

Radio Controlled Soaring Digest

April 2006 — Vol. 23, No. 4





Front Cover — This picture was taken on Signal Hill, Cape Town, South Africa, the main flying site for the Atlantic Flying Club <www.atlanticfc.org.za>, and shows Sandy Sutherland flying his X-Models *Whisper* from the hillside. The photographer, Jason vd Westhuizen, is 12 years old and enjoys flying scale and combat. Panasonic FZ-30, 1/400 sec, 25.2 mm, f 6.3, ISO 80.

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Phil Pearson presents the first of a series of articles that provide a text and pictorial walk-through of the entire *Encore* kit production process. **By Phil Pearson**

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Cape Cod has been the annual spring slope rendezvous of the Canadian East Coast slope buffs for about ten years. Great photos and tour guide commentary will have you agreeing it's a slope soaring paradise. **By Daniel McCrae**

Back Cover: An aerotow adventure takes place annually in July in Interlaken, Switzerland, and is attended by fliers from throughout Europe... and the U.S. ("Tool Room" columnist Steve Richman is in the last row, second yellow shirt from the right.) This photo of the 2005 event participants courtesy of TUN Modellbau <<http://www.tun.ch>>.

R/C Soaring Digest

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We encourage anyone who wishes to obtain additional information to contact the author.

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In the Air!

This issue marks the return of Jerry Slates to the pages of *RC Soaring Digest*. The recent heavy rains in California made flying next to impossible, so Jerry spent the time building a sailplane, a *TIMON 2M*, for those dry days he knew were coming. Jerry's reintroduction is in the form of a review of the *TIMON 2M* kit.

Well, no sooner had we put the March issue on-line than we got news from Don McGlauflin of an update to the Mikro Designs SPF-5-RXO receiver software. Believe it or not, Don's made this small receiver even better! Be sure and check out the review addendum on page 40.

The first installment of Chris Boultinghouse's *Genie* construction project is also in this issue, together with the start of Phil Pearson's photographic documentation of what goes into producing an *Encore*. We are pleased to be able to publish these series in *RC Soaring Digest*.

Those with a propensity for seeing details may have noticed an addition to the adjacent Contact list. Yes, *RCSD* now has an AIM screen name. We're hoping this will make it easier for us to coordinate with columnists, contributors, and readers.

The R/CSOaringDigest Yahoo! group now has more than 450 members (That puts the group at #12 out of 424 Radio Control groups). If you're not signed up for the R/CSOaringDigest Yahoo! group, we encourage you to do so. It's the one sure way of being notified when the next issue is placed on-line.

Time to build another sailplane!

Art Hobby *TIMON 2M*

Review by Jerry Slates, <oldjer@themacisp.net>

This past winter here on the west coast was very wet. Too wet to go out, so I spent several days at my computer surfing the net. While surfing the net I came across a very interesting web page, www.arthobby.com.

In their catalog they have a collection of some very interesting models. Something for everyone. There are hand launch, 60 inch slopers, two and three-meter thermal types with straight and bent wings, all from Eastern Europe.

After about three days of surfing, I kept coming back to www.arthobby.com and looking at the *TIMON 2M*. To make a long story short, a check was in the mail for one *TIMON 2M*.

While waiting for my *TIMON 2M* to arrive, which it did in five days, I was thinking that I would also do a construction article.

Well, my *TIMON 2M* arrived.

Kit contents As I unpacked its box, I first removed a lot of bubble wrap and found one painted-in-the-mold, epoxy/fiberglass fuselage. This is a very

nice fuselage, with carbon fiber reinforcement in the wing root.

Next, I found a four-panel set of white foam core, pre-sheated wings, with leading edges and tips factory installed and sanded to shape. The wing tip panels are plug in, so the factory has installed the wing tubes for you. On the bottom side of the tip panel, the factory marked where to cut out for the aileron servo. Plus, on the top side of the same panel, the factory also marked where to cut out the aileron.

There were two plastic bags : One bag contained a set of stabilizers and elevators, already shaped, sanded, and hinged by the factory. The second bag contained all of the hardware items — control horns, screws, and bits of wood (cut to the correct size and shape) — to complete this model.

The last items found in the bottom of the box were the push-rods and the instruction manual.

Instructions The seven page instruction manual has one page listing everything that is in the box, plus a list of the items, tools and supplies required to complete the *TIMON 2M*. There's another page with

a 3-view of the *TIMON 2M*, leaving five pages of building instructions with a lot of pictures. A first time builder shouldn't have any trouble assembling the *TIMON 2M*, as all of the information needed is in the construction manual.

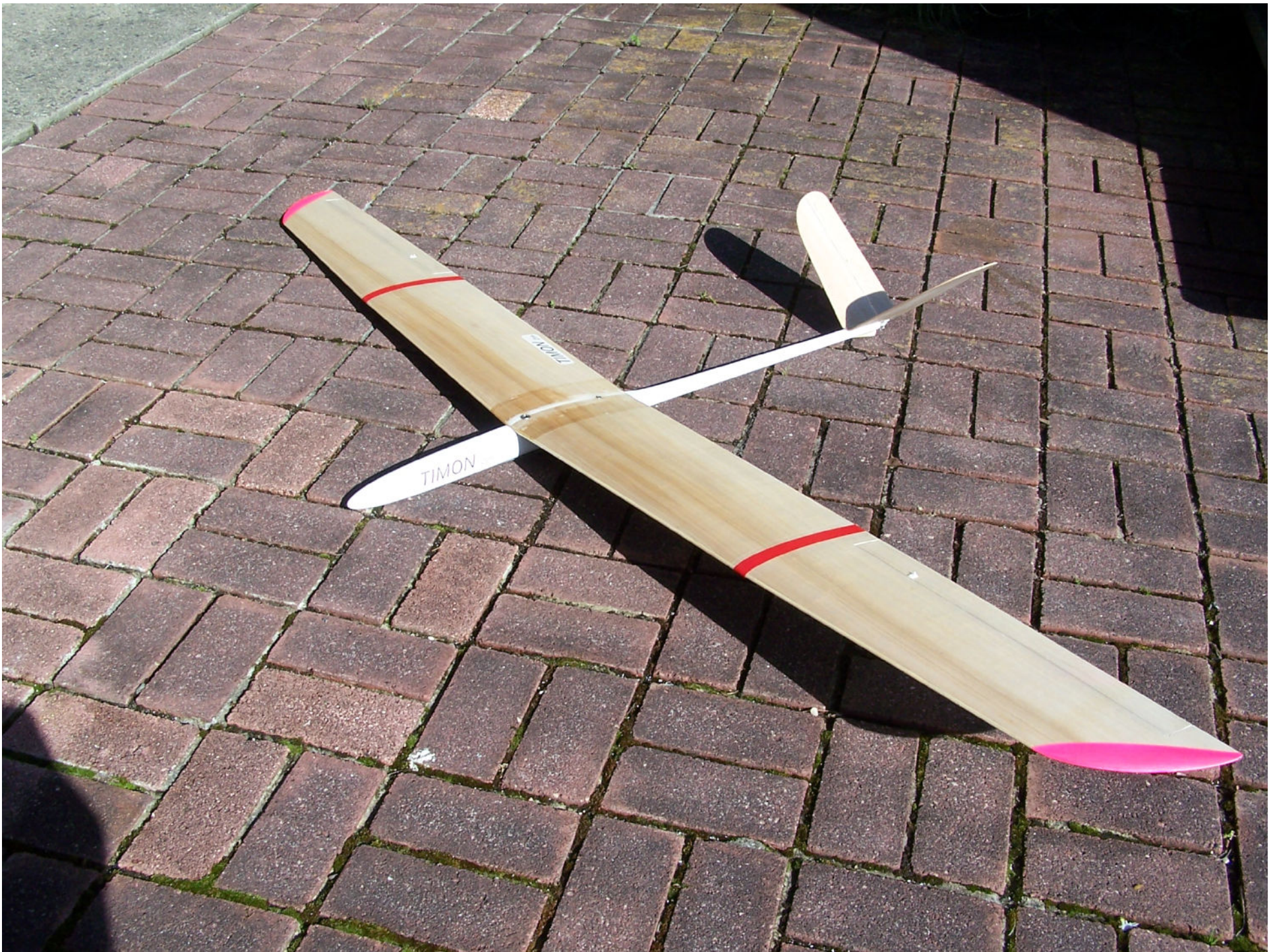
I hope you can see where I'm going with this construction article. There was going to be very little construction to do.

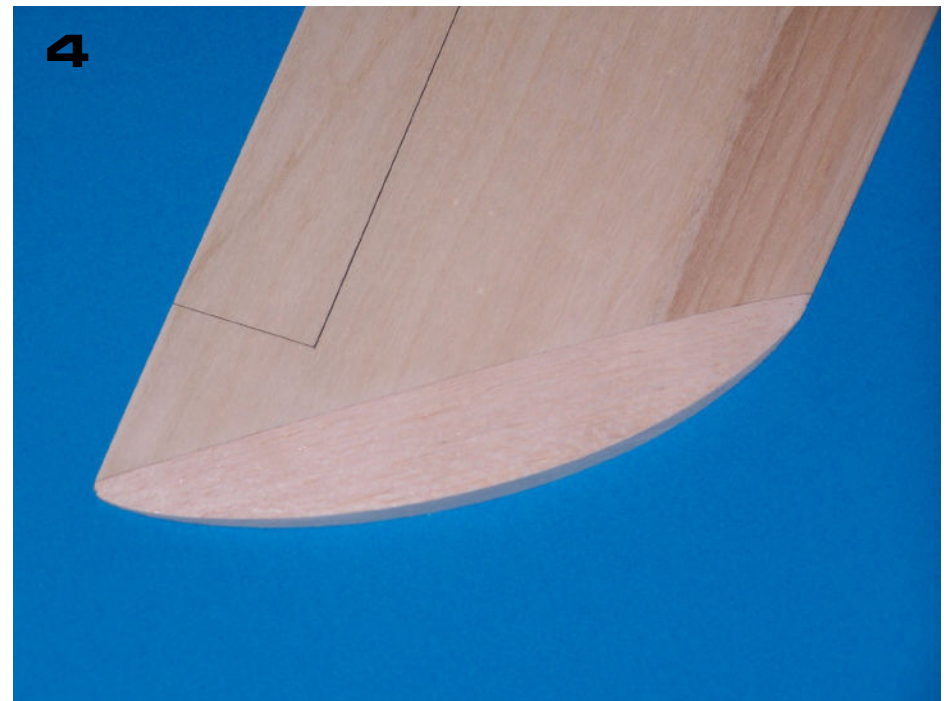
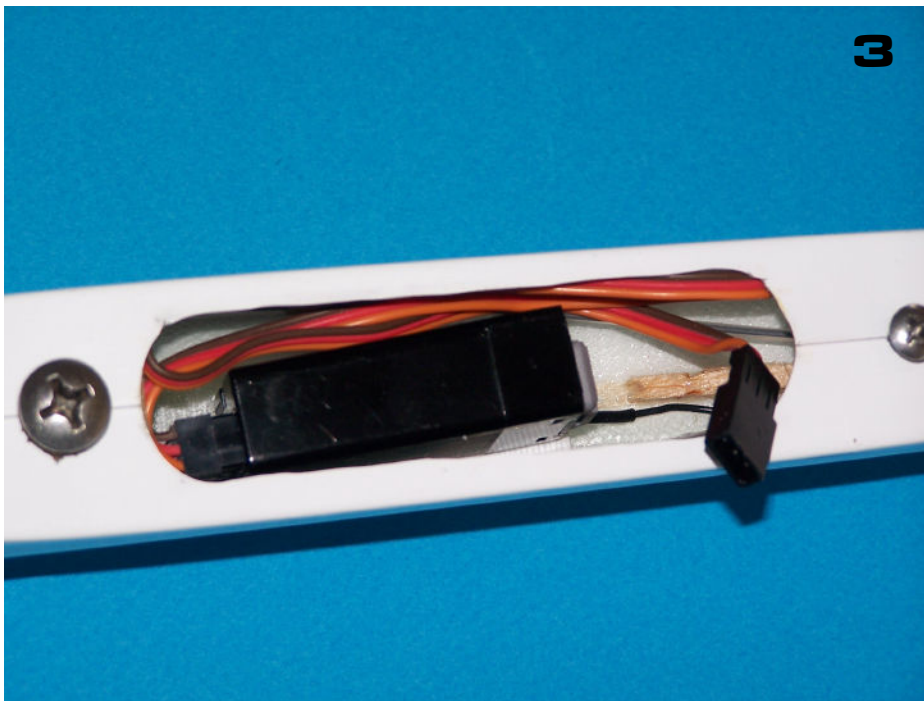
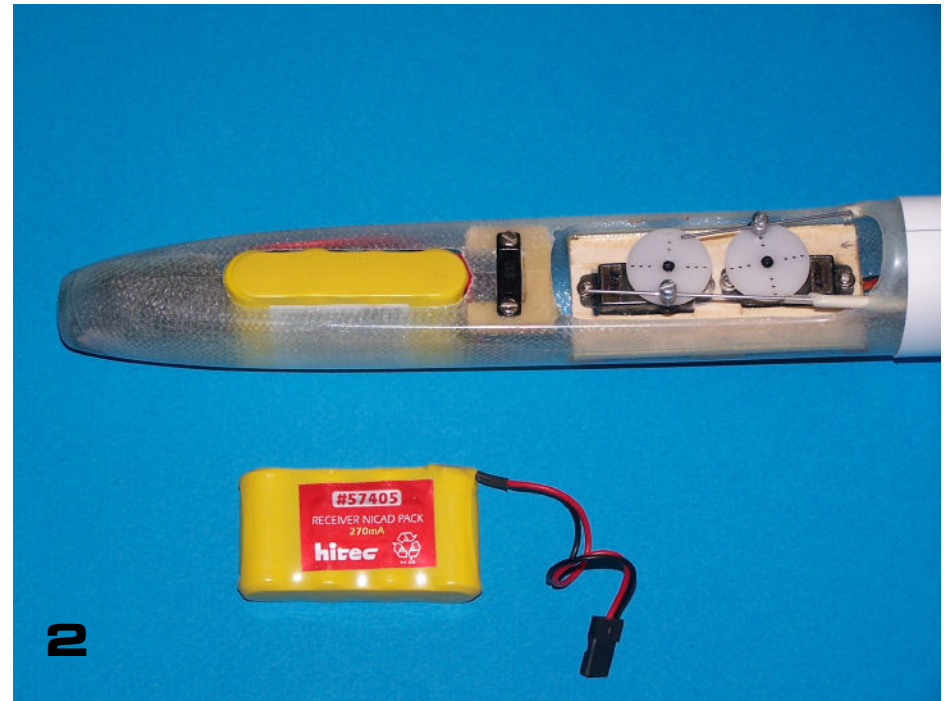
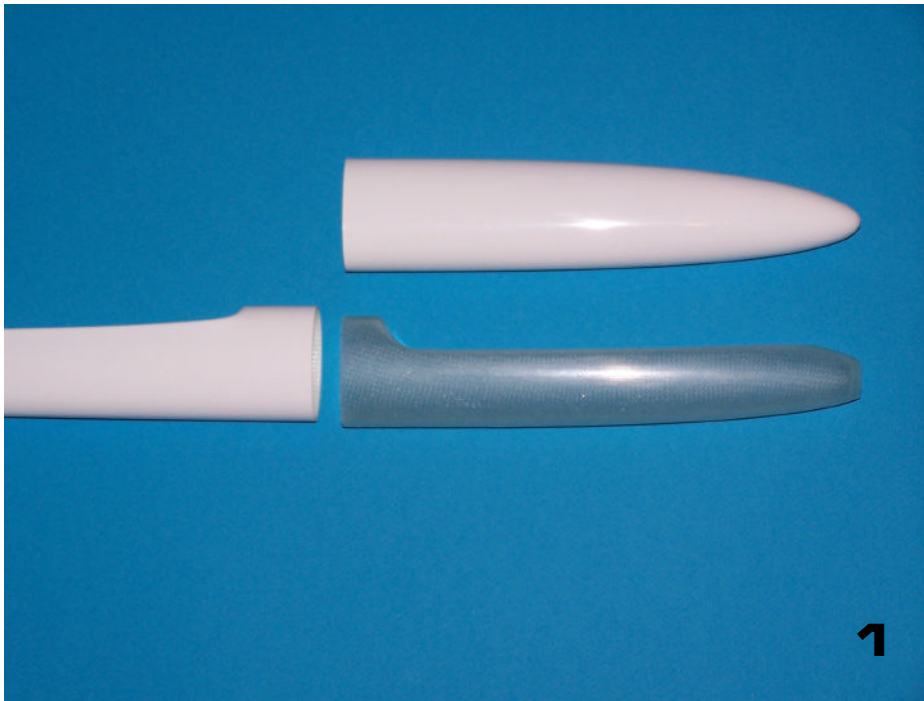
Construction I started construction of my *TIMON 2M* by gluing the V-tail halves together, and then glued the V-tail onto the fuselage. Then I glued the inner nose cone into the fuselage.

