Radio Controlled Soaring Digest

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Photo by Philip Randolph

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In the Air!

There are a few articles in this issue which deserve some form of explanation before reading.

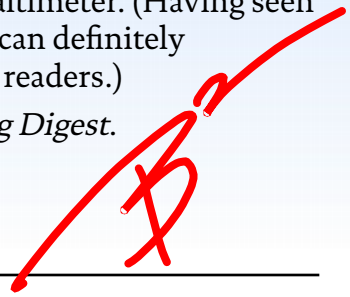
This issue includes two F3J World Championship reports — one from Sydney "Uncle Sydney" Lenssen, who provided the preliminary write-up on the Martin, Slovakia, event for the August issue of *RC Soaring Digest*, and the other from Matthew Wood, the Australian Team Manager. *RCSD* thus provides full coverage of the event, including focused coverage from an associate of the (repeating) World Champion, David Hobby.

A few weeks ago, we once again found ourselves reading the August 1978 *Model Aviation* article on the RC sailplane speed record by Werner Sitar and Frodolin Fritz, set June 18, 1977. The record flight took place with a starting altitude of 6600', and the aircraft speed over the 50 meter course was 242.9 m.p.h. The *MA* article, written by Richard R. Weber, an engineer, explains how this record speed was attained and why it received FAI ratification, despite continuing controversy over the team's previous record claim of 188.24 m.p.h. With this article fresh in our minds, we saw Joe Huwaldt's Standard Atmosphere program and decided some *RCSD* readers would find it useful for determining sailplane performance parameters, particularly for higher elevations.

And Joe's program ties in quite nicely with Seth Arlow's review of the Winged Shadows Systems How High altimeter. (Having seen this small lightweight device in action, we can definitely recommend its purchase and use to *RCSD* readers.)

We hope you enjoy this issue of *RC Soaring Digest*.

Time to build another sailplane!



F3J WORLD CHAMPS 2006, MARTIN, SLOVAKIA

CHAMPIONSHIP GOSSIP COLUMN

by Sydney "Uncle Sydney" Lenssen, sydney.lenssen@virgin.net

World championships do not get more thrilling than Martin's. And he's done it again. David Hobby is the F3J world champion 2006. He's the first man to do it twice, and consecutively at that. Nobody can dispute that he is the worthiest pilot to carry the Neil Webb trophy back again down under!

David's clinching flight was the second round of the flyoffs where he coaxed an extra 100 seconds from his Pike Perfect over Canada's Rolf Oetter by riding the breeze in kinder parts of the overcast sky than all the others.

Then to crown it in the fourth and last round, he mid-aired with the Italian Massimo Verardi, leaving his right wing panel skewed like a gullwing with two minutes still to fly and 300 metres from the spot. After a spin or two, he nursed it in gently but not too fast, already certain that he was entitled to a refly, then landed on the spot for 100, but 50 seconds early.

Massimo decided that he wouldn't ask for a refly. Canny spectators and Karl Hinsch, two spots away, knew that David did not need a refly because he was already champion. So we all waited for four minutes for the times to be lodged and official confirmation. Then we all cheered the champ with a broken wing! He was elated.

Flyoff Saturday, overcast with barely a glimpse of blue sky, the day for four rounds of junior and four rounds of senior flyoffs, was only part of the excitement. Friday had seen the last two preliminary rounds of senior and juniors in tricky weather, fully overcast, most but not all times thermally, with sometimes gusty and misleading winds.

I have never seen the battle for final flyoff places so keenly fought, nearly every slot bringing casualties. Philip Kolb, lying second in the penultimate round, lost 70 seconds and dropped out. Four slots earlier, Carl Strautins hurled his cap into the ground in disgust landing 22 seconds early, certain he'd lost his place. Then much later, his hopes reawakened nailbitingly as others slumped. Italian Marco Salvigni, who'd flown brilliantly for ten rounds, dropped 260 points was out, whereas team mate Massimo Verardi dropped only 3 points and was in.

The evening before, at a technical meeting called by Tomas Bartovsky to review possible rule changes, several team managers moaned that Martin and other recent championship venues had too often resulted in "launch and land" contests - not soaring. Yet the following morning, highest order skills in making the best of rotten air were vital, together with a little bit of luck if you went for the wrong side of the sky.

Another bonus for hundreds of F3J fans around the world was the excellent web-site, masterminded by Patrik Michnac, where results were posted within minutes of appearing at the control tent. For the record and at risk of boring most gossip fans, senior team prize went to Germany. Karl Hinsch and Sebastian Feigl gained flyoff places with Philip Kolb missing by 0.5 of a point in 9,914.30.

USA team came second, 220 points behind, Joe Wurts making the flyoff as sole American, Skip Miller and Tom Kiesling making up their total. Tom, who was flying his own bagged versions of the Supra, scored as many 1000's as anyone, but had a poor round one flight - dropped - and collected a 100 point

penalty. Every pilot must have had tales of "what if" and "if only"!

Third was the Slovak national team of Juraj Adamek, Pavol Vasicek and Jan Ivancik, just 69 points behind the US, remarkable since none gained a flyoff place. Local success brought a deserved big cheer at the prize-giving in the town square later that evening.

Junior team results showed real surprises, Germany knocked into third place by USA in top spot, convincingly 356 points ahead of Italy in second place. Cody Remington, Casey Adamczyk and Joseph Newcomb all flew brilliantly in the championship, the flyoffs and the Martin Cup. They were staunchly supported by parents, a good manager and enjoyed more than a little help from launcher/spotter Joe Wurts.

Congratulations too for the Italian juniors who certainly exceeded my expectations. They enjoyed the loudest and most vociferous support!

