode.on.net

Southern Soaring League Flyer, August-September 2006/Southern Soaring League, Adelaide, South Australia

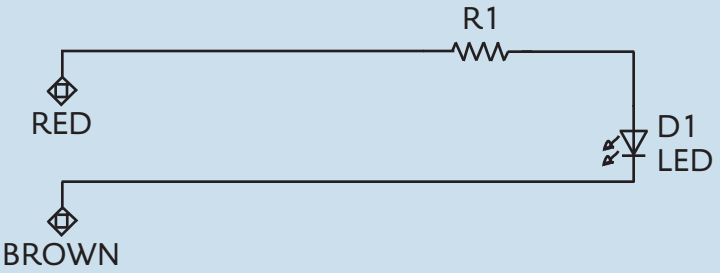
Ever wanted to see down the inside of your fuselage? By the time you get the torch (flashlight for us Yanks) lined up you can't see past it, let alone get any tool past. Here is the answer, a high intensity white Light Emitting Diode (LED) attached via a length of wire to a small battery pack. A standard 600mAh flight pack should give you 30 hours of light.



Probably the easiest way to make a light wand is to use a servo extension lead or a length of old telephone extension cable and a matching connector so you can plug in a 4 cell flight pack.

The LED (D1) and resistor (R1) are available from Dick Smiths. The resistor value will need to be changed if you are going to use a different battery pack.

D1 = LED Cat No. Z3984 (Super bright white LED)
R1 = Resistor Cat No. R1050 (100 Ohms 1/4 W)



<u>Construction</u>:

1. Shorten the LED legs to about 10mm.
2. Attach the resistor to the LED leg opposite the flat edge on the LED.
3. Attach the cable, putting some heat shrink tubing on to cover the resistor.
4. Put another piece of heat shrink on to cover the soldering and you're all done.

Maple Leaf Design *Encore*

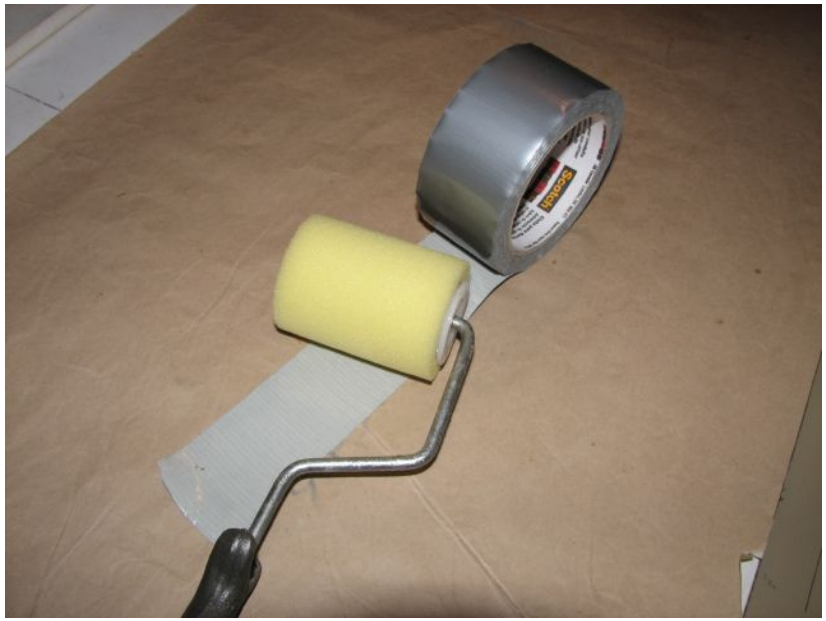
Fabrication walk-through, Part 6

by Phil Pearson

Finally, the wing is vacuum bagged, providing this month's subject. Many different steps are used by other builders to arrive at a successful vacuum-bagged model glider wing. Over a period of years I have developed a method that has consistently worked well for me and the following photos illustrate the basic process.

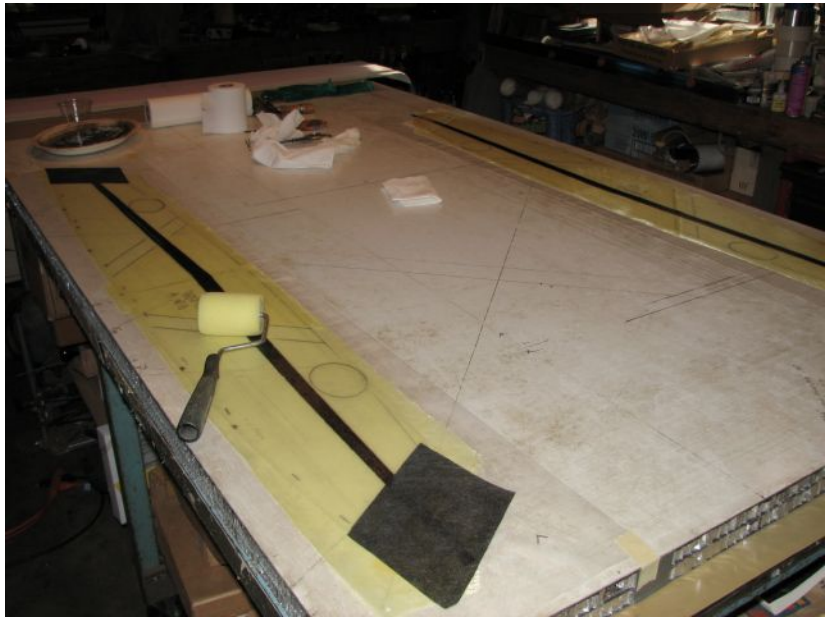
Right: Currently MGS resin is used with the slow hardener, 287, yielding a working time of about two hours at room temperatures around 80 degrees Farenheit. Dispensing is with plastic squeeze bottles into plastic cups. A Dremel tool with a disk is used to mix the resin/hardener. The disk will generate a minimum of air bubbles while mixing thoroughly. Wear eye protection and use only enough rotational speed as necessary to avoid splattering resin.

Right: All resin/hardener mixtures are weighed on a triple beam balance to at least a 1/10 gram accuracy. Resin is weighed first and then the calculated total weight of resin plus hardener is matched with the addition of hardener.