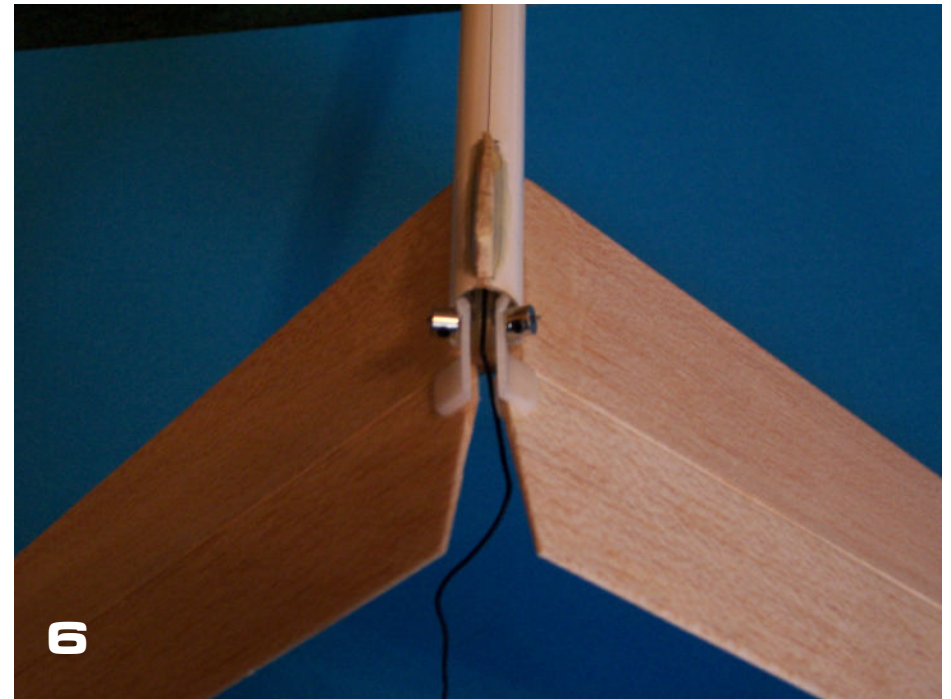
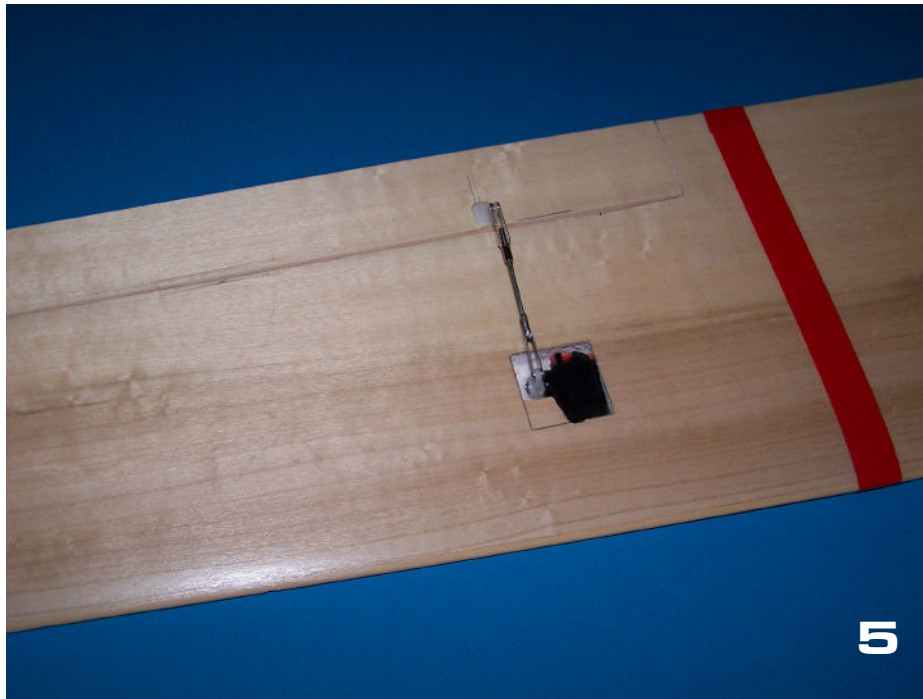
Next, the wing. I started by gluing the two center sections together and then fiberglassing the center section top and bottom. Then, taking the tip panels, I cut out the servo wells and ailerons. Be sure to cut on the line, as the factory installed a strip of wood inside the wing. It is already wood-faced for you when the aileron is cut out.

I installed the radio, servos, control horns and push-rods.

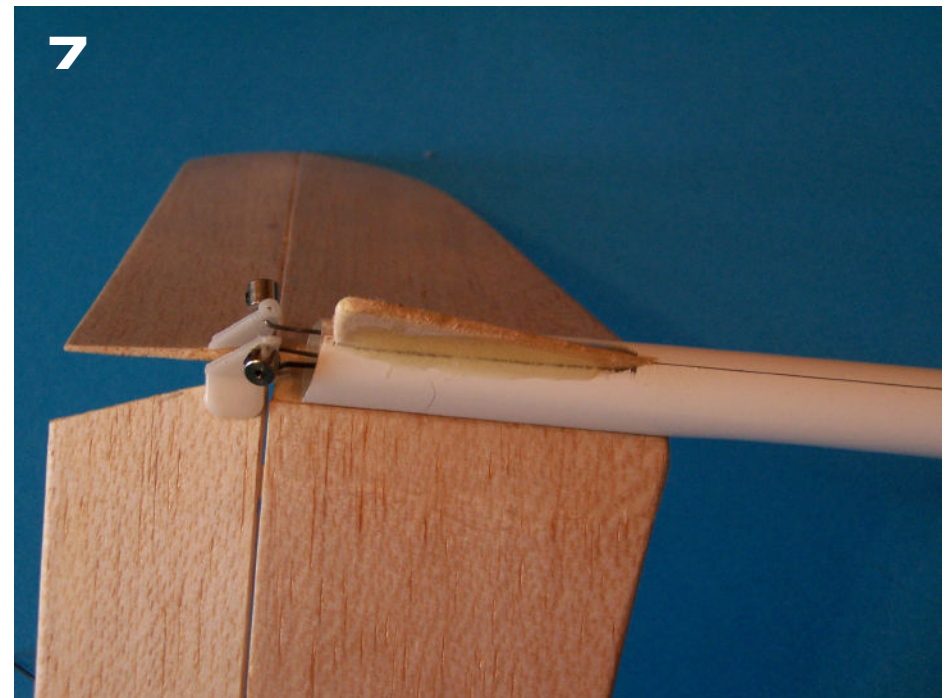
— Text continued on page 8







1. The three fiberglass fuselage parts — main fuselage, inner and outer nose cones.
2. The slim fuselage has room for a 270 mAh battery pack up front, with the two rudder servos behind.
3. The receiver fits directly under the wing.
4. The pre-shaped wing tip just needs a bit of finish sanding.
5. The aileron servo fits in a premarked pocket and has a straight stout pushrod to the aileron control horn.
6. The v-tail is glued on. Notice the special v-tail control horns. The skid helps protect the linkages from damage.
7. The pushrods come straight out the open end of the fuselage with direct connections to the control horns.



Last, I painted all of the wood surfaces — wings and V-tail — with a water-based paint. Three coats were applied.

Even though this model is not advertised as an ARF, it can be built by an experienced builder in just a few days. The most time consuming part in building this model is waiting for the glue/epoxy and paint to dry.

Ready to fly I balanced my model as per the manual, 73 mm back from the leading edge of the wing, then did two hand tosses. The glide was straight and flat, but was on that fine edge of a stall. I added another, very small, bit of lead to the nose and did another hand toss. This toss was better and I felt comfortable.

Flying off of a 350' high-start, I let the model fly itself. I didn't use any elevator on launch, and no zoom at the top. Just like the hand toss, the *TIMON 2M* came off of the tow straight and flat.

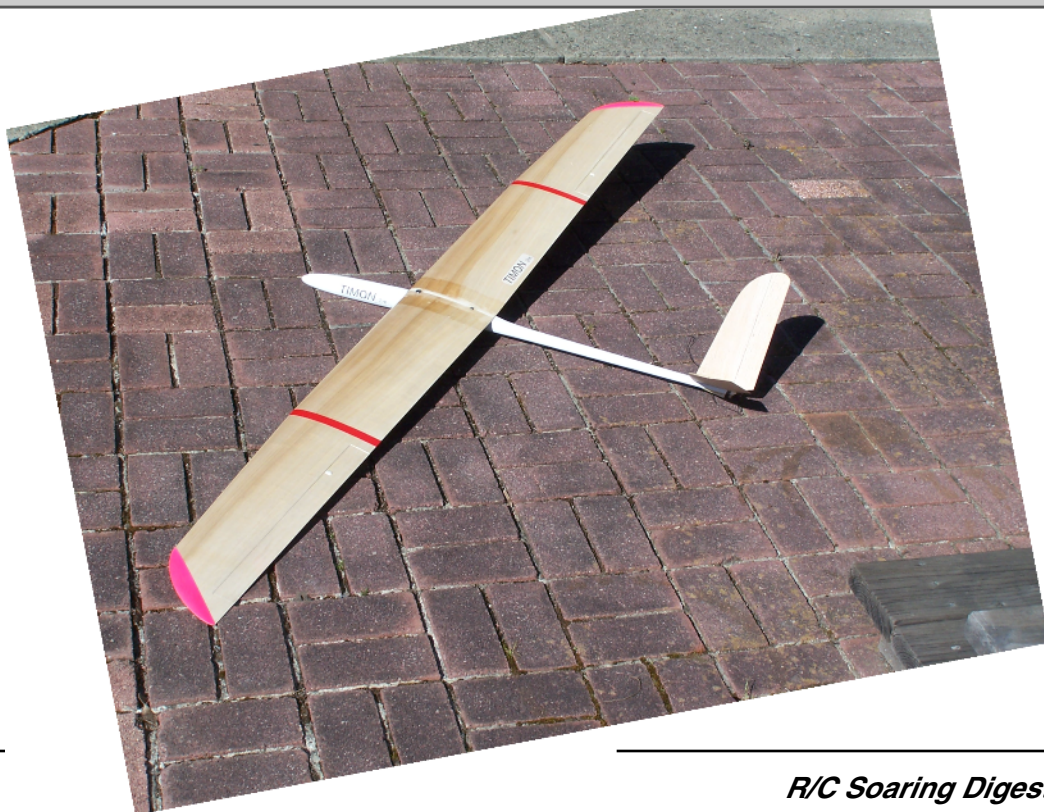
The aileron and rudder controls were commanding and smooth.

The elevator was a bit sensitive, but I think that the sensitive elevator was me. This was the first flight on a new model, and my first flight of any kind in several months.

Conclusion Easy to build and easy to fly. What more can I say? The day that the *TIMON 2M* had its test flight there was absolutely no wind, nothing, zero. With a gross weight of 24 oz. and a wing loading of 5.25 oz. per sq. ft., I can't say how this model will react under windy conditions... Yet!

TIMON 2M

Wing span	two meters
Profile	HN 1033 Modified
Length	38 inches
Gross weight	24 ounces
Wing loading	5.25 oz./ft ²
Price as tested	US\$145
Equipment used	JR Sport SX600 6 channel computer radio: <ul style="list-style-type: none">• Transmitter: JR SX600 w/V-tail mix• Receiver: JR RS600• Servos: JR 241 (4)• Battery Pack: HiTec #57405, 270mAh



2006 Black Eagle Slope Weekend

Getting there was part of the fun!

John Godwin, <johng@cis.co.za>

The Black Eagle Slope Weekend was the brainchild of Evan Shaw when he lived in Ladybrand. This town is in the mountains on the Lesotho border. When Evan moved to Krugersdorp there was a hiatus for a couple of years.

This year Izak Theron and his colleagues at Eastern Thermal Busters revived the idea. The site they chose was the Tamatieberg just outside Volksrust. The town is on the railway line route between Johannesburg and Durban. The hills in the vicinity are the northern outliers of the Natal Drakensberg. For the most part they are covered in glider-friendly grass.

We had never been to Volksrust before so here was a chance of an outing into the country as well as some flying...

We left Jozi and made our way to the South and onto the R29. We passed Brakpan and Springs, the old industrial heartland of the country.

In the days when our daughter was a CB buddy, Springs was known, not surprisingly, as Suspension City.

Once, from Johannesburg, she had brief contact with a buddy in Florida USA. Such rare long distance links were known in the parlance as “ton-up skip.” But I digress.

We left the industrial haze and moved out into the country. Cosmos was coming into bloom at the verges of the road.

Between Springs and Leandra we passed a road sign warning of “Owls” for the next five kilometres. It was not clear just what the danger was, or what sort of owls these were. Could they be of enormous size, swooping down to seize cars from the road? My good wife, the professor, kept a sharp lookout for the next while. We ran the owl gauntlet with no ill effects.

Halfway to Leandra we crossed the Gauteng border into Mpumalanga. From now on we would see more number plates ending in MP than in GP. An aside, everyone knows that the GP on Gauteng number plates really stands for “Gangsta” Province.

We carried on through Standerton to Volksrust.

We stopped for lunch at the Volksrust Wimpy, and had the usual excellent hamburger and fries, then it was on to the slope.

All the usual suspects were there. Dave Greer, Mike Summers and Warren Butler from Durban, Charl Cilliers from Bloemfontien, Izak Theron, Craig Baker, Evan Shaw and Piet Rheeders from up on the Reef, Dion Liebenberg from Pretoria. There must have been fifty pilots in all.

The Tamatieberg is a wonderful flying site. There are slopes facing most wind directions. The landing area is large and covered with grass. The view of the town of Volksrust, Majuba and the surrounding country is magnificent.

As we arrived the wind was a perfect strength for flying. It remained so for the whole day.

A highlight of the day was the Zagi racing. This consisted of a five-lap course followed by two minutes of combat. I don't know who won, but this was not the point. A good time was had by all.