What happened to the German juniors? Up until Martin, they had won all previous junior team titles. Chatting with Reinhard Barefoot Vallant their manager at the opening ceremony, he was guarded about prospects, modesty I thought at the time. He reckoned the raw will-to-win and self-confidence was not quite at the same level as last year in Osijek. The more champions I see over the years, the more I recognize that winning pilots do psych themselves up, and frame of mind plays as much a role as trannie skills and reading the air.

Junior world champion after a four round flyoff which was even more competitive than the seniors, is Cody Remington flying his Espada RL. He comes from Colorado, flies with Skip Miller and has been competing seriously for only two years. Second came Benedikt Feigl, only two points behind. Third place went to Casey Adamczyk, again from the US.

No need to repeat that the senior winner was David Hobby, so instead a story. In the Turiec Hotel two days before the champs started, seeing David for the first time this year, he stopped short well away and loudly informed everyone in the lobby that he would never talk to me again. "You don't rate my chances, you don't reckon I can make the flyoff, I'll show you." And he did!

Second place went to Sebastian Feigl who only just made the flyoffs. I reckon Sebastian is Germany's most improved F3J pilot over the past 12 months since winning Hollandglide 2005.

Third place went to Rolf Oetter from Canada, a pilot who emigrated to Canada from Germany some 15 years ago to find better job prospects. Rolf placed third in the preliminary rounds too which shows consistency.

There are those in the F3J world who feel it would be fairer if the rules were changed to require scores from both the preliminary rounds and flyoffs to be added. I would tend to favour such a change, if only because it seems strange to spend four or five days of the contest, with everyone competing against each other, then devoting an hour or two to decide the champion. Why have two contests?

What would have happened in Martin 2006 with such a change?

All 12 places - David Hobby, Sebastian Feigl, Rolf Oetter, Joe Wurts, Karl Hinsch, Arend Borst, Jaroslav Tupec, Martin Rajsner, Massimo Verardi, Carl Strautins, Hiroyuki Sakai and Roy Dor - would have been exactly in the same order! Other years that would not happen. This year's flyoff weather gave wide point margins, outstripping point differences in the preliminaries.

For spectator excitement, tricky conditions where 15 minutes cannot be flown out every slot, are best.

Biggest bouquet for F3J WC 2006 goes to Jaroslav Kostan, the contest director and his assistant on the microphone and scorer, Patrik Michnac. They would also include the Italian software, signals and timing system which ran so efficiently.

Everyone who took part would also thank the team of organizers, timekeepers and helpers who made the Martin world championships truly

David Hobby, F3J champ (centre), Sebastian Feigl (left) came second, and Rolf Oetter from Canada came third.

memorable. They were ever helpful with time to spare for everyone on the airport, pilots, helpers, spectators and friends, even when rain and winds threatened.

The town of Martin was involved too, hundreds turned up for the opening and closing ceremonies, plenty of locals came to the airfield the first weekend to see what was going on, the town was plastered with advertisements and leaflets about F3J. The supportive mayor came every day to watch and shake hands.

Also thanks to the aeroclub of Martin for sharing one of the most beautiful flying sites anywhere in the world, surrounded by handsome hills and mountains, too far away to allow slope flying but certainly influencing the air and storm patterns.

I wish the weather had been sunnier a bit longer, but when it was, it was really hot and you needed lots of water. Promised sunny and stable weather between 25 and 35 degrees C, you only got that if you turned up for training early and for the first day of the Martin Cup. For the championships we got variable cloud, calm to squally winds, a few interruptions for rain and temperatures between 18 and 25 degrees C. It was warmer and more stable in London that week.

Big bouquet goes to the Feigl family. Peter Feigl went home to just south of Munich as manager of the winning German team, Benedikt Feigl went home with second place in the juniors, and Sebastian Feigl celebrated with second place in the seniors. Which family anywhere can match that!

Another bouquet for the best flight - in my view - of the week. One of the early round flights saw Arend Borst snapping off the line early, not deliberately this time, at a height of maybe 25 metres. Not too disastrous if he'd come for a quick relaunch, but as he turned back, the air looked kinder than it had been all morning.

For five minutes he nursed his Supra around the same spot of air above the spectator enclosure, never climbing more than a metre, amazingly never dropping more a metre, ever having to drift back a bit, or forwards, or to either side. Such flights make me marvel. You could see the wingtip waver slightly as the kinder air shifted, but every shift of the slow circling invited loss of height and a relaunch. Arend flew the slot out for his 1000, only reaching towline height in the last minute 300 metres away in comfortable lift.

Arend also gets my prize for "most ruthlessly competitive flyer" with his Supras and "Supracon" - a Supra with Icon wing. His models weighed in at 1600, 1700 and 2000 gms, and in the wing panels, the Volz servos have their cases removed before fixing. "I found I could save 20 gms by fixing them in ply, and decided that's worth having."

There was only one team managers' meeting, the night before the competition started,

and no protests during the week for the jury. There were a few moans about overflights, launches on the safety line or outside, and other oddities. The sound system on site was first class, and even the towmen down the line could hear clearly. Inevitably the distance travelled by sound signals gave the appearance of pilots landing late, and I saw a couple which were certainly late but not penalized. At the managers briefing it was clarified that the independent timekeepers' would judge not only time, but whether the flight launched early, overflew or if the model had touched anyone on landing.

All the official timekeepers were F3J flyers, but that did not make it easy to communicate quickly. When one pilot deliberately touched down before the end signal then bounced on to land close to the spot, he was adjudged to have overflown. Another pilot launched early, thought he's got away with it because the timekeeper did not tell him, only to have the contest director inform him 60 seconds into the flight to relaunch.

But overall, the timekeepers were super. Who has the stamina and dedication to spend eight days on duty? No system can ever be 100% perfect.