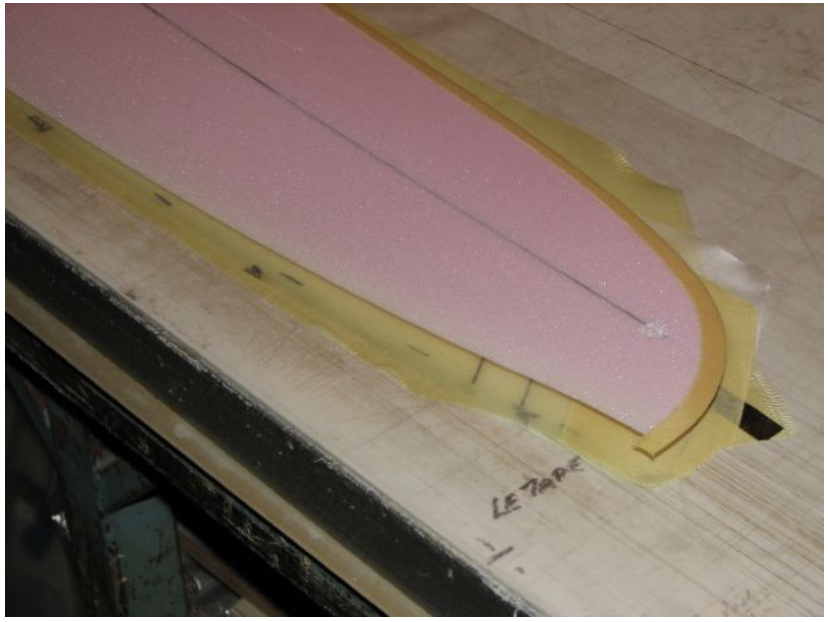


Above: Three-inch-long foam rollers with plastic tubing cores are used to distribute resin on the "cloth" lay-up. Debris from cutting the roller to length can easily be removed by rolling over duct tape.

Above right: Foam rollers are wetted with resin on a paper plate that has been reused for many years! A neat, lay-out of tools, and "cloth" reinforcements helps with an orderly progression of work.



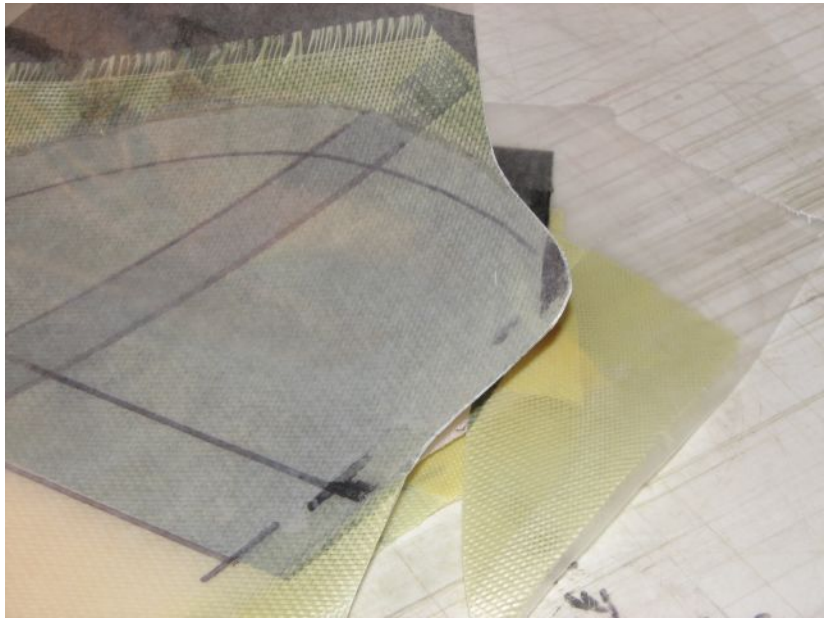
Right: Cloth is placed on waxed mylars on top of waxed paper. Resin is applied first to the fiberglass or Kevlar cloth with the roller. No attempt is made to use a minimal amount of resin as this usually results in dry spots. Carbon spar caps are wetted out on one side in place and then turned over in place and wetted out on the other side. Fiberglass reinforcements at the wing tips and outer servo locations do not show in this photo.



Above left: A heat gun is carefully used to warm the resin while rolling with the foam roller to facilitate wetting of the cloth layup. Toilet paper is placed on the resined layup and rolled once using force to absorb the excess resin. The layup appears dry after removal of the paper. Toilet paper will absorb more resin than paper towels and result in a lighter layup.

Above: The top layup is trimmed, making it easier to align the mylars.

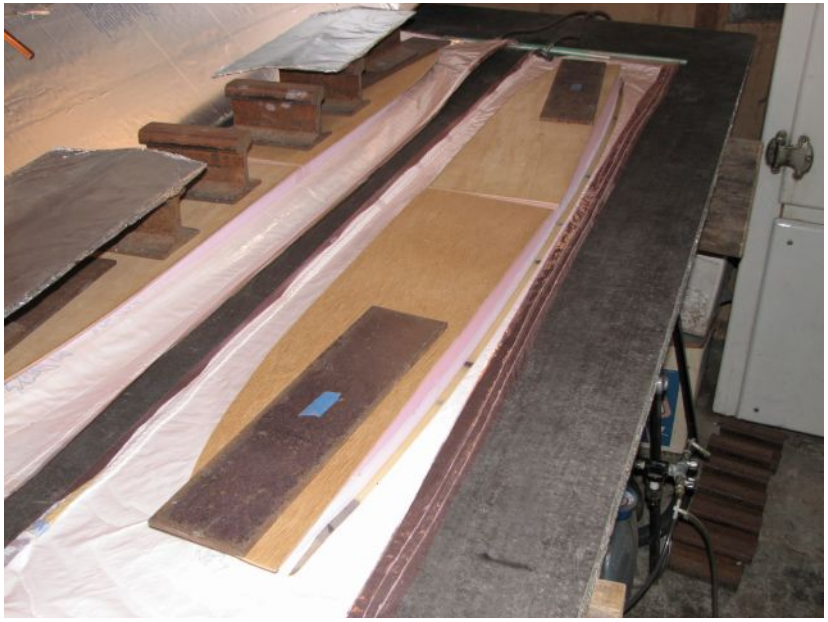
Left: The leading edge Kevlar has been wetted with the foam roller and the excess resin wiped off with a paper towel. This is done at another location on the table and then located on the top cloth/mylar matrix. The foam roller is rolled on several layers of toilet paper to blot excess resin and the "dried" roller is used to lightly roll the entire surface of the foam core. This process picks up any debris and lightly wets out the surface, improving the laminate bond.



Above: The bottom layup is added and the excess cloth is trimmed flush to the mylars at the tips to allow easier alignment.

Above right: Excess cloth, (and wax paper), are trimmed around the mylars. The mylars are then joined with thin Scotch tape. The tape must be thin to prevent imprinting the finished wing. The mylars are taped together near the tips and the center along the trailing edge and in about 12 inches and the middle along the leading edge. Three 1" long pieces are used along the leading edge and three along the trailing edge. The mylars extend about 3/8" past the core trailing edge and about 1/2" past the leading edge of the core.

Right: The cores are placed into the vacuum bags on thin plywood door skin and ends sealed. Two layers of paper towels with one layer of peel ply cloth are placed and taped onto the bottom of the vacuum bag for breather and release. Another breather-peel-ply layer is placed on top of the wing layup and held in place on the mylar with thin double-stick tape. Milled foam beds are placed under and over the outside of the bag for support.