It was a perfect weekend.





This page Above: The squadron from the BERG club. Evan Shaw and Piet Rheeders are BERG members. Upper right: Charl Cilliers with a *Limitex*. These little aircraft fly extremely well. Right: Paul Carnall's splendid *Fox*.

Opposite page Upper left: A general view from the top of the slope. Upper right: Evan Shaw. The Black Eagle was his brainchild when he lived in Ladybrand. Middle right: Charl Cilliers from Bloemfontein and Mike Summers from Durban. Lower, from left: Dave Greer. (No prize for guessing that he comes from Durban.) Izak Theron, the organizer. He comes from Benoni. (Charlize Theron, the Oscar winning actress, also comes from Benoni. Makes you think....) Piet Rheeders at Base B during the Zagi racing. Dion Liebenberg wearing a South African F3J 2006 shirt.

Below: The flag men and woman at Base B for the Zagi racing.

Right: Zagi racing in progress.

Far right: Base A during the Zagi racing



Left: That's me, the author, underneath the hat fettling the *Prodij*. It got away from me shortly after and buried itself in the ground at high speed. The horrible evidence can be seen in the photo above.

Peter Wick on Planks

by Peter Wick, <and-wi-pep@parknet.dk>

Part 4: Practical questions

During the first parts of this series, we have seen that it is better to design planks for slope flying instead of trying to fly thermals, and we would be better to use airfoils with lower camber, around 1 to 2%.

As I pointed out, the Phoenix airfoil, although it has twice as much camber as the EH1.5/9, does not have a better sinking speed or a better best glide ratio for our standard plank model. Only at very low speeds, from 15.5 m/h to 17.4 m/h, does the Phoenix airfoil have a small advantage over the EH 1.5/9.

And the Phoenix airfoil is actually very well adapted to the task, which means it is thin (8.2%), and the transition from laminar to turbulent happens at 20% of the upper side. This leaves the airflow enough time to reattach and follow the S-shape on the rear of the airfoil, keeping the pitching moment positive in combination with the high camber.

Control surfaces (flaps) Changing the angle of attack on a plank can only be

forced by changing the pitching moment of the airfoil or changing the static margin.

I will first be looking only at what happens with control surface (flap) deflections. This means you are actually looking for the biggest change in pitching moment at the smallest possible deflection, because the control surfaces are working the wrong way round and are reducing the maximum lift available of the airfoil and mostly increasing the drag of the airfoil.

The change depends on the chord of the flaps as shown in Figure 15 (Wohlfahrt, 1990).

As you can see, the optimum for getting as much pitching moment as possible is a 25% chord flap, but the optimum is rather flat, and this means flap chords of 16 to 40% will not make a big difference.

If you calculate, for example, the EH1.5/9 with different flap chords in XFOIL, you will find these general findings to be about right. I don't know if this is true for all types of airfoils, but I think as long as you are not designing your airfoils way off the

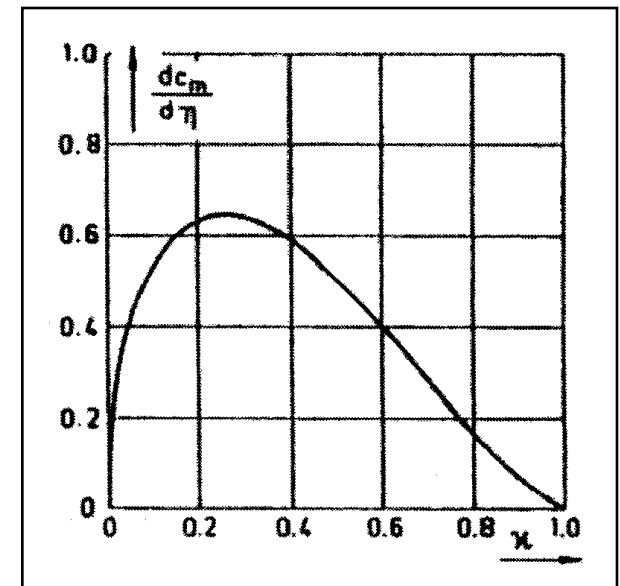


Figure 15. Pitching moment and flap chord (Wohlfahrt 1990)

normal way, the graphic will hold. But, as said before, the airfoil designer has some freedom with respect to flap chord.

So there is the question of how long should the flaps of a plank be? If the flaps are full span, their influence on the pitching moment will be maximal. In this case the deflections are going to be minimal.

On the *Green Monster* plank, the static margin is 3% and the maximum upwards deflection is about 5/64 of an inch, downwards it's about half of that. This is enough to control every flying situation from minimal speed to flying inverted.

As you can imagine, servos that don't come back to exact neutral make flying the plank a pain. Normally you will cure this by increasing the static margin.

Unfortunately, you do not only increase the stability around the pitch axis, you will also diminish the effect of the elevator, and thereby you will need more travel. This costs performance in almost every aspect.

Quite often you see planks with flaps inboard or just outboard. This has the following consequences:

If the flap is only half as long as the span, you will need double the travel as on full span flaps for elevator control. At the same time, the lift distribution will be deformed if you have not included the necessary deflections in your design approach. This means more calculation work and some knowledge about the pitching moment of



Figure 16. The *Green Monster*. Note the very short nose and the “Eta-shaped” fin.

the airfoil, from flying experiences or wind tunnel experiments.

Inboard elevators normally make the plank more prone to tip stall — outboard elevators make planks more safe to fly.

I therefore recommend the following flap conception for planks:

Full span flaps for elevator and aileron control. If the plank gets big, you will have to use four flaps. The very responsive elevator can be made more comfortable by

using some (moderate) exponential control at your transmitter.

If you have four flaps on your ship, you have some more possibilities. I use a three step switch for trimming my plank into different flying situations: a slow flying mode, a distance mode and a speed/acro mode. All four flaps move the same amount and in the same direction. By doing so, you keep the lift distribution the same all the time... you just have to do it right the first time in your design.

For small corrections during flight, you can choose to use only the outboard flaps to get some more resistance to tip stall or just to make the elevator less responsive.

But remember, if you are using full flap deflection you have to mix the inboard flaps to your outboard flaps to reach the same amount of maximum deflection, for example in sharp turns during F3F. This can be done by programming an exponential function on your inboard flaps. This sounds very complicated, but it is actually the same as all F3B flyers can do with their butterfly mixer, with the little difference that the camber changing flaps are moving the right way! You can fly with a very low static margin if you use this concept. You get a very responsive sloper, which can turn very tight, because of its low inertia around the pitch axes.

The aileron control should be without differential in the beginning, and can be adjusted to your flying tasks. I use some differential the other way round — one flap more down than the other one up — when flying F3F, so the plank is actually rolling into the turn. That makes it very aggressive to fly, but it works good if you pull a little bit up before the turn.

If you use four flaps, you can realize some kind of rudder, or at least you can do something against adverse yaw. If you use the outboard flaps with a lot of differential to counteract adverse yaw, you can use the inboard flaps to keep the pitching moment constant. (See Figure 17)

As you can see from the illustration, the right side of the plane has almost a kind butterfly braking. The angle of attack is the same as without deflection, so the pitching up and down are equalized. The red line is the lift distribution. You will get some proverse yaw by using these, I admit, rather extreme flap deflections.

If you have a computer radio, you can find the right amount of differential and compensation by switching from the proven model condition to the experimental condition.

Vertical stabilizer Winglets are more or less useless for controlling yaw on planks because the lever arm to the CG is very

low. They increase inertia around the lateral axis and, in my experience, seem to add a lot of drag.

So by far the best solution is the central fin. But what size and what shape?

To begin with, the central fin right behind the main wing seems favorable. If you use the ailerons to bank, a very strong vortex forms in the middle. This vortex causes the airflow to reach the central fin at an angle, causing the fin to produce lift, like a rudder which is deflected. (See Figure 18)

This lift is, if the fin is mainly on top, counteracting the adverse yaw. To support this situation, the fin should have a minimal strake in front of the fin, and the

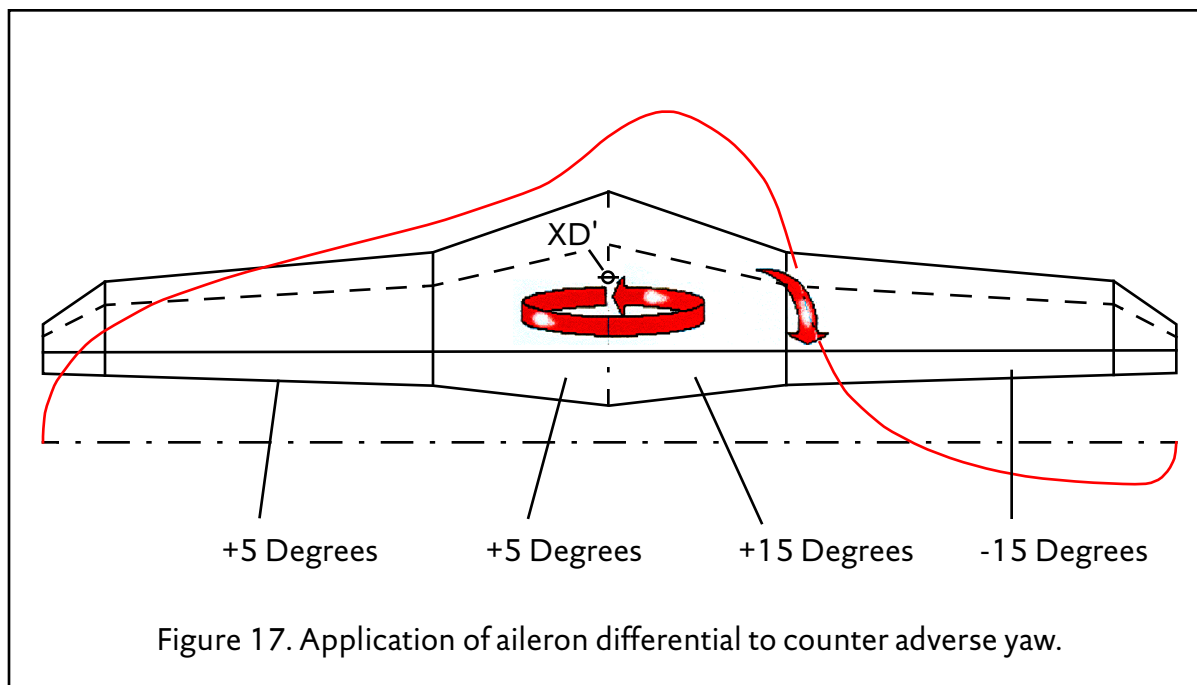


Figure 17. Application of aileron differential to counter adverse yaw.

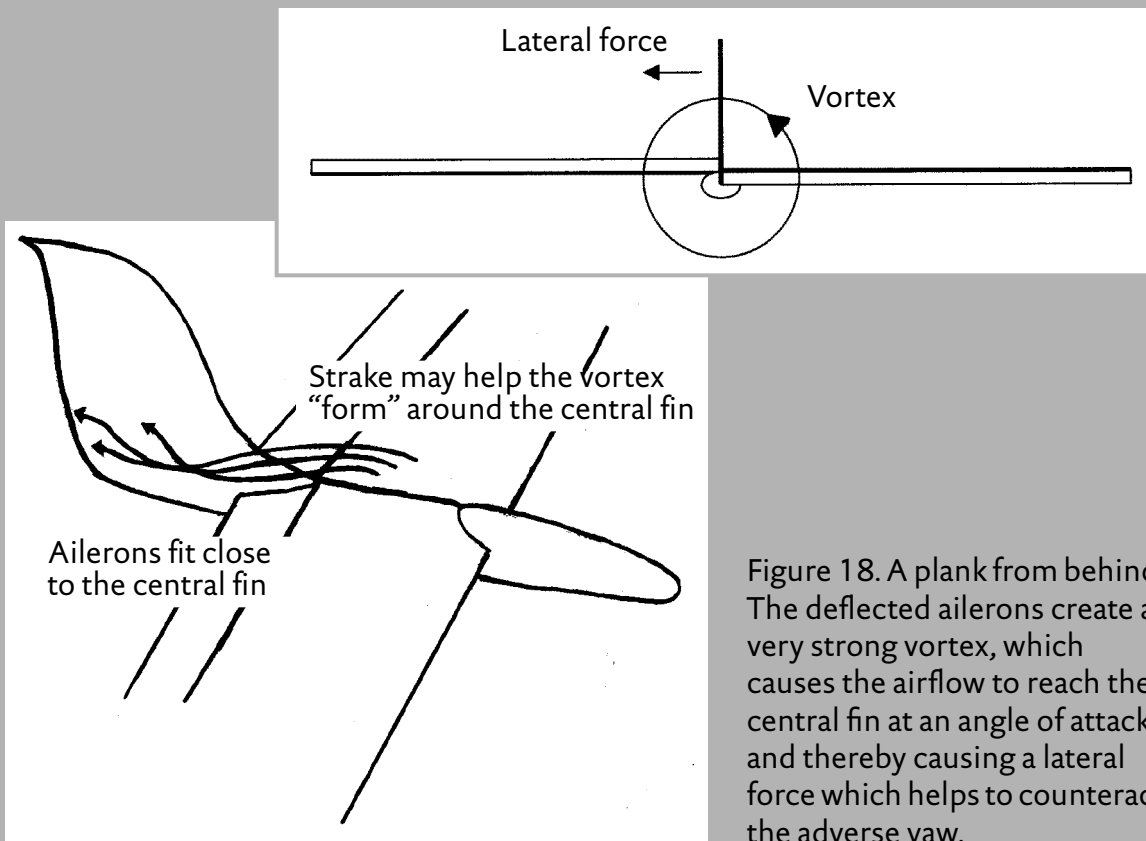


Figure 18. A plank from behind. The deflected ailerons create a very strong vortex, which causes the airflow to reach the central fin at an angle of attack, and thereby causing a lateral force which helps to counteract the adverse yaw.

What I mean is that in the middle of the wing, where the ailerons meet, emerges a very strong vortex, because of the ailerons which are deflected up and down. This vortex (airflow with a kind of spiral shape) meets the central fin, which is actually in the way of this vortex (like a winglet). This means that the central fin is met by this airflow at a certain angle. This induces the central fin to produce a lateral (rotational) force which acts like a deflected rudder and helps to counteract the adverse yaw.

You actually are able to see this. Just use a very bendy central fin, fly straight away from you, and give full aileron. You will see the central fin bending a lot! A friend of mine, who was also skeptical, was able to “turn” his central fin (*Bluto*-style attachment) in a vertical dive with rolls... So now he has become a “believer.”

strake should stretch between the two flaps.

Also, there should be as little space as possible between the flaps and the central fin. Otherwise the vortex will not be as strong as possible. The pressure differences will try to equalize each other on both sides of the fin. I am using ailerons over the whole span to get maximum roll rate.

Regarding the shape of the fin, I did a lot of testing with my planks to find out if there are shapes which are better than others for certain flying situations. In these tests, the fin volume was held constant.

The test was quite subjective, but went like this:

(1) I first looked at a very hard F3F turn, where you are making a pilot error after the turn — holding the elevator not long enough, or not rolling enough, so you are forced to correct the mistake and try to force the plane back on course, for example. Here I was looking at how fast the plank was coming back to the right track, and how long it took to dampen the swinging.

(2) In the second test I was looking for how the plank was behaving in very slow flight and changing flight direction all the time — aileron left, aileron right, aileron left, and so on. You can easily see how much adverse yaw there is if you do it right above your head.