One interesting aside from a jury discussion: team managers were asked to stress to their pilots that they should launch with both feet in the safety corridor. Then one pilot launched with one foot on the line if not over it. When questioned, the timekeeper reckoned that the foot had gone over the line after the model left his hands. That decision was accepted with no protest. But the jury did discuss the matter informally and concluded that even if the launcher had one foot outside the corridor, they would not have penalized him.

Why?

FAI juries are reluctant to penalize any competitor. If a jury decision would mean a penalty, then they look not only at the rule concerned but also the reason why the rule was written. The safety corridor, for example, is in the rules to provide a measure of safety to everyone on the line

American junior and senior teams both did well.

at that time. It defines a launch area and tries to prevent gliders flying less than three metres above any person or object in it. Since a launcher, allowing one foot to stray onto or over the line, is not jeopardizing anyone's safety and he is unlikely to be penalized.

Juries are not in the business of attracting protests, but when contests are won and lost by margins far smaller than 100 points, managers would do well sometimes to seek sympathetic help from the contest director or jury.

One of Simon Jackson's flights landed hard on the 100, jamming a wing flap with the servo buzzing loudly. Spotter Phil Jackson had a moment of madness and jiggled the flap to free the servo. The timekeeper awarded a zero landing although the model had not

been moved. The UK team was upset, but no protest was made.

Next day, another pilot speared hard into the ground close to the spot, breaking his flap and the fuselage. Before the landing had been measured by the timekeeper, the pilot freed the model out of the ground to check for further damage. He got his 100 points because the timekeeper had seen where the landing was - a hole in the ground - and there was no need to measure that it was within a metre.

Again, it is often the spirit of the rules which counts, and not always what is written. Team managers should remember that most juries are reluctant to penalize any competitor unless a rule is deliberately broken to gain unfair advantage or his action endangers safety.

The Russian team was welcomed to Martin, the first time that they had competed in an international F3J contest. I enjoyed chatting over breakfast with Alexander Volkov who works for an English speaking company and flies from a field just outside Moscow. He reckons about 1,000 pilots fly F3J in the whole of Russia, in several regions of the country, some 5,000 km apart. Rarely do many flyers come together to compete. He does not find it easy to get F3J models and does not know of any home-produced moulded models as yet. Two of the juniors were flying built-up wings, and the seniors were flying prized imports such as Pikes and Espadas.

Alexander says his team was amazed by everything going on, and the team had little idea of what to expect. The Martin Cup was a revelation, where the team lost several models in crashes, missed flights because they were not ready or were short of towers because they were out looking for lost models. I saw some of them bargaining for models put up for sale at the end of the contest.

2006 certainly proved to be a vintage year for new models. Soarers are getting slightly bigger and lighter, wing sections allow higher zoom launches. Pilots' targets have increased too, not that there's much scope left for improvement. Line tensions seem to get higher, but there were few line breaks.

None of the top pilots stay on the line for more than three or four seconds, and two seconds is not unusual in thermals. Few pilots slide the model in for landing, but the spearing seems gentler than yesteryear. Many pilots wait to hear the "one" before hitting the spot, and certainly half the pilots at Martin did this round after round, windy or calm.

Indicative of tighter margins are the questions asked between pilots as they return down the safety corridor after their flights. "How did you do?" - "Only a 56 and missed the landing," might be the reply. That's shorthand for 9 minutes 56.? seconds and 95 landing. Nowadays more pilots talk of 55 and above rather than 55 and below.

I did not count the top models, but I would guess that the Vostrels had produced enough Pike Perfects to make that the most popular. Priority in the production queue had been given to WC pilots, some of them getting one model a couple of weeks before the champs.

Vladimir Gavrylko from Ukraine had produced enough Supras to run the Perfect close, and this model opened up many eyes including mine to its potential. Despite it light weight and frail appearance it whizzes up the line, its wings may bend a lot, but with a now stronger spar and lay-up they don't break. The Supra certainly floats when needed.

I found it interesting that Tom Kiesling chose to register three Supras, all bagged home-produced versions, although he did have a moulded commercial version from Kennedy Composites. He reckoned that he was more used to his own planes and could land them more accurately. For his moulded Supra he still bags his own tailplane and fin because of weight.

Mibo's Shadow, the bigger Xperience, was there in numbers too. British pilot Austin Guerrier had two which he used to get the top Brit spot. Simon Jackson and his dad bought and built a

Champion with the broken wing. David Hobby is still smiling after landing on 100 following his mid-air in the last round of the flyoffs.

V-tail Shadow overnight, gave it four test flights and then flew it throughout the champs. Phil has lots of stories about how Simon drew with Joe Wurts and how his first flight got 1,000!

There were plenty of Espadas too, produced in Slovakia by Jaro Muller, and flown by pilots from neighboring countries, Russia and USA. The RL version seems to fly much better than the R version, and Espadas took prizes in the Martin Cup and the junior flyoffs.

There was an array of one-off specials, a few Icons, Sharons, Pike Superiors and Europhias. Models are getting better, capable of performing over a wider range of weather conditions. Martin showed once more that the pilot rather more than the model counts in the end!

Few of my predictions for Martin proved successful, and although I treat them as a bit of fun, there are those who see them as a challenge. Skip Miller was pleased that the American teams were not rated: "That spurs us on," he reckoned and indeed both US teams did well.

Cor de Jong from Holland said he was pleased before the contest to be included in my flyoff shortlist, and he was in with a good chance until rounds 10 and 11. Then he cracked under the pressure of expectation, or so he reckoned with a smile. I was very pleased to see Roy Dor scraping into the flyoff, he saw his shortlisted name as an extra challenge, and the Israeli team did well again to take fifth team place. One of their towmen was due back home on Monday straight into the army, and all the others were reservists - a sobering thought.