Above left: Thin plywood is placed on the top bed to distribute the weight load.

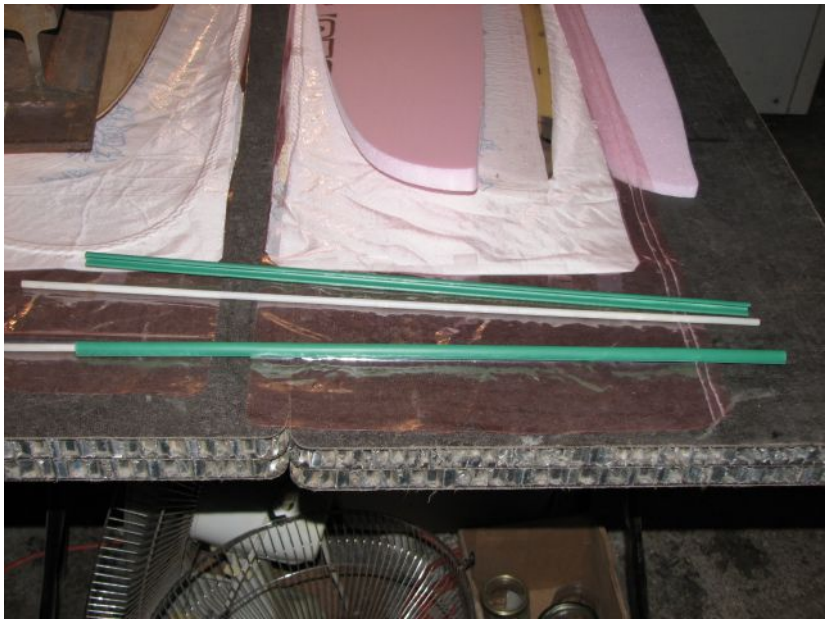
Above: A small amount of weight is applied to help fix the pending alignment of the beds and wing layup.

Left: Heavier weights are used to align the wing layup during application of vacuum. Vacuum is brought up slowly to 18" Hg. The interior of the heat box shows a fan and 200 watt light bulb for heat. Two light bulbs are used and two fans circulate the air down and around the perimeter of the heat box. The sensor probe for the thermostat is visible to the right of the light bulb. Foil covered cardboard panels are used under the light bulbs to limit localized heating. Curing temperature is usually around 120 degrees Fahrenheit for 12 to 14 hours for MGS resin.

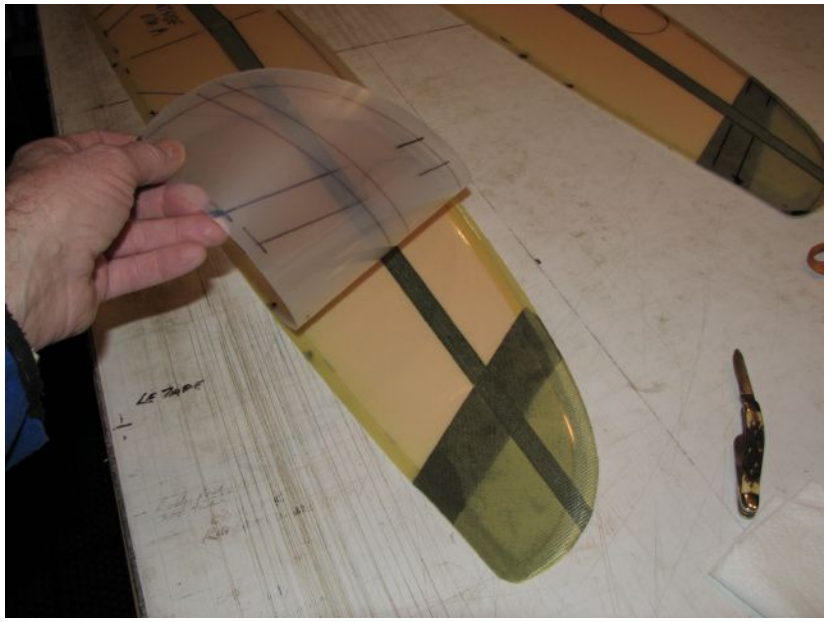
Above: The exterior of the heat box. Two wings are usually cured at once.

Above right: Photo showing a 1/3 HP oilless vacuum pump with limit switch and a vacuum regulator.

Right: Close up photo showing vacuum fitting and tube locks sealing the end of the bag, available from Aerospace Composites, California.



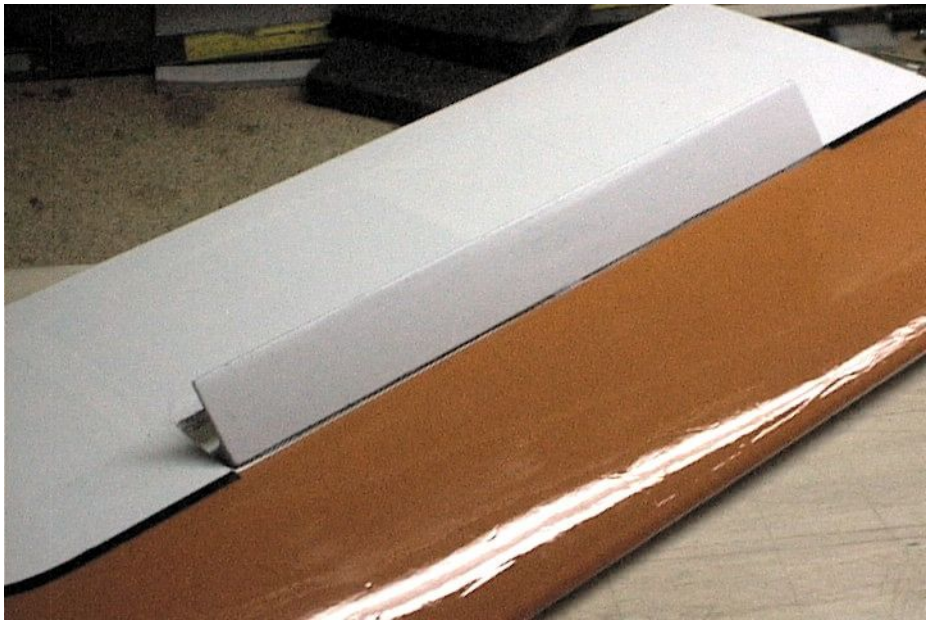
Left: Vacuum is released after curing by removal of the tube locks. Right: The same plywood door skin panel used to slide the wing/mylar layup into the bag is used to free the sticking bag from the layup after cure prior to removal of the wing.



Left: Upper breather/peel ply layer removed from the mylar/core sandwich. The lower breather-peel-ply layer remains in the bag. Right: The tape holding the mylars together is cut and the mylars peeled back revealing the shinny surface of a new wing.