Figure 19A



Figure 19B



Figure 20

Figure 19A. Original fin shape, mounted on a plank with straight leading edge.

Figure 19B. A *Bluto*, modified with the addition of an *Eta*-shape central fin in place of the part included in the kit.

Figure 20: The shape of the *Eta* winglet. See <http://www.leichtwerk.de/eta/de/technologie/winglets.html> for more information.

(3) The last test was combat, where you have a lot of control inputs at “strange” angles of attack and speeds. I was also looking at how fast the plank would stabilize after a hit.

The results are rather subjective and should therefore be taken with care.

First of all, the differences were surprisingly small. But if you were flying the best variant right after the worst for a certain situation, the difference was obvious.

Results: High aspect ratios are good in damping, first and second test, whereas low aspect ratios are better for combat. This is an easily understandable result, as the lift increases faster for the same yawing angle for wings with high aspect ratios.

In the first test, a variant with an unswept leading edge performed best, see Figure 19A. For this shape it was easiest to counteract yawing and it showed very good reaction to control inputs correcting flight direction.

A very smooth reaction and a great tolerance to big yawing angles was observed with a fin shape which I found on the internet, and that was the reason for me to eventually modify the fin of my *Bluto*, see Figure 19B. It is the shape of the winglet of the *Eta* full scale glider. (See Figure 20) The German text on <<http://www.leichtwerk.de/eta/de/technologie/winglets.html>> says that the winglet is designed in such a way that the

top of the winglet will stall first, the biggest part in the middle afterwards, and the root will almost never stall.

This shape seems to be very good for combat applications — aerodynamically, but probably not structurally. On the other hand, it can be a good choice for slope ships as well, because it's shape gives a quite long lever arm, and therefore some good damping.

The question of fin area is rather difficult to answer, but here is an approach which may be acceptable. Werner Thies once presented this formula for the calculation of fin areas

$$Af = \frac{A \bullet b/2}{STAf \bullet xf}$$

Af means the area of the fin; A the area of the wing; $b/2$ half of the span; $STAf$ the stability factor for the chosen fin area, and xf the lever arm, from quarter chord of the wing to the quarter chord of the fin. The stability factor is the critical size. For my planks it is around 42, which might be a good starting point.

The following factors will lead to a higher stability, which means a lower stability factor:

- Intended flying purpose is thermalling and you are mainly flying slow
- High aspect ratio (my wings have aspect ratios between 6 and 10.)

- Big planks, in terms of span (mine have spans between 48" and 71")
- Heavy outer wing panels
- Big fuselage area in front of the CG

The last point is especially important because all lateral area in front of the fuselage is destabilizing and should be avoided. You have to pay in fin area on the other end of the plank, which adds weight, and then you have to increase the length of the fuselage... and that gives...

To optimize your fin area you can also make a big primitive coroplast fin first. Fly in the cross-wind direction and cut the fin area until the plane neither turns into nor with the wind. It will not take more than an hour to get to the optimum.

Wing planform A lot of planks are still looking like tree-planks you buy in the local do-it-yourself shop. This is only reasonable for aspect ratios around six. Over that, there is no reason why they should not have the geometrical shape of a moderately tapered F3B wing

If there is not enough taper, you will get a lift distribution which does not make effective use of the airfoil potential, both in terms of drag and maximum lift available. I will vote for a wing planform with a straight, unswept leading edge.

Two reasons why I think a wing planform with a straight, unswept leading edge is a good idea:

It seems to me that planks with this kind of leading edge are not so much affected by gusts or nasty weather. In gusty weather conditions, planks with sweep, as well as swept back wings, lose a lot of performance compared to conventional planes.

I think the reason is that the front of the swept back wing is entering the gust first, which makes the plane fly with a higher angle of attack. For a short moment the airflow will meet the wing at the center and at the rear parts at different angles. This increases the induced drag because the plane is flying with higher C_L and a somewhat distorted lift distribution.

A “normal” plane with a tail will also react to a gust, but the pitching will be less because of the higher damping, and the lift distribution will not be affected. Planks are especially prone because of their very low inertia, but will not have a distorted lift distribution. Normally you will fly with the CG a little bit more forward in these conditions, and this will also cost some performance.

The other reason why a straight and unswept leading edge has some advantages is that the ailerons, if the wing is tapered, are closer to the CG, and thereby their effect on the pitching of the plane is reduced. Using differential ailerons will not have the significant effect of changing the angle of attack of the plane. This circumstance was pointed out by Jim Marske (See box), who made his planks the

Resources:

You can find the program for calculating lift distribution (Ranis / Möller) and more at these URLs:

<http://mitglied.lycos.de/frankranis>

<http://n.ethz.ch/student/mmoeller/mmm>

Homepage of Hartmut Siegmann:

<http://www.aerodesign.de>

Eta Winglet Geometry:

<http://www.leichtwerk.de/eta/de/technologie/winglets.html>

Marske's Nurflügel:

<http://www.continuo.com/marske>

Genesis “Nurflügler”:

<http://www.continuo.com/marske/articles.htm>

http://www.nurflugel.com/Nurflugel/Fauvel/e_genesis.htm

<http://www.continuo.com/marske/butterfly1/genesis/genesis%20horizontal%20graph.htm>

Similar, but a little less “only wing” (tailless):

<http://foamworks.co.nz/sg/concepts.htm>

Wohlfart, M., Nickel, K. (1990): Schwanzlose Flugzeuge. Basel, Boston, Berlin: Birkhäuser Verlag

Hepperle, M.: Profile für Nurflügelmodelle. In FMT Kolleg, Nr. (1996). Baden- Baden: Verlag für Technik und Handwerk GmbH

Pfenninger, W. (1946): Untersuchungen über Reibungsverminderung an Tragflügeln. Promotionsarbeit an der ETH Zürich. Zürich: Dissertationsdruckerei AG Gebr. Leemann & Co.

same way. On the downside, this shape will locate the CG very much toward the front of the wing, which is bad. You will need a longer fuselage. On the other hand, it will deliver a long lever arm for the central fin.

Construction and building It is very important to keep the inertia around the pitch axes as low as possible, which means everything behind the CG has to be built as light as possible, whereas everything in front of the CG can be made heavy. This actually makes a very robust plane and will be an advantage if you make your plank out of a mold, as I will be doing in the future.

Furthermore, you should use very accurate servos. They don't need to be very fast, because the elevator travel is very small, but there should be no slop and they should be very precise in coming back to neutral. Have you ever flown an all moving tail with a lot of slop? If your answer is yes, you know that this will kill the fun of flying. If you do it on planks, it gets worse. This is probably one of the reasons why planks do not have a very good reputation.

Sometimes I think it has also to do with the attitude some people have when looking at planks: "Ohhh, it's a plank... Well, I still have some old servos from my shaking fuel plane which crashed some years ago... I think they will still do it... The performance of planks is not that good anyway..." YES!



Jo Grini throws his *Pike Giant* on the winch into a blue sky.

LET'S BUILD A GENIE!

Or “How to Get an Open Class Glider the Fun Way, Not the Buy-N-Fly Way”

Part 1, Starting the fuselage

by Chris Boultinghouse, <caboultinghouse@yahoo.com>

As you might have guessed by the title, this series of articles will allow you to follow along as I build a *Genie*, designed by Harley Michaelis. I won't go into the history of the *Genie*, as that was detailed in the March issue of *RCSD*. What I will tell you is a little bit about me, and why I decided to build a *Genie*.

I've been flying RC since 1980. My first plane was a House of Balsa 2x2 (remember those?). I wasn't very good at finding lift, but I had a lot of fun. As the years went by I tried almost every segment of the RC hobby, but came full circle back to gliders in the early 90's. I became so obsessed with the hobby that I even designed and kitted a hand-launch glider named *Corn Dogger*.

After making over a hundred kits, burnout set in. In search of more fun, I got my pilot's license and my RC hobby/business was shelved. All my money and time was funneled into flying whenever I could, and ultimately building a full-scale experimental aircraft.

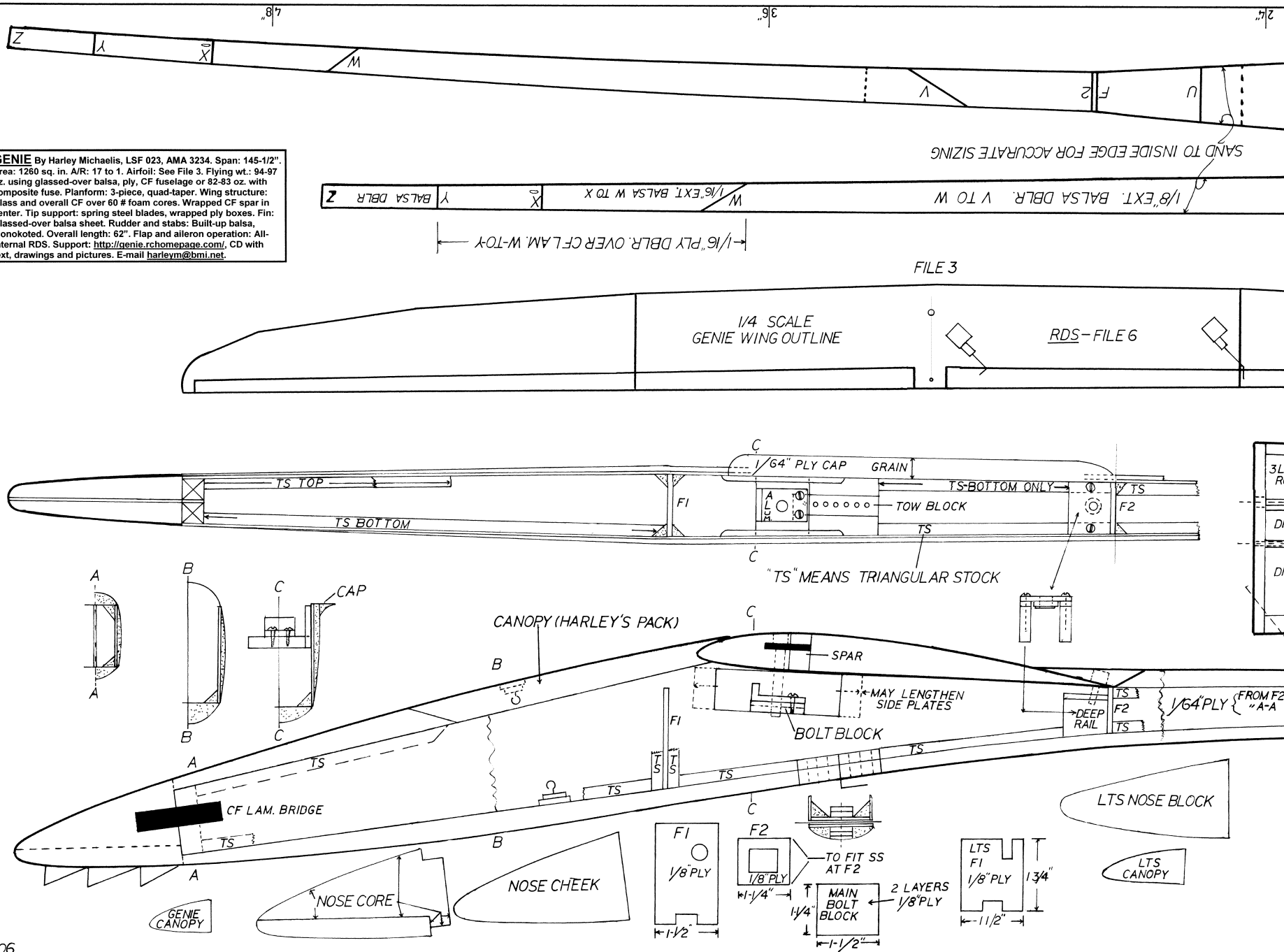
Fast forward about six years, where I finally realized that full-size airplanes are really expensive and, because of that, not quite as much fun as I had imagined.

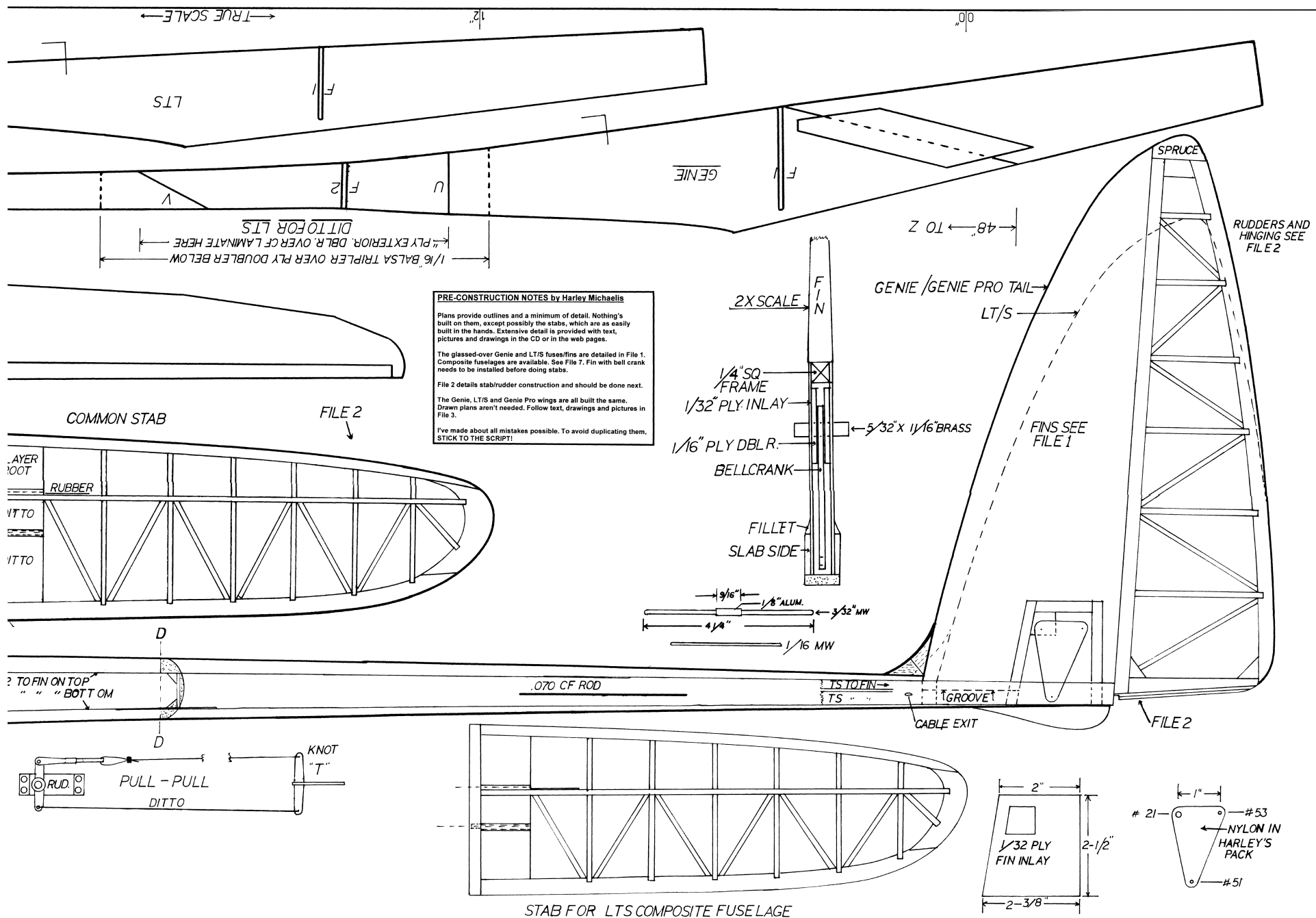
So the big plane was sold, and the thumbs are itching to fly RC again. Wow, things have changed! Radios are better and cheaper, and strides have been made in airframe design too. I need a big glider!