Worst prediction was the weather. Enough said.

I chose 16 senior pilots for the flyoff, and seven made it. Philip Kolb nearly did, but if he had, then Sebastian would not have been in. Biggest omission I admit was David Hobby, and I haven't bought him a beer yet to make up! Other predictions or hints are best forgotten. I shall need to recover my courage before making any guesses next year!

Finally, in Prospects gossip I wondered where Ben Clerx had got to. He answered and sent some nice pics. He coached Casey Adamczyk a couple of weeks before the WCs, he races a full size ASW 28, flies a Boeing 777 professionally, teaches aerobatics and formation flying with an Extra 300L. Aside from that he hopes to make the US F3J team 2008. Wow!

2006 F3J World Championship

An Australian's perspective

By Matthew Wood, mswood@bigpond.net.au

It was a few days before the team was due to leave for the F3J World Championships in Martin Slovakia, when I started to watch the weather patterns for the region. With the news channel headlines stating that France was experiencing a record heat wave and the rest of Europe in a swelter, I thought this was going to be another unbearably hot World Championships. This was certainly the indication we got from our 11 hour drive in 34 degree heat from Frankfurt to Martin which is situated 200km North of Bratislava near the Czech border.

The area surrounding the airport was amazing with towering mountains on 3 sides and rolling hills to the south. The airport itself was a huge open area surround by model-eating corn fields and a small village to the west. The all-grass strip was green as is usual in Europe, but surprisingly hard underneath.

The team consisted of Carl Strautins, Mike O'Reilly, Matt Partlett and Dave Hobby as reigning World Champion, Myself as TM, Theo Arvantakis, Thomas Cooke, and Ziggy Kusiak as towers.

The team had three days practice in the heat before the pre-event, the Martin Cup, and all were tired before things started as the temperature was in the mid 30's. The hot weather continued in the Martin Cup, as 177 pilots contested for 12 fly-off positions in friendly thermal conditions. All the team performed well. The hard ground was proving difficult for "dork" landings as the model would often bounce back out of the spot. Its was really only the landings that prevented all team members from making the fly-off as the top 50 places were separated by less than 45 points. Carl made the fly-off with some excellent flying and won the first fly-off heat by one second. The second heat was a bit tougher; Carl zigged when he should have zagged, and was unable to make his time in the second heat. But that is F3J, you choose the side you will fly and if the thermal is not there, well there is not much you can do about it.

The opening ceremony later that day was like no other I had experienced. Situated in the main mall of the town, over 1000 people turned up to see an Olympic style opening ceremony. The crowd was six deep around the barriers and they cheered each team entering the arena, which was followed by a display of marching girls and bands.

The first day of the championship was not the greatest for Australia, although both Dave and Carl had scored 1000 in their first flight. Conditions had change

remarkably from the previous days. The temperature dropped a few degrees and the thermals were small and infrequent. This resulted in Dave and Carl not making their times in the second flights and Mike was un-lucky not scoring any landing points in the first and third rounds by over-flying the working time by a fraction of a second. Matt Partlett experienced a line-break prior to launch and the second line disconnecting from the stake in his first round. He recovered to fly out the remaining 8 minutes 30sec in the slot.

Rain and thunderstorms hampered the first few days of the competition, the condition changed every hour from typical big weak European thermals to very small strong lift and strong sink.

The Australians recovered from their first day nerves and thrived in the tricky conditions. The Aussies were the first and sometimes only ones to follow the wind indicators directly to the thermal, while the others followed the pack mentality and just floated around aimlessly at low altitude and still made the times because of the forgiving air, much to our frustration. You could never get away with that in Australia.

There were some memorable flights, over the week. Matt flew five minutes at 40 feet with his Sharon. Mike caught a great thermal with his Pike Perfect from 30 feet in his last flight from a very ordinary position up-wind in windy conditions, to work it back for a one metre landing to get 1000 points.

The end of the preliminary rounds was an anxious wait for Carl as he was in 15th position with four groups to be flown. In a scenario that could be likened to Steven Bradbury's speed skating gold in the 2002 Winter Olympics, some big names fell in the now tricky condition where 10 minutes was no guarantee. After the round Carl was in the fly-offs in 11th position and Dave in 9th.

What was to happen in the fly-offs, I wish I could properly explain but it was a case of "you had to be there." The thermals were in consistent 20 minute cycles. The temperature was 16-18 degrees and full cloud cover. In the first fly-off everyone maxed their 15 minute time chasing a large thermal down-wind to be a speck half way through the working time. Dave was beaten by 0.7 of a second by Karl Hinsch to score 999 and Carl's two metre landing cost him the same score.

For the second fly-off round the big thermal had past and the lift had softened dramatically. Carl, along with most of the group, re-launched but Dave engaged weak lift and climbed out in it and ventured a long way down wind. This placed him higher and down-wind of a number of other pilots, some of whom we used as markers (mainly for the sink that a lot hit). By moving around the sky away from sink and through some buoyant air, Dave was the only person to fly out the slot which gave him a cushion of over 100 points on everyone else.

Round 3 and Dave was in great position. A long launch gave good height and the ability to cover most other pilots. Nearly all pilots encountered good lift early in the flight and were able to fly out the slot. Dave came in two seconds early to be safe and got a two metre landing. It meant the loss of a few points but he had a nice buffer to play with and we took the conservative approach.