Spoiling the Dynaflite *Bird of Time*

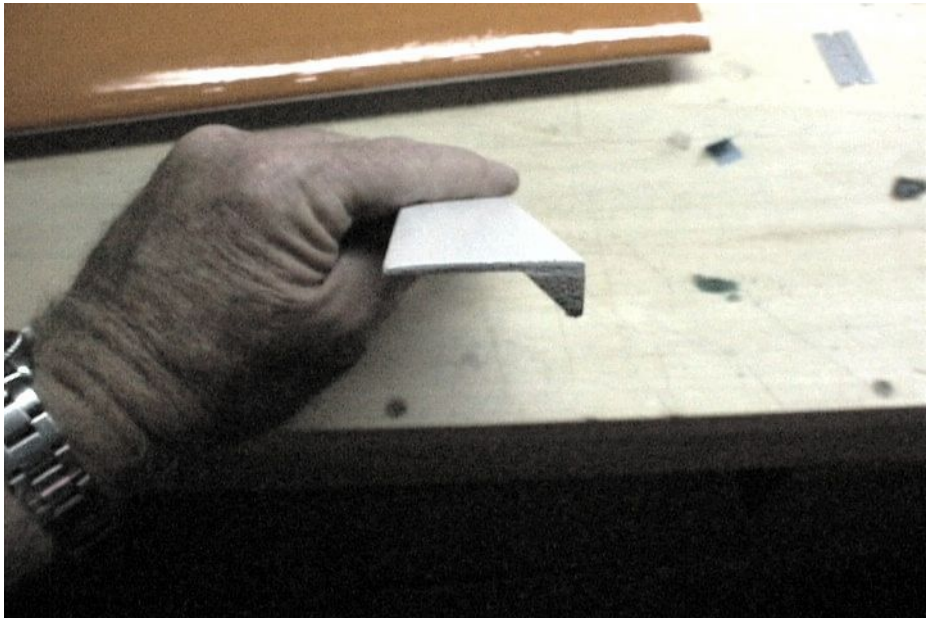
By D. O. Darnell, darnell@swbell.net



Anyone who has ever flown a Bird of Time knows that when it gets down close to the ground on a landing approach, it goes and goes and goes. Flying one without spoilers is a definite handicap when attempting to hit the spot, not to mention the fact that sometimes Birds may become bird-brained and try to fly south in a strong thermal, and, without spoilers, may just go bye-bye!

I recently picked up one of the new Dynaflite ARF three meter Bird of Time at my local hobby shop, intending to use it for RES competition. At $149 a copy, already built and finished, it was impossible to resist! Not only is this ship affordable, but it can also use practically any radio and servo combination. And, since it needs only three channels (with the spoilers we're going to add) using an inexpensive, three- or four-channel radio should make it appealing to beginners. Moreover, this classic design by Dave Thornburg is a very good looking ship that anyone would be proud to own and fly. Dynaflite will probably sell a gazillion of them!The excellent instructions included with the kit show how to mount a micro servo in a hatch in the tail for activating the flying elevator, while the rudder utilizes a traditional music-wire pushrod in a tube for the rudder. Although this may be adequate, I chose to use a second pushrod and user-fabricated bellcrank to activate the elevator. (See picture) My thinking being that while 15-20 in/oz of torque might, as stated in the instructions, be sufficient for a counterbalanced flying elevator, the real-world shocks experienced during dork landings are hard on the small servo gear trains and might require frequent replacement. My equipment consists of a 600 mAh square battery pack, a 4-channel Airtronics 92745 Receiver, Airtronics 9410 servos for elevator and rudder, and Airtronics 4091 9 gram micro servos for the spoilers. The following describes spoiler construction and installation. It should help you if you choose to install them in your Bird of Time.

The spoiler is hinged to the spar and when deployed, folds up and forward to effectively "kill" airflow over the wing. Care must be taken when choosing the spoiler location as it is undesirable to blank out air flow at the elevator. Thus, spoilers are usually placed far enough outboard so that there is enough space between them to allow the elevator to "see" enough air to retain pitch control when the spoilers are deployed.



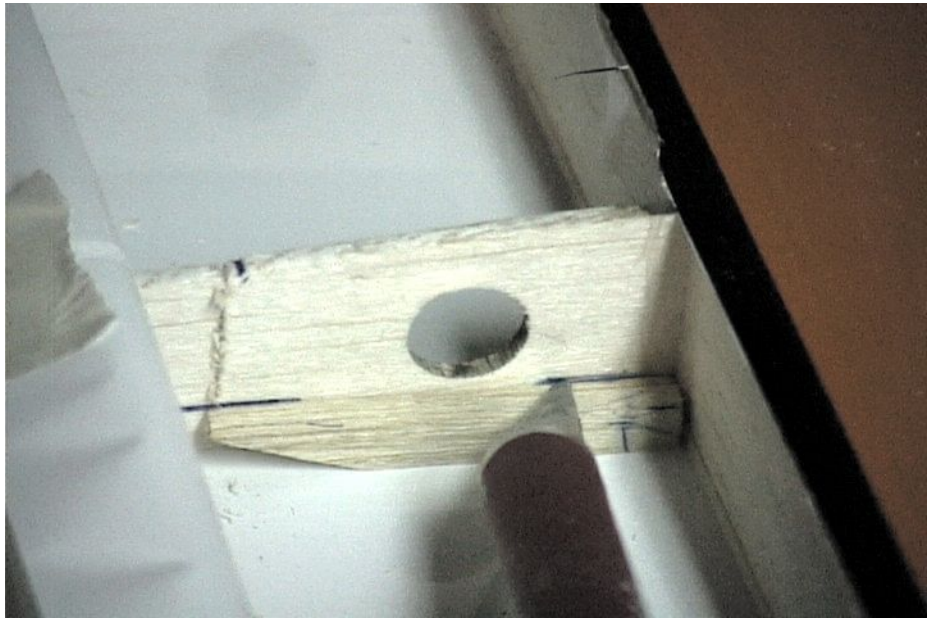
Traditionally, spoilers have been made entirely of balsa trailing edge stock and were activated by a nylon string, routed through tubing inboard to the center of the wing, then down into the fuselage and attached to the spoiler servo. Such designs have a tendency not to reliably and/or completely close, eventually get warped, become unhinged, etc. I decided to use a little higher technology than I had in the past and see if some of the inherent problems with traditional spoiler design could be overcome.

I decided to activate each spoiler with a micro servo. Fortunately, the Bird of Time wings are jig-built and have two jig-holes in each rib which conveniently allow routing cabling for the servos. I simply drilled a 5/16 hole in the bottom surface of the wing center section, in line, span-wise with the rear holes in the ribs, and inserted a plastic soda straw through which to route the cabling. I used the female ends of two 12" Airtronics servo extension cables and one male end to construct the cabling, forming a Y with the two female ends connecting the servos and the male end plugging into the receiver.