And here we hit a snag. What happened to the beautiful designs of the 90's? What happened to kits? I'm a do-it-yourself kind of guy, and actually enjoy the building phase of the hobby. It seems that everyone today just whips out their checkbook, buys a “moldie,” sticks in the servos, and goes flying. And not to be unkind, but many of these high-end machines are, well... unattractive! They look like a broomstick with a wing stuck on it.

After searching for several weeks, I came across a build thread on RCGroups.com about the *Genie*. Reading it convinced me the *Genie* was what I had been looking for, so I corresponded with Harley, ordered the plans and hardware pack, and here we are.

GENIE By Harley Michaelis, LSF 021, AMA 3324, Span: 145-1/2". Area: 1260 sq. in. AR: 1 to 1. A/C split: 3. Fins: 3. Flang w/ht: 9/17. Features: 100% covered body, p/c fuselage, 62-3/4" long, 10" wide, with composite fuse. Platform: 3-piece, quad-taper. Wing structure: Glass and overall CF over 60% foam core. Wrapped CF spar in center. Tip support: spring steel blades, wrapped ply boxes. Fin: Glassed-over balsa sheet. Rudder and stabil: Built-up balsa. Monokoted. Overall length: 62". Flap and aileron operation: All-internal RDS. Support: <http://genie.harcomepage.com/>, CD with text, drawings and pictures. E-mail: harleym@bmi.net.



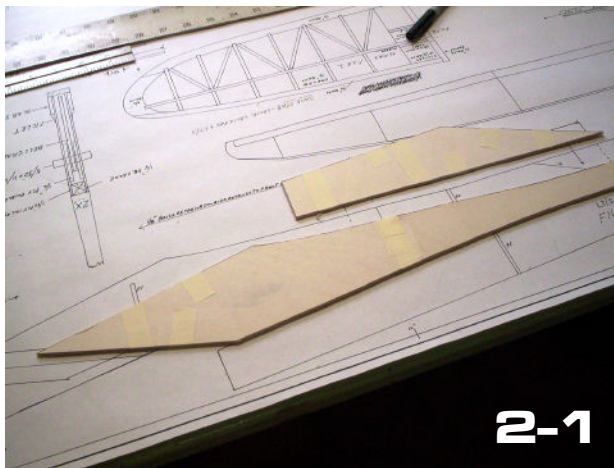


Fuselage Construction Rather than opt for the fiberglass fuselage, I decided to build the glassed-over wood fuselage. Not only will this represent the most economical version of the *Genie*, but it would also satisfy my craving for a real builder's project. Let's face it: There is something therapeutic about revealing a sexy curvy fuselage by carving and sanding. Perhaps there's a frustrated sculptor in most modelers?

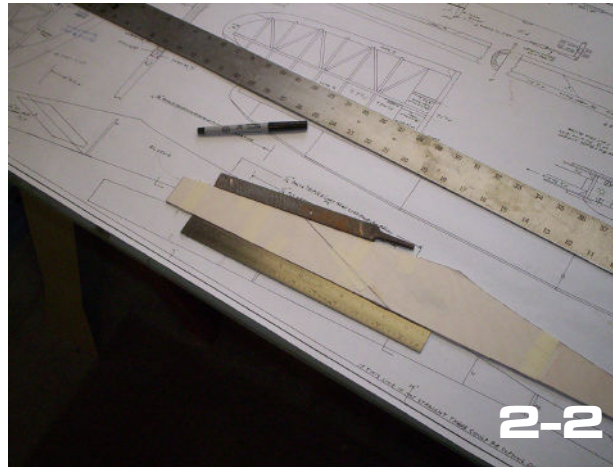
I used Harley's excellent materials list to order wood from Lone Star Balsa. As I usually do, I basically doubled the quantity for the balsa, so I could pick and choose (and have extra for the inevitable "oops").

When the order arrived, the first step was to lay out the plywood fuselage sides on the 1/16" plywood sheet. Make no mistake, this is a big machine, and requires splicing the sides even when using 48" stock. Tracing paper was used to trace the fuselage outlines rather than cutting the plans. All cutting was done with a bandsaw. If you do not have a bandsaw, visit a friend who does to cut the fuselage parts!





2-1

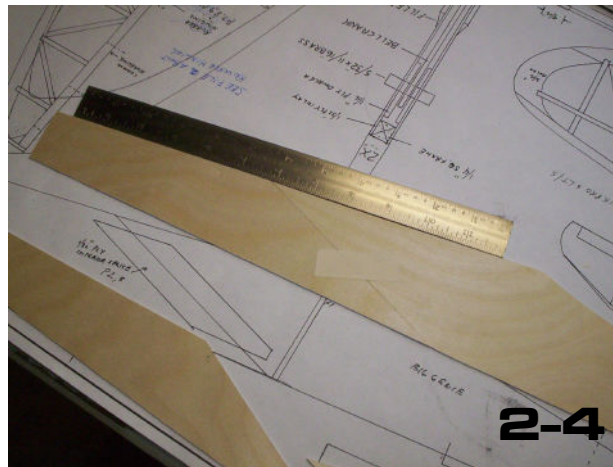


2-2

The fuselage sides are shaped while lightly bonded together with 3M77. Take your time on the splice of the forward and aft sections. You want a precise fit, and a straight top and bottom profile, or you'll have issues later. Follow Harley's tips in the instructions for shaping and joining. A piece of 1/32" ply is used to reinforce the joint on the inside.



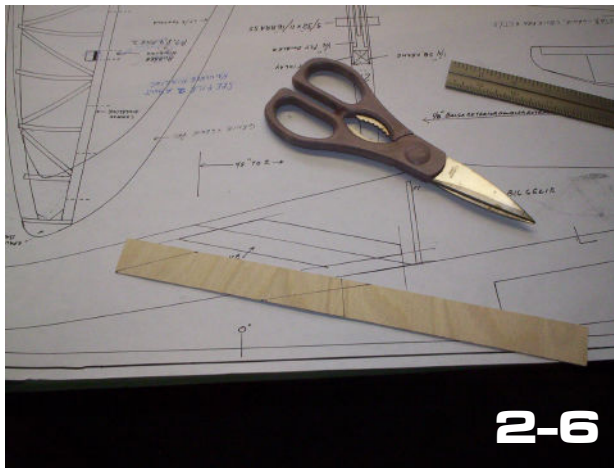
2-3



2-4



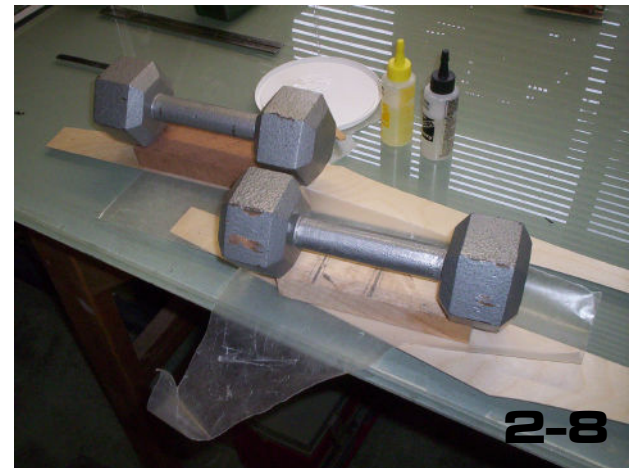
2-5



2-6

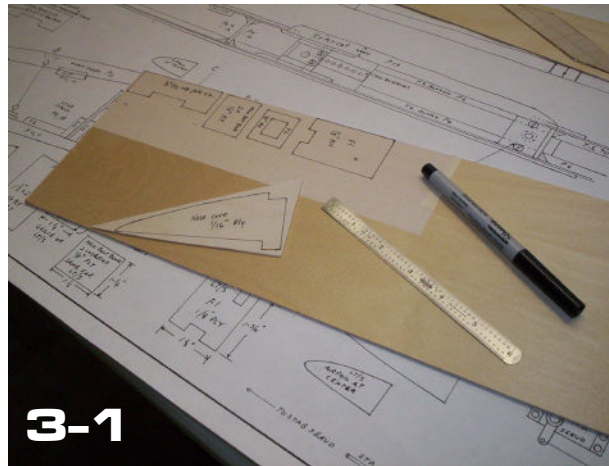


2-7



2-8

Internal formers are cut from 1/8" plywood. I used the "connect the holes" method to make the cutout in the center of F2.



3-1

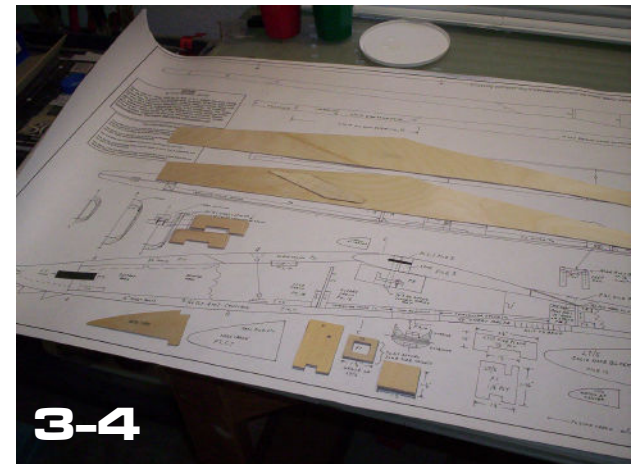


3-2

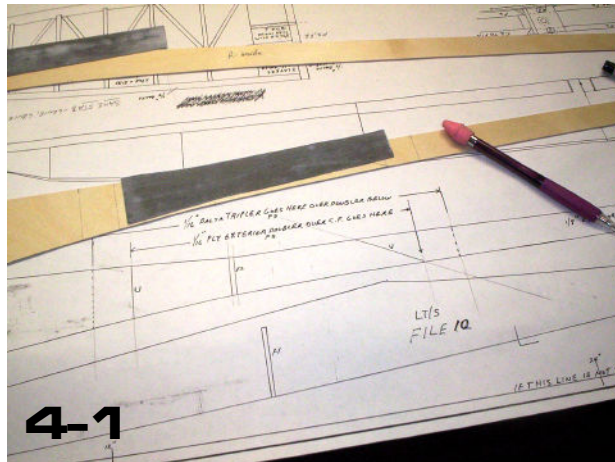
The fuselage sides are a clever lamination consisting of 1/32" and 1/16" plywood, 1/16" and 1/8" balsa, and .014" carbon laminate.



3-3



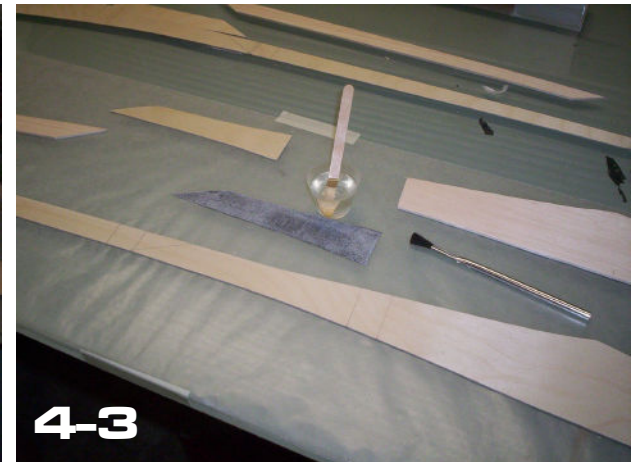
3-4



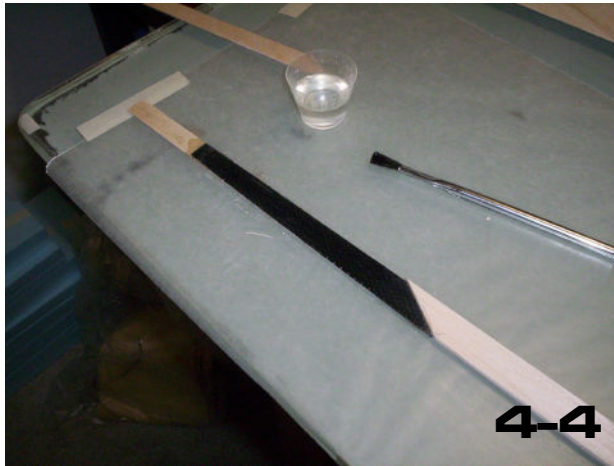
4-1



4-2



4-3



4-4



4-5

Don't be tempted to change this design. It is strong where it needs to be, and flexible where it works best. Take your time, study the plans, and read the construction notes and the lamination sequence will become evident.

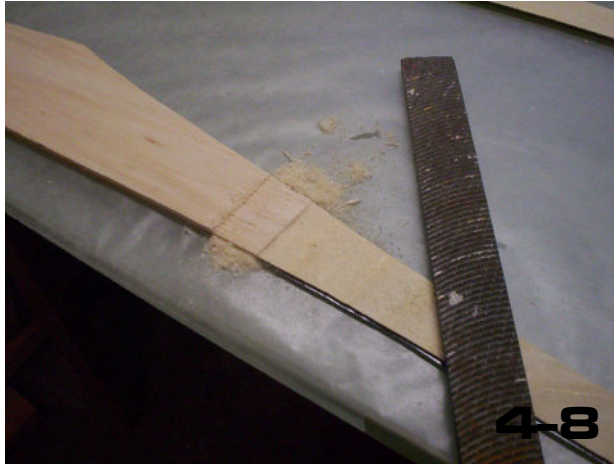
After the sides are laminated, it's time to build the simple fuselage jig outlined in the instructions and prepare to join the sides together. It's worth noting that you will find yourself jumping around a bit in the instructions, or at least I did. For example, I went ahead and cut the fin so I would have it for the fuselage joining process.