Round 4 was definitely the flight of the contest with Dave and Carl getting isolated in two separated groups while a third group engaged weak lift a long way down-wind. The first 7-8 minutes for both were spent working very soft air down-wind but with no height gain. Carl had no luck and again had to re-launch. With about seven minutes to go Dave was probably 400-500 metres down-wind and no higher than 75-100 feet. With the aid of Carl and his ICON marking the air in front off his re-launch, he then proceeded to point the Pike Perfect into the wind back towards us and set out in a very gentle search pattern no more than 30-40 metres wide measured cross wind. Twice Dave encountered weak air and took a few turns in it but again with no height gain. The drama was added to by the fact that Dave spent most of the seven minutes over

a very thick corn crop that had claimed a few lost models over the previous ten days. If Dave were to outland into the crop not only would it have forced a relaunch it would probably have lead to the loss of the Perfect and the loss of the World Championship.

Late in the flight, with the model finally upwind, Dave engaged lift and started to climb out to what would look like an easy victory when Dave and the Italian had a midair at about 30-40 feet. The Perfect had a big chunk out of the middle of the right hand tip panel and this panel had separated from the centre section by about 25mm and was cocked up at a slight angle because the joiner box at the end of the centre section was damaged. Dave did a long wide landing approach with moderate control of the model and then came in to land inside one metre of the spot. We were then pressured by the officials to make a decision on whether we wanted to claim a reflight. As soon as Carl landed, Mike and I were forced into mental arithmetic mode to see if Dave had enough points with his 13.52 flight and one metre landing to win and thus not need the reflight. After quite a bit of heated discussion in Slovak and English we got clear of the officials, did the sums and were confident that Dave had won. (The officials refused to tell us any Round 4 scores to help with the decision). With some confidence we decided that Dave had done enough to win the WC and that proved to be the case with his 40 odd point win.

This fourth flight was absolutely fantastic and to end with such drama just added to the tension. About four hours later Dave was presented with that big and heavy trophy for the second time and it was a very proud moment for all of Australia.

I feel privileged to have been part of a great team of guys who got two Aussies into the fly offs and came away with the World Championship again. Congratulation to Dave and Carl for making the fly-offs. Many thanks to all who had supported the Australian Team; I hope the tradition of an Australian World Champion continues.

Andy Page launches his brand new Pike Perfect at 60 Acres. Andy and Jim Laurel picked up their Perfects on a Thursday and built them over the following weekend. Both 'ships launch high and fly beautifully.

Watch for Jim and Andy's review of the Pike Perfect in a future issue of *RC Soaring Digest*!

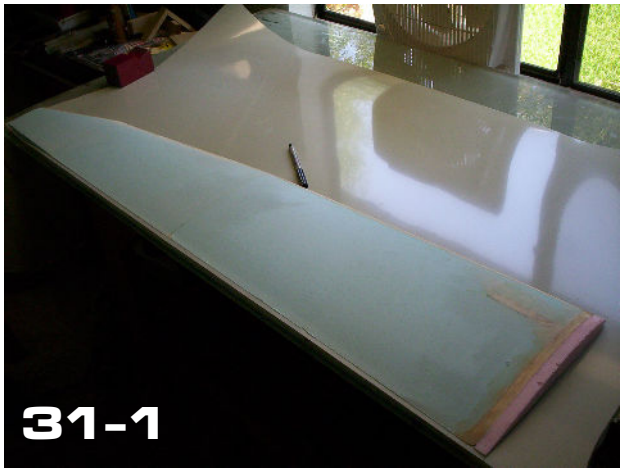
LET'S BUILD A GENIE!

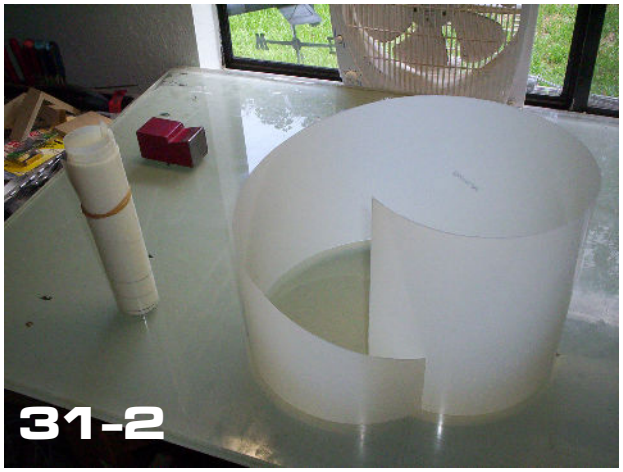
Or "How to Get an Open Class Glider the Fun Way, Not the Buy-N-Fly Way"

Part 5: Mylar preparation and wing bagging

by Chris Boultinghouse, <caboultinghouse@yahoo.com>

In our last installment, we had the wing cores ready to bag. This month we'll show how to do a relatively complex paint scheme on the mylar and we'll get a tip panel bagged. The other tip and the center panel are just more of the same, so we won't cover their preparation and bagging in detail.