Blade Construction:

I built the blades first. I fabricated my spoiler blades using 1/16" balsa sheet, some woven carbon mat and some 7/16" triangular stock I had on hand. I laid a sheet of wax paper over the wing center-section just forward of the spar, where the D-box section of the Bird of Time wing is sheeted. The curvature in this area is very close, if not identical to, the curvature where the spoiler blade will be installed which is just behind the spar. I laid the carbon mat on a piece of x 3" x 14" balsa sheet, (large enough for both spoilers) and wetted out the mat with 20 minute finishing epoxy. I then placed the combination mat-side down onto the waxed paper and laid it on the sheeted, D-box section, just forward of the spar where there are no dips between the ribs. I then covered it with another sheet of waxed paper and laid two phone books, end-to-end upon the stack to weight it down overnight, while curing.

The result conformed exactly to the curvature of the upper wing surface. I then cut the piece in half into the two blades, trimmed them to the final dimensions of 11 ²" x 1 5/16" and CA's a 11 3/4" piece of 7/16 triangular stock to the forward



edge of each blade on the mat side. The blades were then sanded and trued up very carefully to avoid carbon splinters. To finish the blades, I used a layer of 0.6 ounce glass cloth on the upper surface, sanded, primered and painted with Krylon¨ white paint to match the white MonoKote¨ on the Bird of Time wing and fuselage.

Bay Construction:

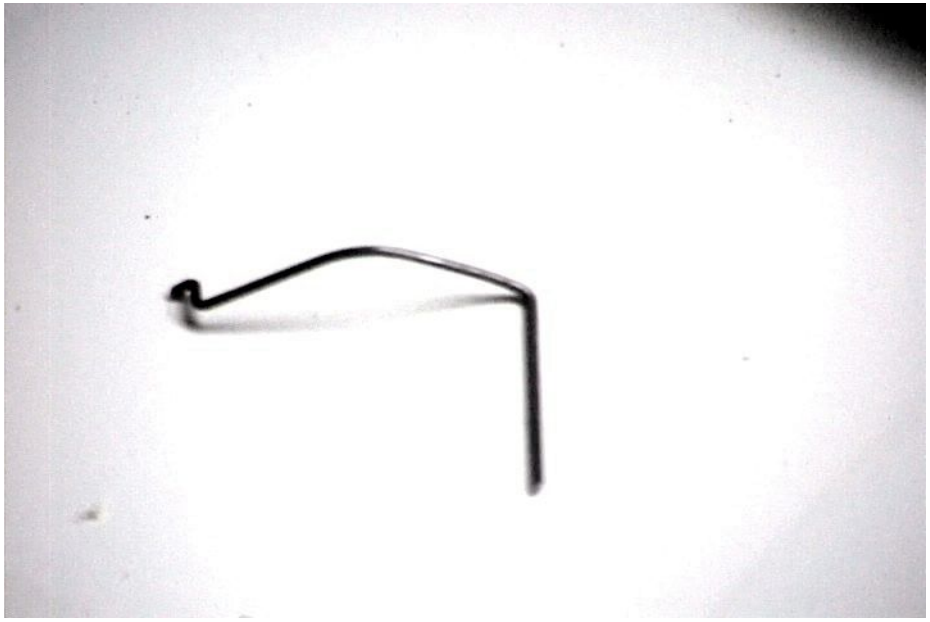
It was now time to cut into the upper center section to create the "bays" for the spoiler blades. Needless to say, I was hesitant to cut into this beautiful model. But, you gotta do what you gotta do! The fabrication of each bay requires three additional pieces of balsa: The rear edge of each bay utilizes a piece of 1/8" x 3/8" x 11 3/4" hard balsa stock; A "floor" is made from a piece of 1/16" medium balsa sheet 3 3/16" x 1 1/2", and a 3/16" square x 3 3/16" support is CA'd to the long edge of the floor and fits in between two ribs. The inner end of the bays start in second (from the center) open bay and the outer end is in the next-to-the-last open bay. The width of the bay is about 1 1/2", but customized to blade width.

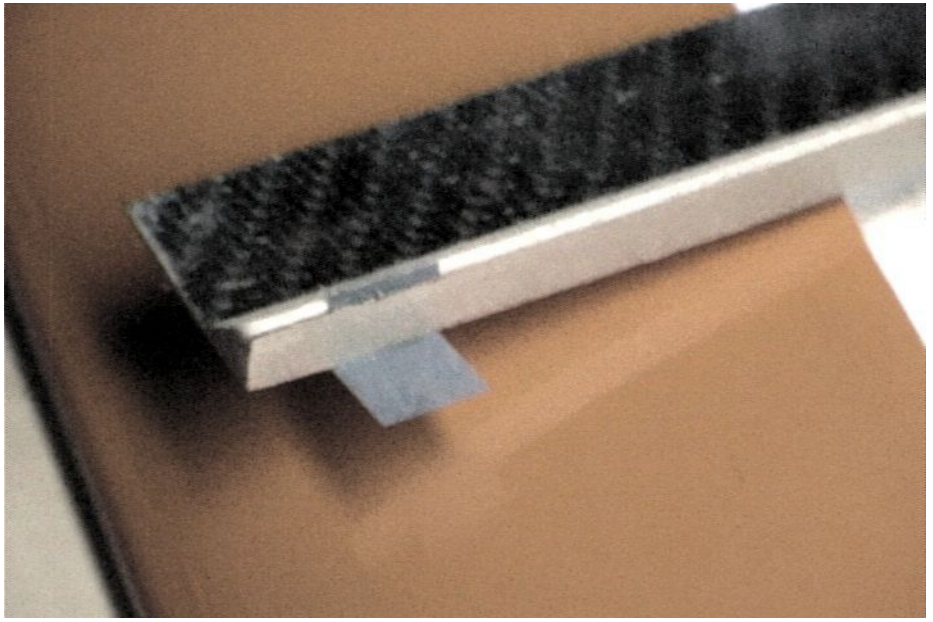
Removing and Replacing Covering:

I wanted to cut, then reuse the covering in such a way as to be able to fold about ¸" over the rear edge and ends of the bay. In practice, this didn't exactly work. When I attempted to shrink the existing covering after construction of one bay, it distorted the bay, so I then had to remove the covering, square up the bay, and replace the covering back to the trailing edge. So, to make it easy, just go ahead and remove the rear covering from behind the spar in bays 2-5 back to the front edge of the trailing edge. After installing the rear edge of the bay, recover with white Monokote. I.E., remove only the covering for four bays and leave the covering on the trailing edge. When recovering (after you have finished building the bay) cut a piece of Monokote about 1" wider that the width of the opening between the bays, enough to fold ¸" down into the spoiler bay, and ¹" to wrap under the trailing edge. Take your time and try not to trap any wrinkles.