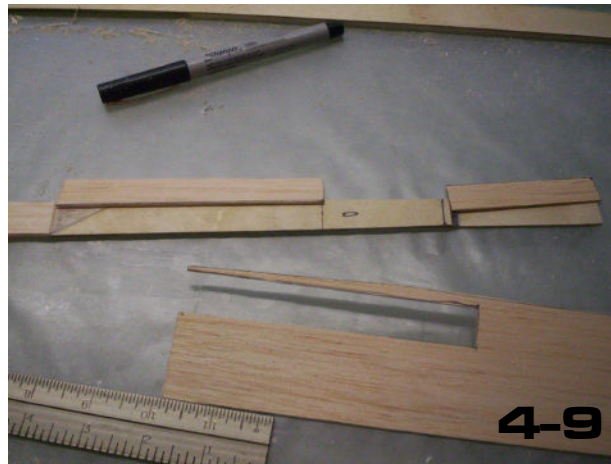
4-6



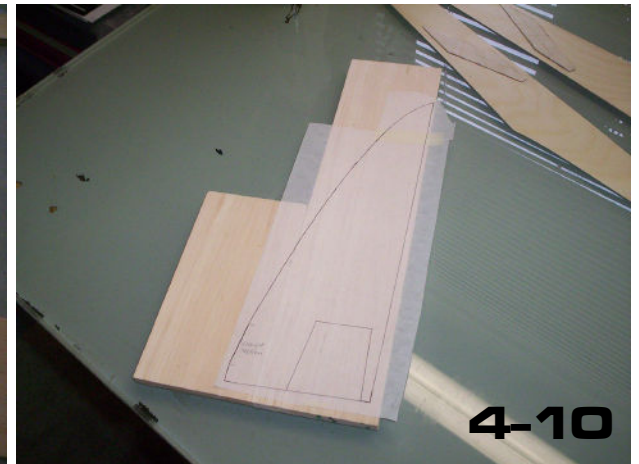
4-7



4-8

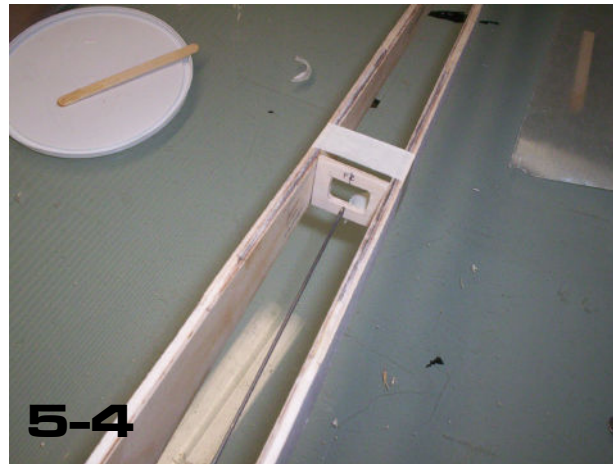


4-9



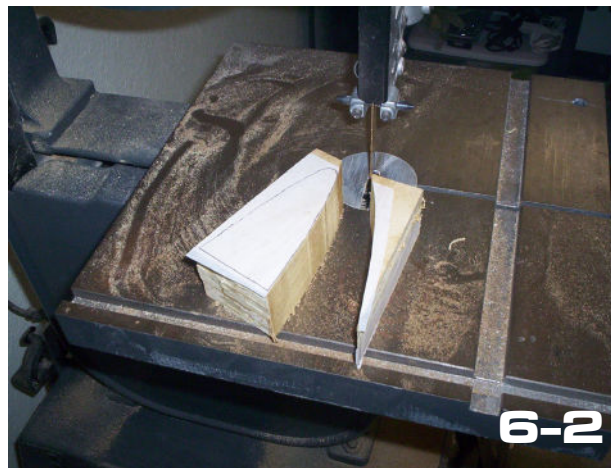
4-10

Once your jig is ready, start assembling those fuselage parts. You add triangle stock and other miscellaneous bits and pieces prior to joining. It goes quickly and, with the help of the jig, comes out straight as an arrow.



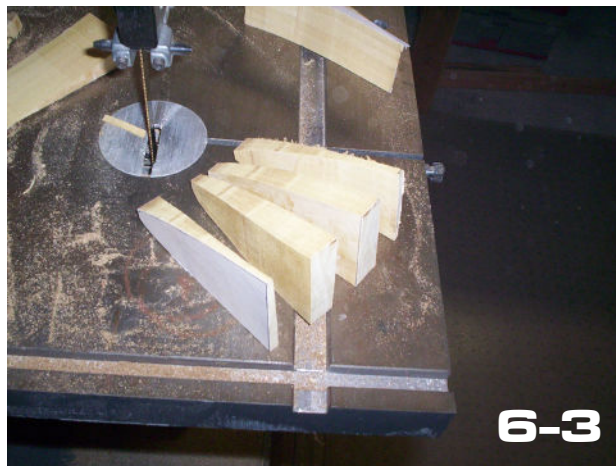


6-1



6-2

Once the sides are joined, it's time for more fun carving! I chose to use laminated 1/4" sheets of poplar for my nose block. I like using laminations whenever I carve, that way the fine lines of the blanks serve as guides for symmetry during the carving. I cut the top and side views of the nose block assembly on the bandsaw, and shaped it down with a razor plane and vixen file. Note the groove in the bottom, into which a set of "sharks teeth" will later be inserted.



6-3



6-4

I drilled a 3/8" hole into either side of the nose block and poured two ounces of molten lead inside. Use caution and adequate ventilation when working with molten lead! Lead shot and epoxy would work as well, and be much safer. The shaped and ballasted nose block is then glued to the fuselage sides.



6-5

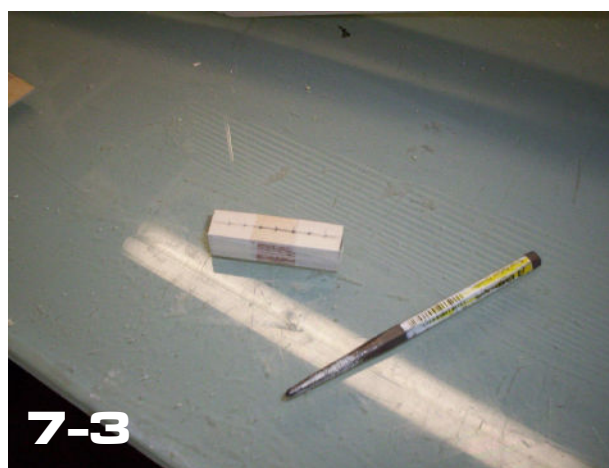
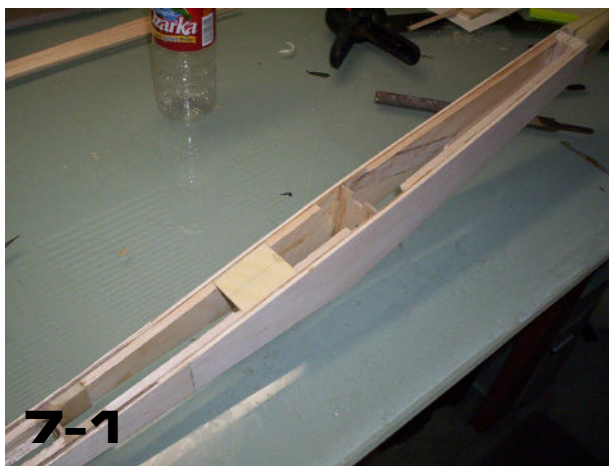


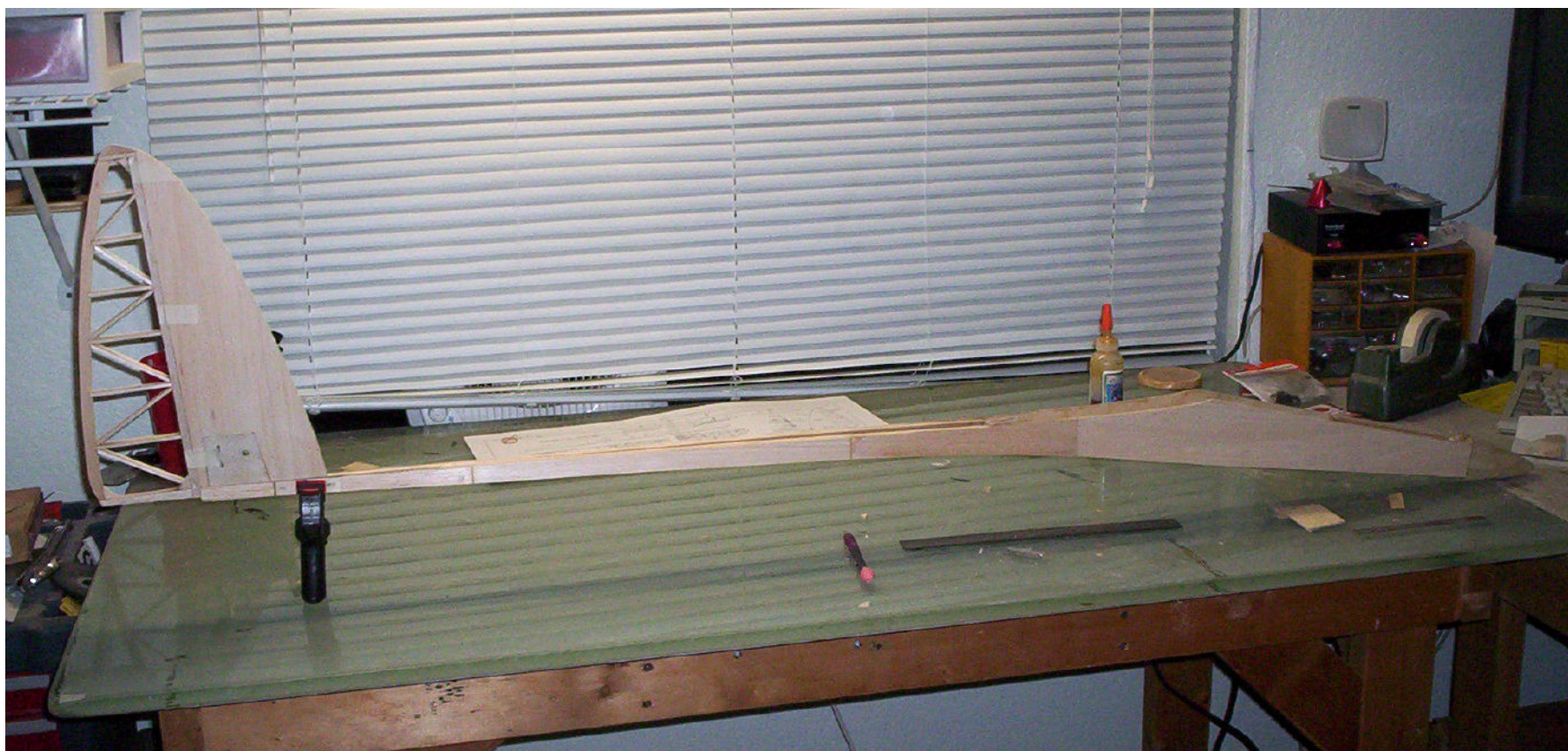
6-6



6-7

Next up is the tow hook block assembly. This consists of several pieces of 1/8" and 1/16" plywood. Sounds complicated, but it isn't.





As you can see by the picture on the facing page, it is starting to look like a glider fuselage! You can also see the framed-up rudder in that picture, but you'll have to wait until next month to see how the rudder and the stabilizers are constructed. As they say, "stay tuned".

Let's face it: There is something therapeutic about revealing a sexy curvy fuselage by carving and sanding.

Maple Leaf Design *Encore*

Fabrication walk-through, Part 1

by Phil Pearson

This discussion and series of photos detail methods used in early *Encore* mold production. Later articles will detail the actual lay-up of the fuselage. There is no attempt to cover all the details, but hopefully some hints will solve a few of the many frustrating problems this process is fraught with.

With regards to successful mold and part production, the philosophy of surface preparation deserves a thought. Less work is involved sanding soft material as opposed to hard materials. Low spots on the plug surface should be filled with sandable primer and other fillers to the level of the higher areas of the plug. It is much more difficult to remove hard plug material in order to work the surface level to the low areas.

Many different methods are used to produce a plug and mold for a fuselage. All share similar difficulties in obtaining a good result. The most difficult problem

seems to be getting the mold to release from the plug.

Draft angle is very important as it is necessary to have a more complicated part line and usually a multiple number of inter-fitting molds for plugs with undercuts.

Finish compatibility or a finish that is not fully cured will usually cause the plug to stick in the mold. I have had good success using an Acrylic clear coat on the plug. The coating mentioned in the photo captions has the additional advantage of flowing to a smooth glossy finish that needs little preparation for molding.

Usually waxing ten or so times and spraying PVA on the plug will allow easy separation. If Partall #2 wax is used it is best to wipe and polish off before it dries, as it is almost impossible to remove once it has glazed over. Partall #2 is a very dependable release agent when applied properly.

Problems with air bubbles in the first resin coating on the plug are difficult to remove later on. I have found the epoxy can be mixed with a Dremel type tool using a small wire brush to emulsify the epoxy and air to very fine bubbles like those found in mayonnaise or meringue. These bubbles disappear and larger ones are less likely to occur. The wire brush will harden to a disc and can be used many times. Powdered silica can be blended with epoxy to produce a serviceable surface coat. For most applications special resins are not necessary.

Generally, several layers of fiberglass cloth are laid up on two coats of a partially cured resin/silica mixture. For smaller molds, these layers are usually 0.75 oz/sq.yd., followed by several layers of 3.0 oz/sq.yd. twill-weave fiberglass cloth.

Sharp corners are filled with cotton fibers and resin or other suitable thickening materials.

Thicker mat is used next, for bulk, or even easier, tooling compounds such as AdTech's 323 tooling compound. Several layers of fiberglass, in a twill weave, finish the mold in a "balanced" layer/layer manner.

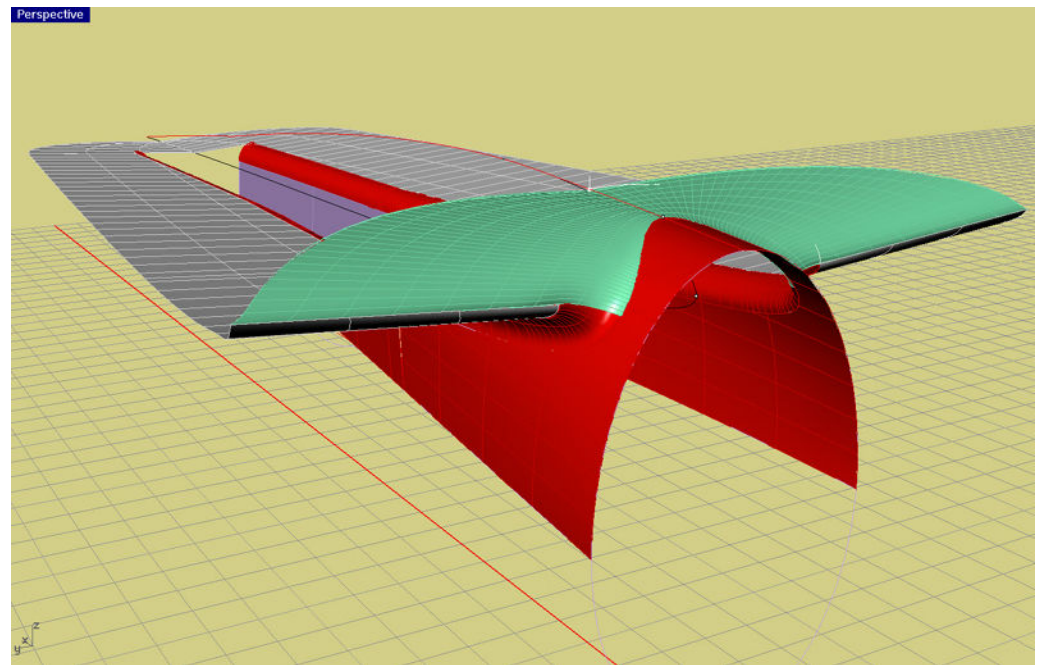
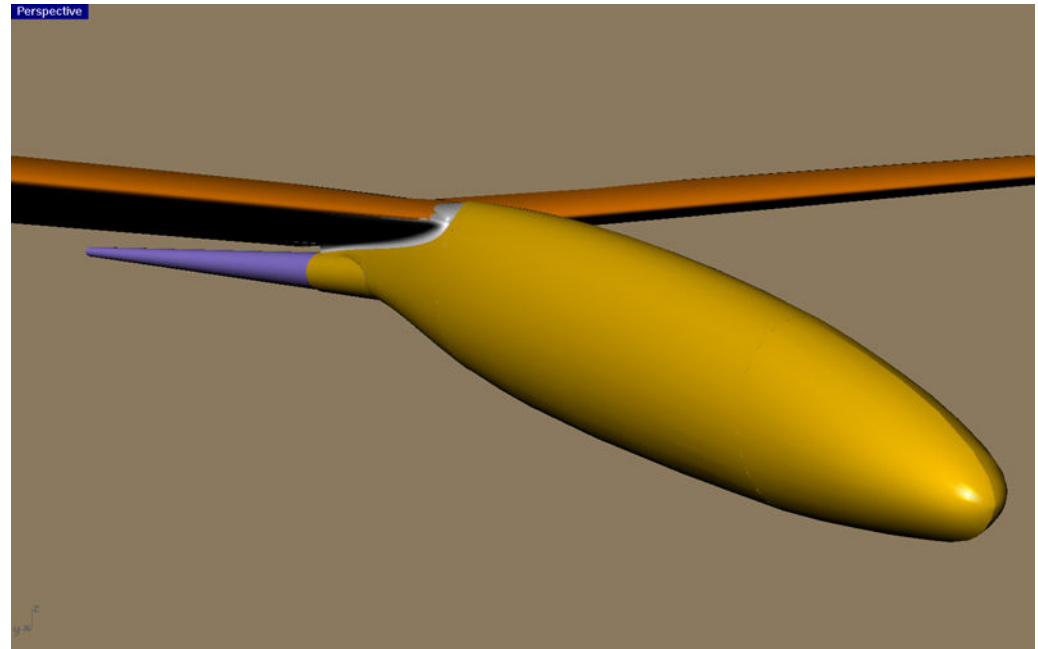
Registration pin holes are bored before the mold halves are split apart. It is a good idea to bore any joiner-bolt holes at this time.