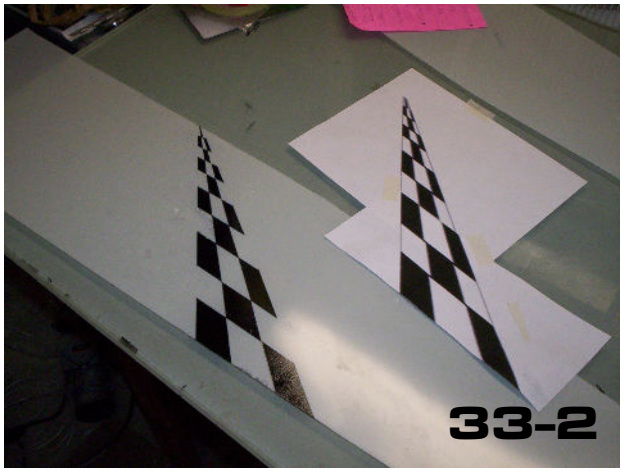


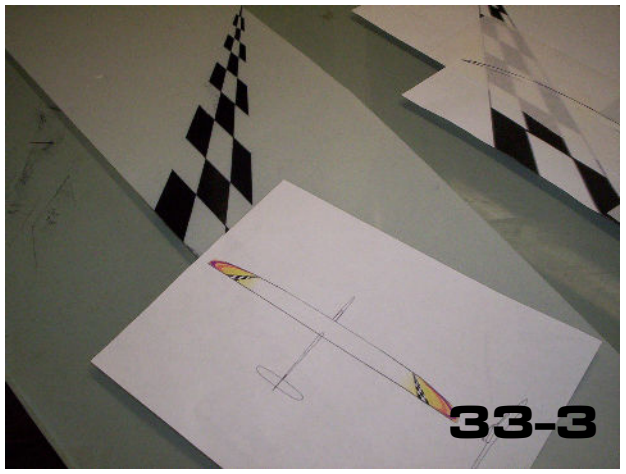


Cutting the Mylars

Harley's documentation goes into good detail regarding how to size the mylars, so I won't re-invent the wheel here. I did size mine just a bit larger since I actually prefer the mylar to go all the way to the leading edge, for less work later on. It is your choice, as I'm sure Harley's method works just as well.

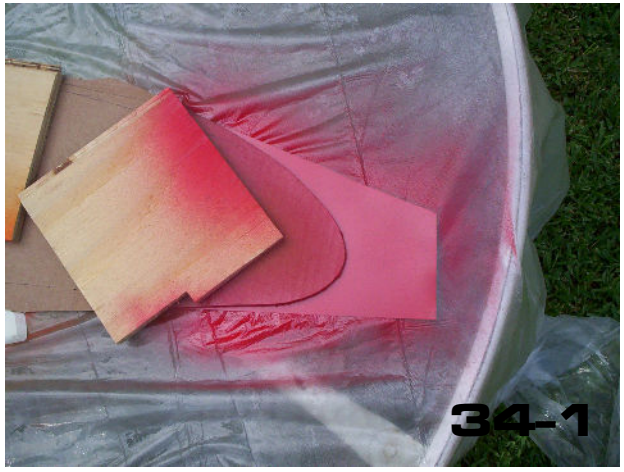
Once the mylars are cut to shape, they need to be treated with a release agent. In the past, I used Johnson's Paste Wax with good results. This time I wanted to try something I'd read about: RainX. This is a windshield treatment that I've used for years on my cars, so I had it handy. A test piece revealed that it worked well, so I decided to try it on the real thing. Two coats of RainX were applied and buffed away.





Your paint scheme must be applied from the inside out, which can be a bit of a challenge to the imagination. You also must design the scheme so that there is no need to mask over a color that has already been applied. I designed a scheme on the computer, and included a "checkerboard" pattern stylized so that it appears to vanish into infinity at the leading edge of the wing. The pattern was created and printed using a graphics program on the computer, then cut from photo frisket film and applied to the mylar. The rest of the wing was masked off and the black paint was applied. When painting mylars you must mist the first few coats on very lightly and let them tack up before applying thicker layers. If you don't do this, the paint will "fisheye" over the release agent. Once the paint has tacked, remove the masking and frisket film.

Next up is the color at the wingtips. As you can see from the pictures above, I decided to vary slightly from the scheme I originally designed, since after cutting them full size, I did not like the "C" patterns at the tips. I simply used cardboard masks for the colors at the tips.



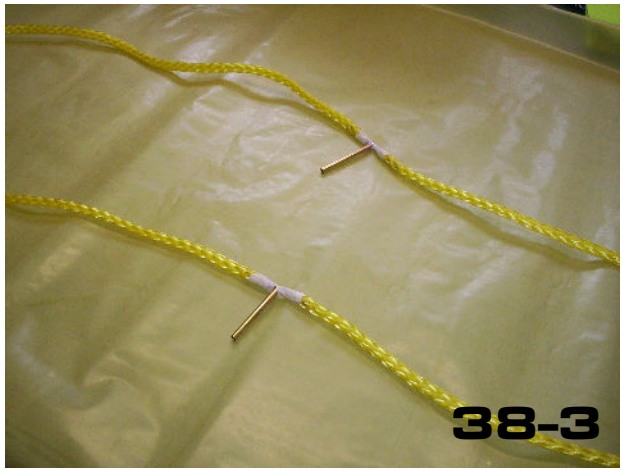
Now it was time to apply the yellow fade, but I had to protect the area of the checkerboard that would later be white. Since you cannot use masking tape over the painted mylars (it would pull the paint off!) I made a wet paper mask from tracing paper and applied the yellow fade.

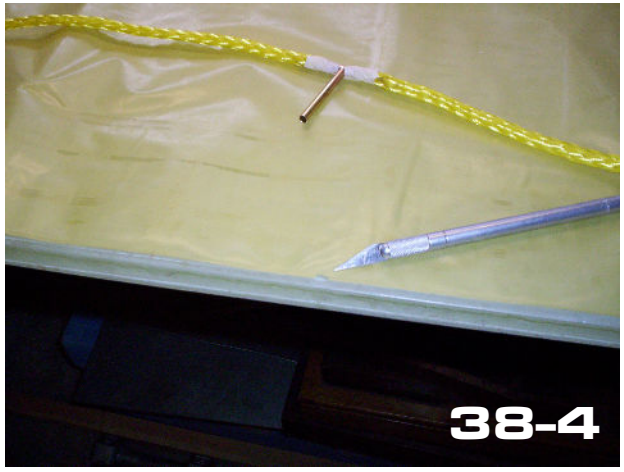
Finally, everything is unmasked and white is applied. I like to put white behind all the colors so they stay nice and bright.

The bottoms of the wings are solid purple, so there's not much to see or do other than mist on the paint with each layer getting heavier.