Ribs alteration and bay rear edge piece installation.

When installing the rear edge of the bay, what we want is a consistent, 3/32" gap at the rear edge when the spoiler blade is butted up against the spar. This is to allow for hinging clearance. The ribs in each bay





must be trimmed to construct the bay, proper. The spoiler blade was placed upside down at the spar and lines were drawn to position the rear edge, taking the gap into consideration. Each of three inner ribs was cut downwards at the spar and downwards about 1 1/2" behind the spar, deep enough to leave only the lower 3/16" on the bottom of each rib. These support the "floor" where the servos are attached.

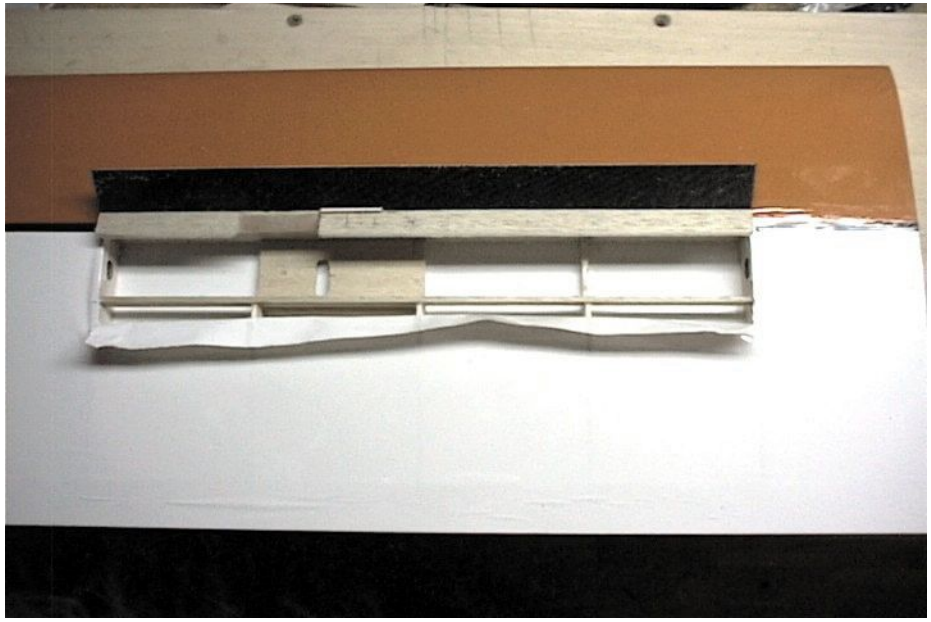
I laid a piece of 3/16" square balsa adjacent to the rib while cutting in between the downward cuts using an Exact knife. Next, the spoiler blade was temporarily taped in place and the rear edge of the bay CA'd in place, leaving a 3/32" gap as mentioned above. After carefully aligning the top of the rear edge piece of the bay with the top surface of the end-ribs, the rear edge was CA'd in place.

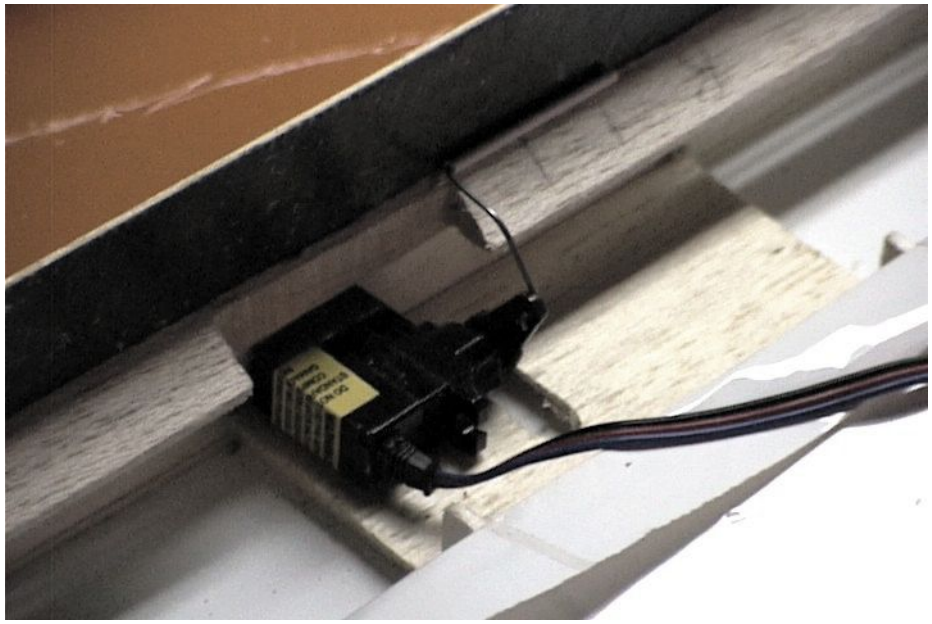
Servo Positioning:

The next thing to do is to decide how the servos are going to be installed. In my case, I'm using one receiver channel for both servos, so both servos will lay on the same side due to the fact that when using just one channel to drive both servos, and thus the servos will travel in the same direction. I had to remove the mounting ears on the servos so they could butt up against the spar and I had to notch the 7/16" triangular stock to clear the servo case when the blade is in the down position.

For linkage, I used .031 music wire and plastic tubing having .032 ID. A 1" piece of the plastic tubing was CA'd to each blade at the inner edge of triangular stock on the blade proper. The linkages are "L"s which slide into the tubing. Z-bends attach the other ends to the servo arms. Both linkage wires were formed at the same time in needle-nose pliers to attain identical lengths between bends. (Do the Z-bends first) When installed, they were bent into an arch so as to obtain the proper closing position. If one blade opens a degree or two more than the other, it doesn't matter. But, both blades should be in the same position when closed.

In my installation, it was necessary to cut a slot in the floor to allow clearance for the tip of the servo arm in the down (closed) position. (See picture). It is easier to do this prior to installing the floor, but you probably have already figured that out if





you've been fiddling with the servo position and mechanics. After completing the bay, I finished up the covering. I then used a thin layer of Goop to attach the servos to the floors.

Hinging was another area I attempted to deviate from the norm and utilized Pro South CA type hinges. I used three hinges per blade, one in the center and one 1/4" in for each end. To attach the hinges to the blades, I cut two strips of 64 thousands ply in strips 1/2" x 11 3/4" long. I bent the hinges in the middle then CA'd them to the ply strips so as to have the fold over the top of the strips.

The ply strips were then epoxied to the blades aligning the top of the folds to the top surface of the blades. The blades were then placed in the bays in an open position and pinned using modeler's T-pins to retain the blade in proper alignment: The top of the blade was leveled to the top of the spar. Thick CA was then applied to each hinge. (Alignment was verified by eyeball sighting from the leading edge prior to applying the CA.)