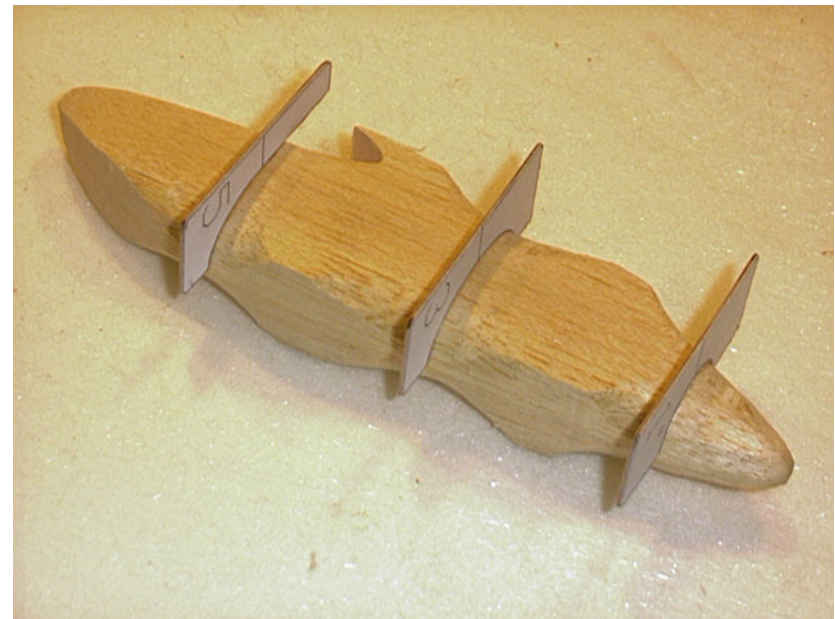
Much success with the molding process can be attributed to a complete cure of the resins, and a heat box set at 100°F is a necessary tool in cool environments.

Storing resins in the heat box before mixing also encourages good cures, and makes the resins easier to stir. However, this can reduce your working time.

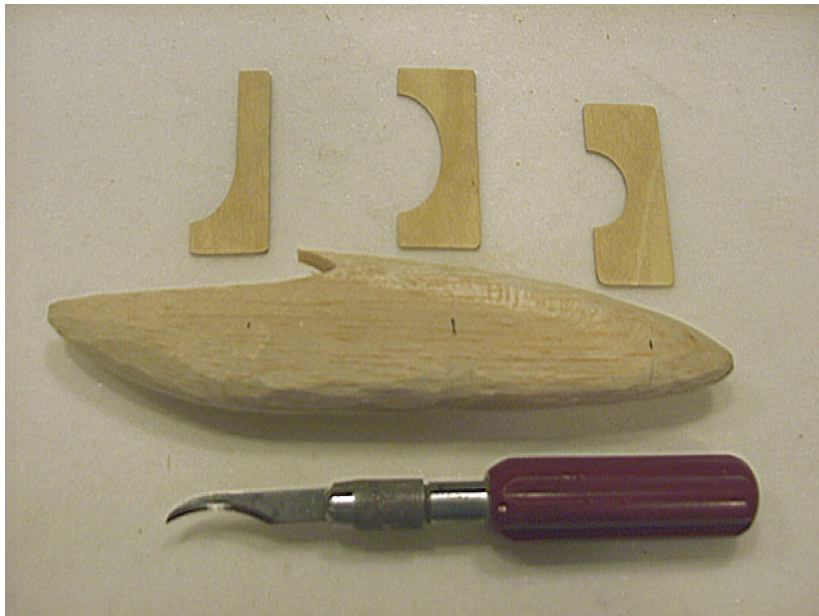
Upper: 3D-CAD, RHINO, is used for checking the finished appearance from several views and flight angles.

Lower: Surfaces can be modeled for CNC cutting of mold plugs.

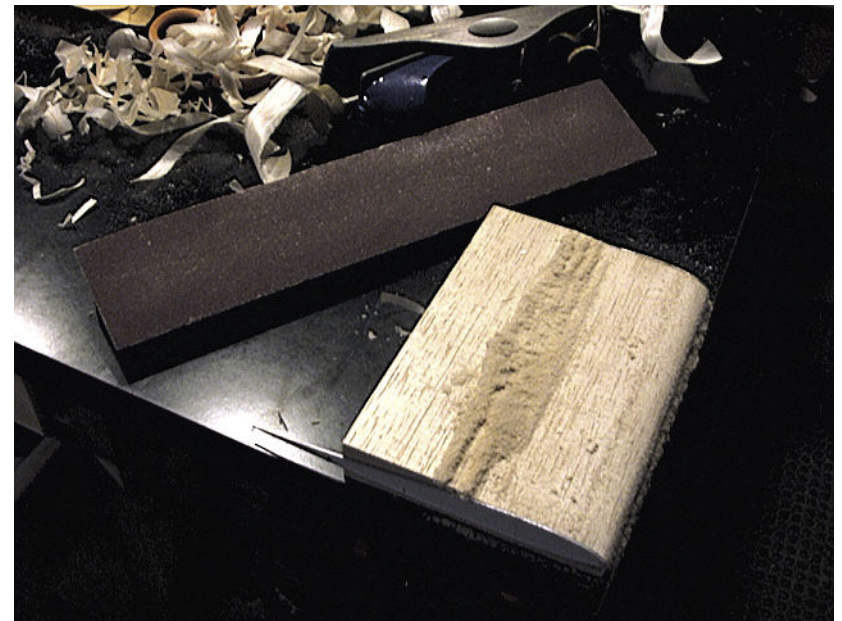
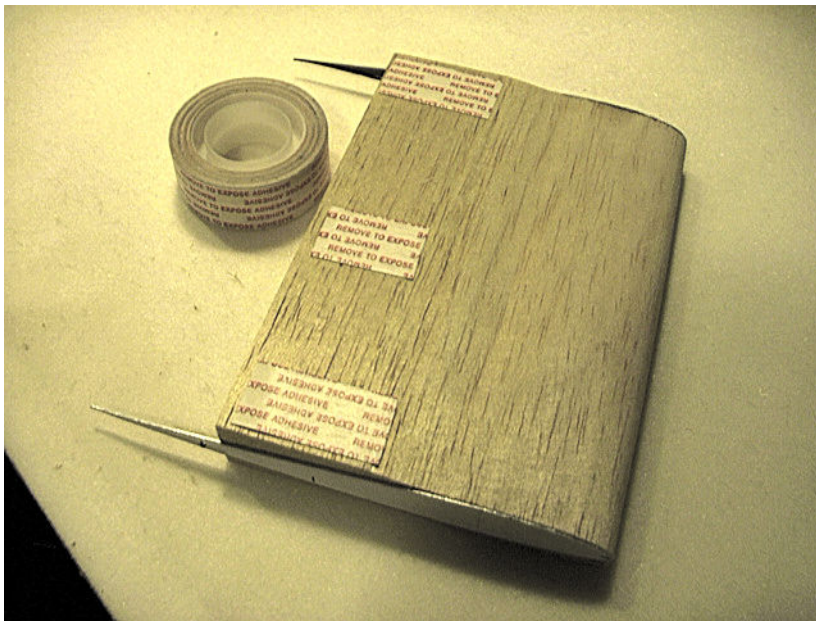




This series of photos illustrate a classical method of carving a plug by hand. Left: Side and Top views are drawn on paper and tack glued to the original block. Right: The cross section of the block is carved at the station locations.



Left: The intermediate areas are rough carved similar to the template locations. Right: 80 grit sandpaper is used to even the contours.



Left: A wing stub is carved with 40 grit paper to aluminum templates glued to the ends of the block. The block is held to the table with double sided tape. Right: A block plane is used to remove bulk material and the contour is sanded in with a "T-bar" sanding block.



Left: This plug is balsa and soft, the surface is hardened with thin CA glue. The excess is wiped off with paper towels. Right: Fillets are added using Bondo, polyester filler, and shaped with a small light bulb or other suitable form. Care should be taken to leave the fillet contour scant and the difference made up with easily sandable filler.



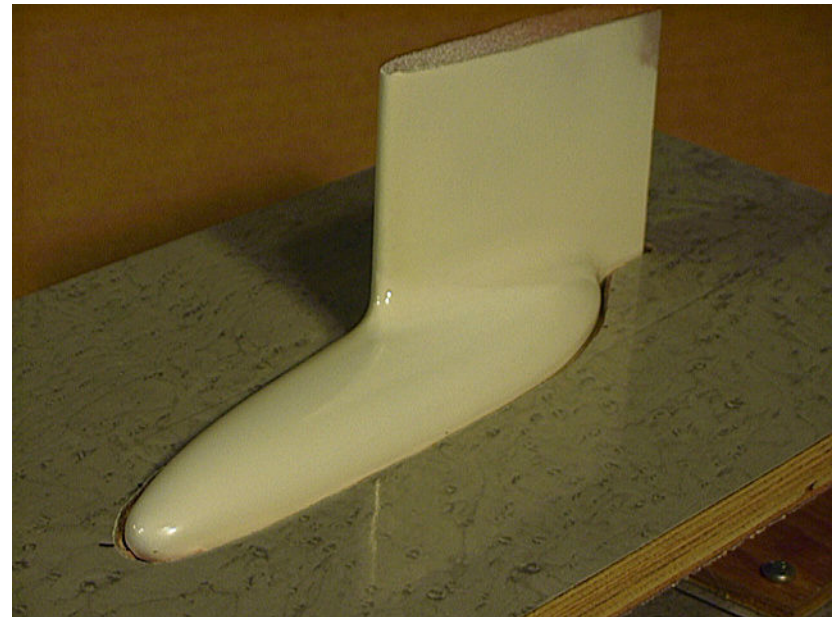
Left: In the background, a workbench air-filter from Grizzly.com filters airborne sanding dust.



Right: Useful plug-finishing products, sandable primer, left, and clear acrylic coating 1301.



Left: Plug finished with epoxy paint. An unsuccessful mold release resulted in re-finishing with sandable primer and Krylon 1301 Acrylic Crystal Clear, as shown opposite. Right: Plug in splitter board, bedded to level with modeling clay and Bondo in plastic baggies to prevent gluing to plug. The plug/splitter gap is left low and the resulting positive-excess is wet sanded level on the mold face.

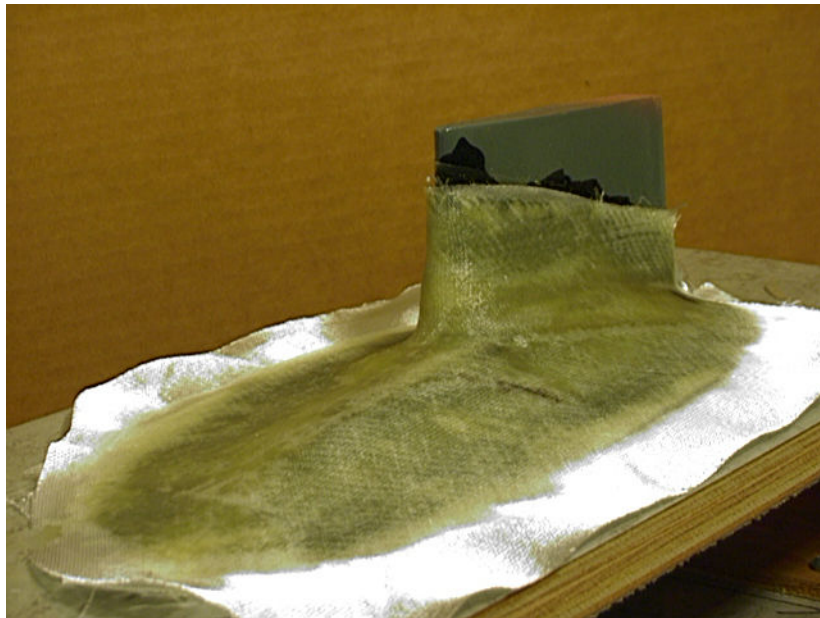




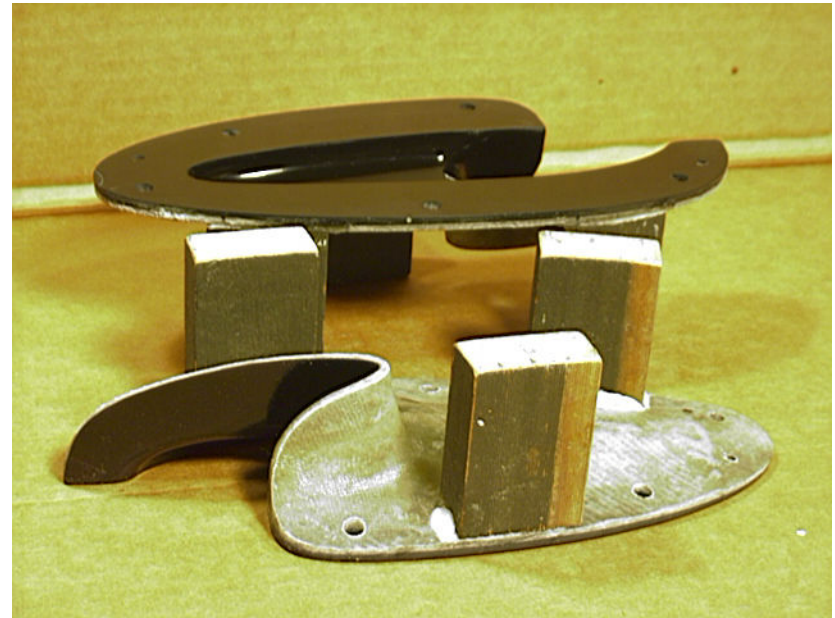
Left: Several products used in Encore molds. Back, Adtech's two-part EL-323 TC tooling compound, used for rapid bulking of the mold thickness. Front-left, Loctite's Frekote B-15 sealer, used to prep new mold surfaces and decrease part release problems. Front-right, Partall's #2 wax is used to prep mold surfaces to facilitate release of the part.