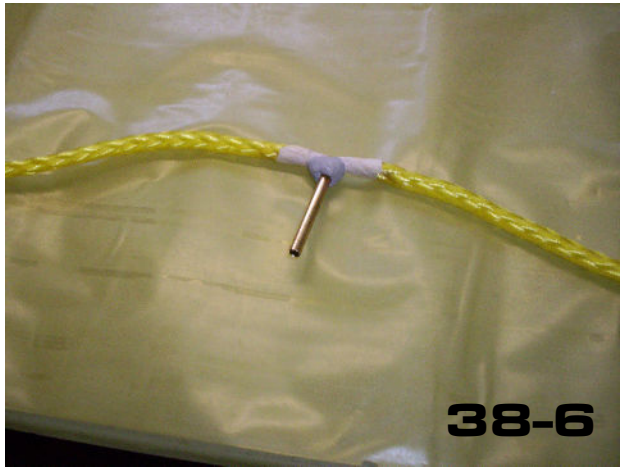

38-1


38-2

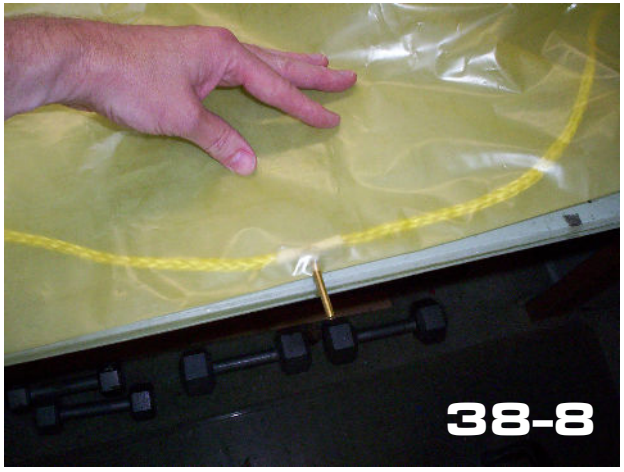

38-3


38-4


Frost King
FINGERTIP
ROPE CAULK
Indoor Outdoor
38-5


38-6


38-7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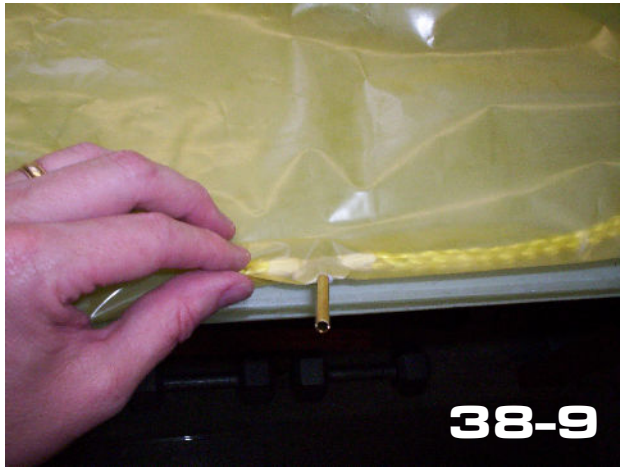

38-9

Preparing the Bag

There are many different ways to make a vacuum bag, and all seem to work pretty well. My own preference is to use the bag "tubes" available from many of the composite vendors. To distribute the vacuum through the bag, I use poly ski rope with a brass tube T inserted through the bag and into the rope. Some common rope-caulk seals the tube where it exits the bag. To seal the bag ends, I use the commercially-available "bag clips". I like to insert two vacuum lines, one from each side of the bag, and use a T-fitting to the pump.


39-1


39-2

Preparing the Cloth

Harley's documentation details the type of cloth and how to cut it, so I won't go into that here. The only deviation I made was to run the cross-grain section of carbon over the blade boxes full-chord to avoid a bump, and to include an extra 1" wide strip of glass at the trailing edge since I chose to hinge the mylars full-length at the TE with tape, rather than as Harley suggests in the manual. This is strictly my own preference, having done many wings this way in the past.


39-3

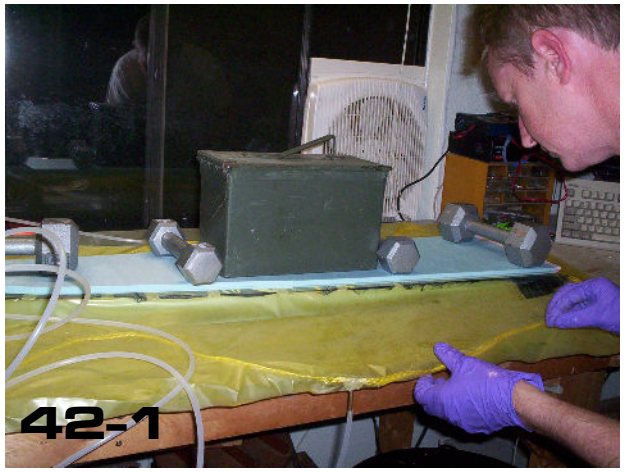

39-4

Fiberglass tape is applied to the leading edges using 3M 77. Be sure you are generous with the 3M for this step. You do not want your tapes to come loose during the bagging process. Ask me how I know this...