Adjusting the servo throws involved choosing the correct servo travel (I used the flap channel on my Vision) and bending the linkage wires. This needed be done only once, however, and should not require any additional mechanical manipulation. With the Vision, I only had to adjust centering and travel for the flap channel and bend one of the linkage wires after setting up the other. I then did the recovering and replaced the black striping with a 1 cm. hand-cut strip of covering.

So, that's how I went about building and installing spoilers in my Bird of Time. The spoilers worked better than expected. Raising them only about 1/2" high brings the Bird down RIGHT NOW! But, flying RES again might take some getting used to! I think I'll go back and re-read Dave Thornburg's *Old Buzzard's Soaring Book* again to get ready for this season's events. And, I'm sure that now the Bird will have much better manners.

Good luck with your Bird!

Rosendal Slope Weekend 2006

by John Godwin, johng@cis.co.za

We made our way slowly up the trail past the old water tank to the tree line at the top. Ahead we saw the laager of vehicles. Above them were many aircraft high in the sky.

The Rosendal Slope Weekend occurs each year at the end of August.

Grobbie sets the exact date. There is some mystery as to just how he does this. Urban legend has it that he uses the phase of the moon.

Whatever. This year, as every year, the wind blew at the right speed and in the right direction.

Grobbie has been making the annual pilgrimage to Rosendal for the last twenty years. Other hardy independent people from the Freestate go with him, among them Ricky Mitchell and Don King.

We have been there three times. Well two and half times to be precise. On the second visit we broke the sump of the car on the last lap. This year we went in a vehicle with more ground clearance. We could not miss the twentieth anniversary.

Altogether about sixty pilots registered. Some tough individuals camped on top for the whole week. Needless to say, most were from the Freestate.

Can't wait for next time.

Norbert's scale ASW 27. It unfortunately suffered damage later due to an error with frequency control.

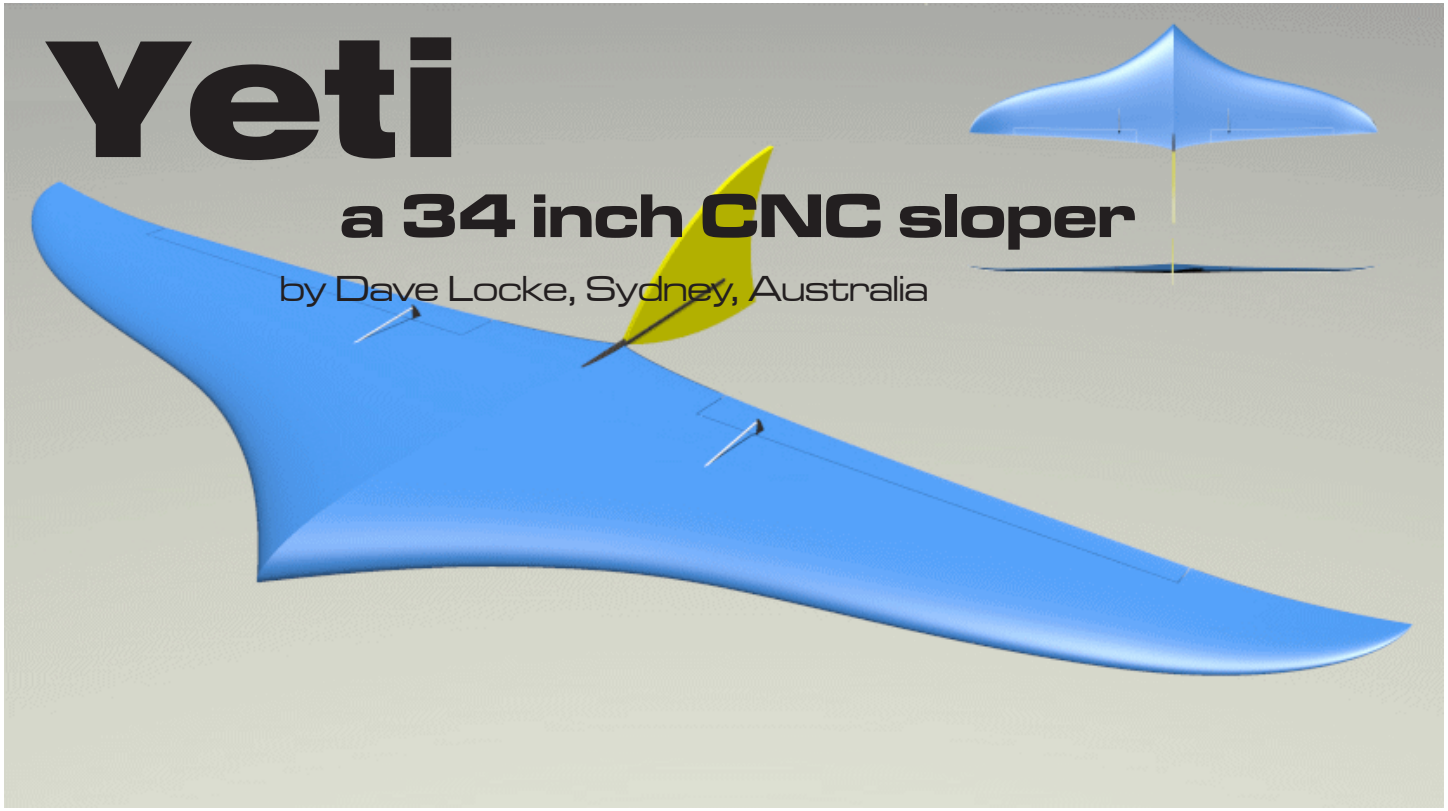
The Rosendal slope -- if you can call it a slope. Not somewhere to loose an aircraft. It's a one hour journey to the bottom by car. Of course you could climb down, maybe.

Opposite: Rosendal Slope Weekend participants.

Above: Piet Rheeders launching a Hill Billy

Above right: Mike May's scale Ventus 2ax had it's maiden flight over the weekend. He built it in eight and a half weeks before the event. It was his first attempt at vacuum bagging, a beautiful job.

Right: Ricky Mitchell, in the camouflage cap, and Don King with a war bird.



I've been designing a unique hollow molded plank for some time, and have at last got to the point where I've milled a prototype from foam using the PW51 airfoil.

Many thanks to Peter Wick for his sagely advice and airfoil, and Michael Richter for the encouragement to *get 'er done*!

The core is high density foam, carefully CNC cut in one piece on my router. The foam handled the swept up tips and thin trailing edge quite well.

To add some durability, it was lovingly hand glassed with two layers of 3oz. 'glass and a final layer of 1oz. satin weave 'glass.

It's quite stiff and should handle the punishment it's about to receive.