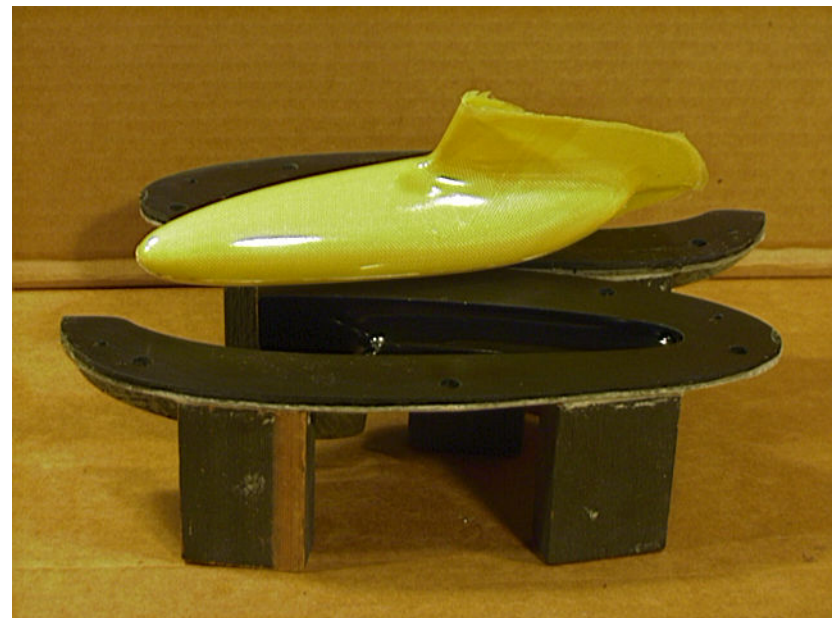
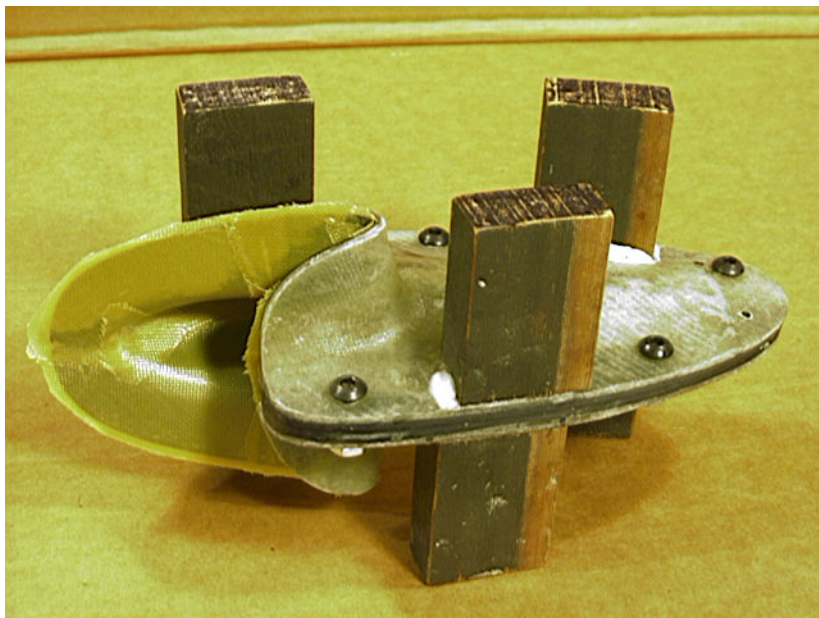
Right: PVA, diluted with water is sprayed on the plug after ten coats of Partall #2 wax is applied.



Left: Fiberglass lay-up complete on first half of mold. Right: First half mold ready for perimeter trimming.

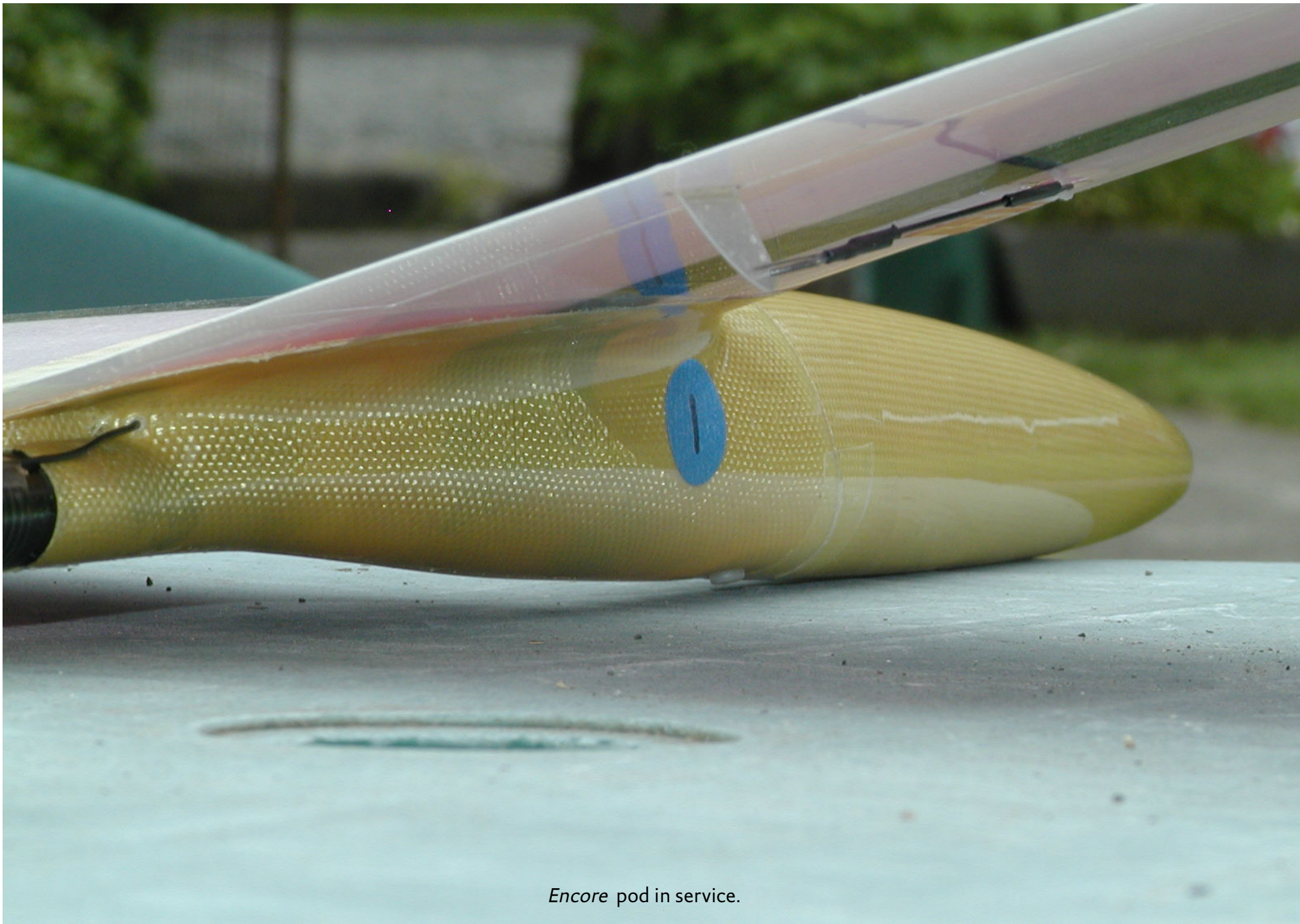


Left: The second half of the mold is laid on the plug and first half mold. Right: Trimmed mold halves with supports.



Left: Assembled mold with Kevlar pod. Note joining bolts and one of two registration pin-holes on top right end of mold.

Right: Pod removed and ready for trimming.



Encore pod in service.

Mikro Designs SPF-5-RXO Version 3

by Bill & Bunny Kuhlman, <bsquared@themacisp.net>

The great thing about an entirely digital receiver like the SPF-5-RXO is that the software can be easily revised.

We picked up our first SPF-5-RXO (Version 1 software) in October of last year, at the Visalia Fall Soaring Festival. This receiver was the basis for our review in the March 2006 issue of *RC Soaring Digest*.

We purchased another SPF-5-RXO (Version 2 software) at the Northwest Hobby Expo in early February. This receiver was extremely particular about crystal placement from the start, and we decided the crystal socket was defective. We contacted Don McGlaufflin at Mikro Designs, and he concurred. We sent the receiver to Don for repair, but he instead

replaced it with a brand new digital SPF-5-RXO with Version 3 software.

So, how does the Version 3 receiver compare to earlier units? The major change is that no jumper is included, as it was with earlier units — all programming is now done without use of a jumper.

- The SPF-5-RXO still works with both positive or negative shift transmitters, but this is now automatically detected and set by the built-in software.
- There is now a specific sequence of actions to switch between channels 1-5 and channels 1-4 and 6. This involves

setting the throttle to low and moving the right stick to the lower left corner. Each time the stick is “cornered,” the receiver software switches the channel designations.

- With one exception, all of the other positive aspects of this receiver remain the same as described in the initial review. The single function lost with the Version 3 software is elevon mixing. But because most transmitters have a switch to turn this function on and off, or have their own software to activate or inhibit this function, it’s not a big deal for most users.

The SPF-5-RXO with Version 3 software is the same size and weight as previous models. Performance remains unchanged. We’ve included a photograph with a small ruler to give an indication of the overall size of the SPF-5-RXO.

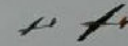
The price of the SPF-5-RXO remains the same — \$43.95 for the receiver alone, and under \$50 with a Mikro Designs crystal included.

As this is being written, the Mikro Designs web site does not yet reflect incorporation of the Version 3 software in the SPF-5-RXO receiver. Watch for updates.

<<http://www.mikrodesigns.com>>

A Cape Cod Slope Soaring Outing

by Daniel Mc Crae, <danielmccrae@sympatico.ca>



For the last ten years, the Cape has been the annual spring slope rendezvous of our east coast group of slope buffs. With its unique nature setting and large number of fantastic slope sites, this region has become our sloping paradise and I feel that it should place very high on your list of “must go” destinations if you are a real slope soaring aficionado.

Cape Cod is also renowned as a great national conservation and recreational area, so if you have trouble leaving home to meet up with your flying buddies, alone, your car filled to the roof with model airplanes (like most of our guys do), then you could at least try to coax your wife and kids to go to the Cape on your next family vacation trip! Seriously, the Cape has

plenty to offer to all your family members and it is a true leisure place.

Cape Cod’s unique geophysical shape offers an unmatched variety of suitable soaring slopes, all located within a 30 minutes drive from each other. Almost any wind direction is flyable at the Cape, from south west to south east. Full south wind (very infrequent) being the only exception.





The most spectacular sloping sites are located in the outer Cape region, beginning around the Wellfleet area, and then going north towards Truro and Provincetown. If you're planning a trip at the Cape, I would suggest you stay at a motel in the Truro neighborhood — this area boasts the greatest concentration of sizable cliffs.

This location map shows where to fly on the peninsula.



Please be aware that many of the sites marked on the map here are part of the National Seashore Park System and are considered to be environmentally sensitive. Be careful to avoid disturbing the native vegetation when flying from the top of the cliffs, and observe the “keep off” signs where specified. Special care must be taken with respect to the environment and to comply with the park rules.

Most community beaches sport a sizable parking lot. It is also mandatory that you use them and don't leave your car along the park roads to get closer to the flying sites.

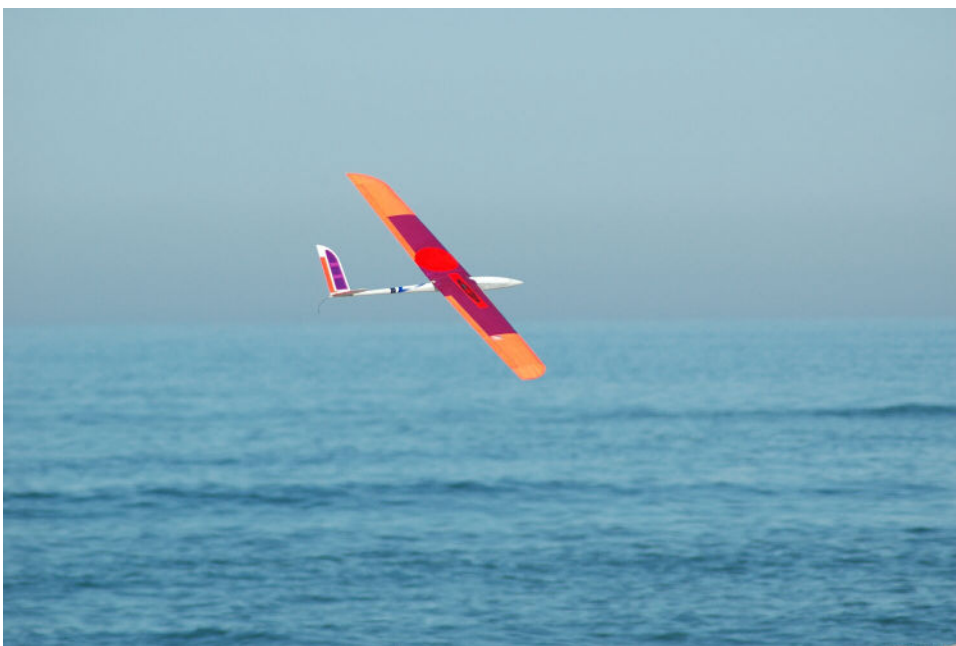
Always remember that flying model planes in those protected areas is a privilege, not a right. Please make sure that the park rangers will still be friendly with the next group of flyers they meet.

Talking about friendship, we are always eager to bring new people with us on our annual trip to the Cape, and I would be more than happy to guide any of you guys into this slope soaring wonderland. What about a unique five-full-day flying experience in great company, with evening barbecues, French wines tasting, model pictures and video viewing sessions... real life!

Feel free to drop me a line at [<danielmccrae@sympatico.ca>](mailto:danielmccrae@sympatico.ca) if you'd like any extra information or even better, join our slope party in May!



Clockwise from upper left: Jean Segers gets ready to bungee his faithful NSP *Sparrow*. Etienne Dorig flies his Advance Model Products *Slope Trik* fast and low... Talking of L/D performance... Alexandre is keeping his *COHEN F3J* model aloft in a 8 mph wind. Of course, our French buddy is a good flyer, too... Jean Segers banks his *Super Dragonfly* (originally built by Etienne Dorig almost 20 years ago).



Clockwise from upper left: Fly me to the moon! Alexandre Loukakos *COHEN* F3J glider over Cape Cod Bay. An ICARE distributed *OCELOT* 60 inch class slope racer with Dominic Rocheleau's great airbrush custom paint job. Jean's *Sparrow* after flying over the ocean waves after a successful bungee launch. High speed bungee launching sessions on the beach is part on our Cape Cod trip traditions.



Cape Cod's beaches offer perfect long sandy runways for safe maiden flights of even your largest winter projects. Daniel Mc Crae's 4.5 meter span, 17 lbs, scratch-built ASW20 motorized glider is powered by a Plettenberg HP 300/30/A2 motor fitted with a 5:1 gearbox swinging a 20 X 12 folding prop at 5300 rpm. Aircraft gets to 600 ft in 15 seconds, pulling 55 amps out of its 9S, 7000 mAh lipoly battery pack.



Clockwise from upper left: An ICARE *Mini NYX* over Cape Cod Bay. Jean Segers scratch built motorglider. Planes resting after a hard day of work. A 2.6 meter span *Lunak* taking the air over Duck Harbor dunes. The *Lunak* model is distributed by Etienne Dorig's ICARE.com. Also a member of the C2VM club, Etienne is our official Cape Cod outing organiser.