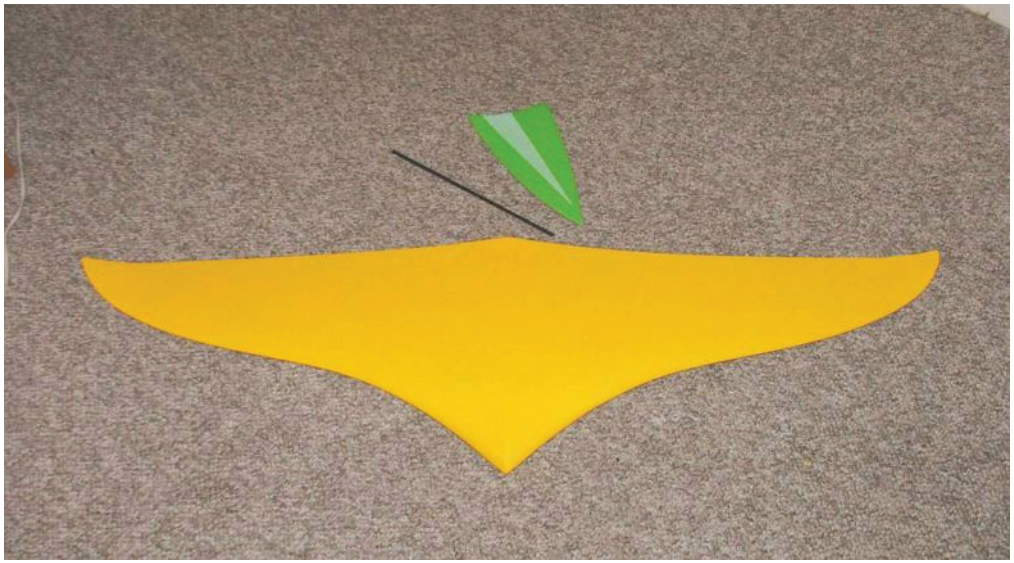
Fully painted, the empty weight is 200g (7oz.) with replaceable cellfoam tail and carbon rod. Not too bad, considering. The wingspan is 34".

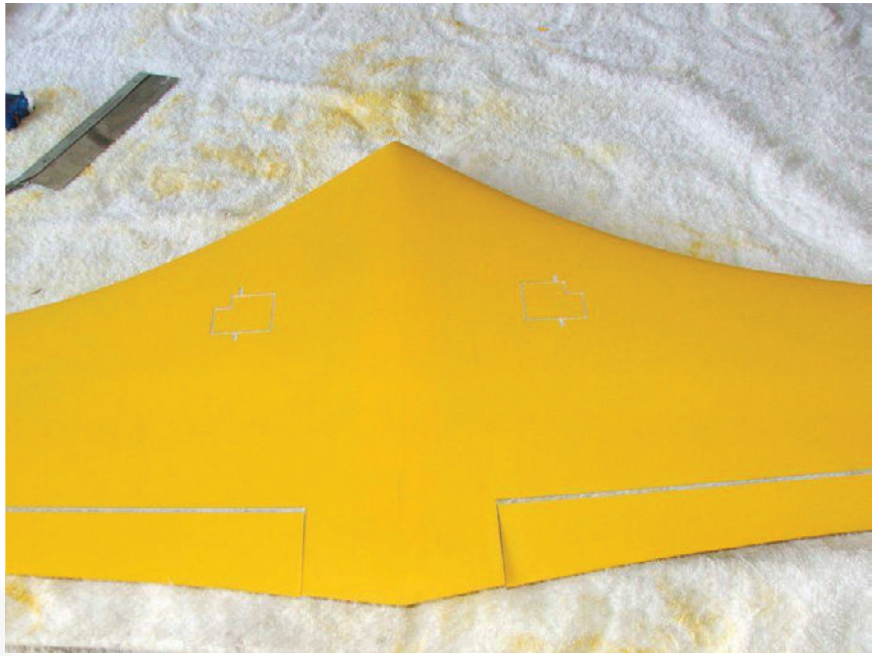
Once painted, it went back on the CNC table for servo well cutouts and freeing the elevons.The paint job is still intact!

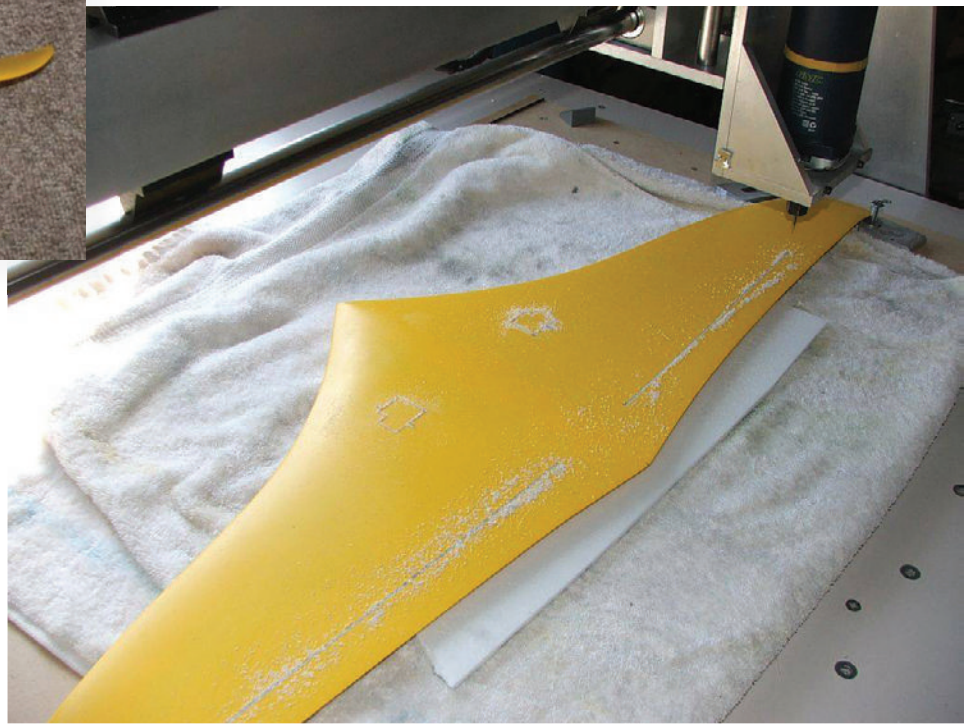
It's using Hitec HS-55 servos... simply because I have a lot of them left over after my electric 3D foamie fetish a while ago. They should be strong enough.

I still need to make the receiver battery pack and cut the battery bay. Determining the CG will be a nightmare...

If it flies well enough, molds will be made for some nice garden variety carbon versions!







Dave's CNC Yeti. Above, the fiberglass covered wing, plus tail and boom. The front profile definitely shows off the thin silhouette. Right, cutting out the servo wells and control surfaces. The lower photo shows the milling machine doing its job, while the upper photo shows the completed work.