Making it all Sticky

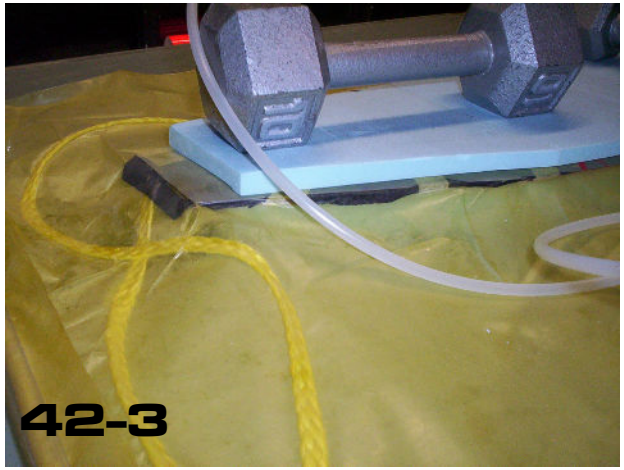
Now it's time to mix the resin and make a mess! Harley's recommendations for resin brands and the amount to mix is spot-on. Follow his advice and you'll have good results.

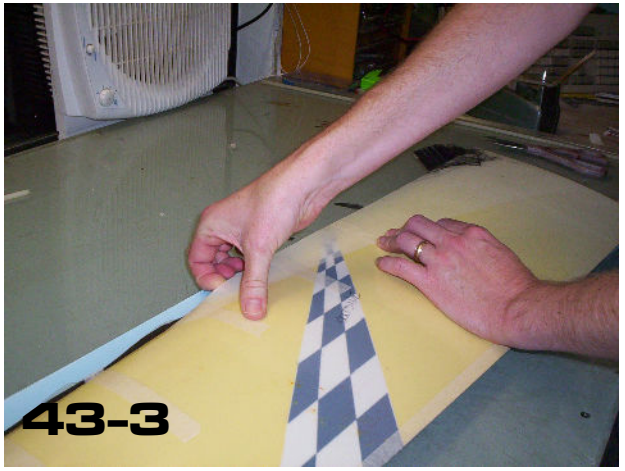
Once the cloth is wet out and blotted appropriately, it's time to insert the core, fold up the mylars, and get it in the bag. I prefer to think of this as "making a toxic taco." (Yes, I know... I'm weird.) Note that the core beds are outside the bag. When you are satisfied with the alignment, stack some weights on top, seal the bag and pull vacuum.



Opening the Present

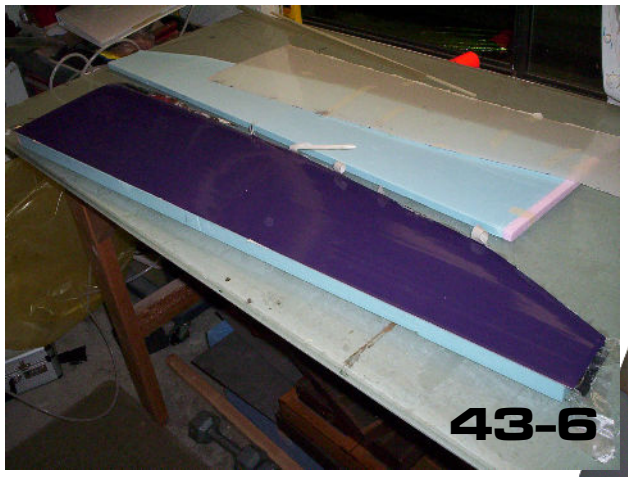
Fast forward 48 hours, and it's time to peel the mylars and see if you have a pretty wing, or a mess. I ended up with a pretty wing! There are a couple of small spots where the paint did not release cleanly from the mylar, but overall it came out really nice, with a good straight trailing edge. Now it's time to trim the root cap, cut back the uglies on the leading edge, and repeat two more times for the rest of the wing.






43-4


43-5


43-6


44-1


44-2

The rest of the wing sections are done in the same manner, so this is much like the instructions on the shampoo bottle (you know, lather... rinse... repeat). The wings are now ready to have the control surfaces cut free and the RDS (Rotary Drive System) installed. Due to a hectic work schedule and other family duties, construction progress has slowed somewhat on the Genie, but I hope to have this article series (and the Genie) finished in time for the winter building season that much of the country enjoys. Maybe it will inspire some of you guys (and gals) to build your own Genie!

Joe's 1976 Standard Atmosphere Program

by Joseph A. Huwaldt (jhuwaldt@mac.com)

The earth is surrounded by a blanket of gasses that we call the atmosphere. As shown in Figure 1, it reaches out to many hundreds of miles; further than most people realize. There is no well defined "end" to the atmosphere, it just slowly fades out into space as you go higher and higher. The atmosphere is made of four very distinct layers: the Troposphere, Stratosphere, Mesosphere, and Thermosphere. Each of these layers is defined by differences in thermal characteristics, chemical composition, movement, and density. For more information see: <http://en.wikipedia.org/wiki/Earth's_atmosphere>

The properties of the atmosphere, at a specific altitude, can vary considerably on a daily, monthly, or yearly basis. The properties of the very high atmosphere can also vary significantly with solar activity. Aerospace engineers need a standard way to identify atmospheric properties in order to communicate information about the design of aircraft and spacecraft. This led to the development of imaginary "standard" atmosphere models which provide reference atmosphere characteristics that can then be used as a basis for designing an aerospace vehicle or communicating a flight condition.

It's important to understand that standard atmosphere models are not predictive, they are representative. In other words, a standard atmosphere model does not attempt to predict the actual conditions of the atmosphere – such as weather – but rather it provides reasonably representative conditions that can be used as a reference for doing engineering calculations.

A basic atmosphere model like the 1976 US Standard Atmosphere provides a hypothetical vertical distribution of atmospheric properties which, by international agreement, is roughly representative of year-round mid-latitude (45 degrees north) conditions. Some of the more advanced standard atmosphere models, like the GRAM-99 (see: <http://see.msfc.nasa.gov/tte/model_gram.htm>, try to account for position on the earth, daily variations, and seasonal variations – but at a cost of significant complexity. It is important for an engineer to be familiar with the various atmosphere

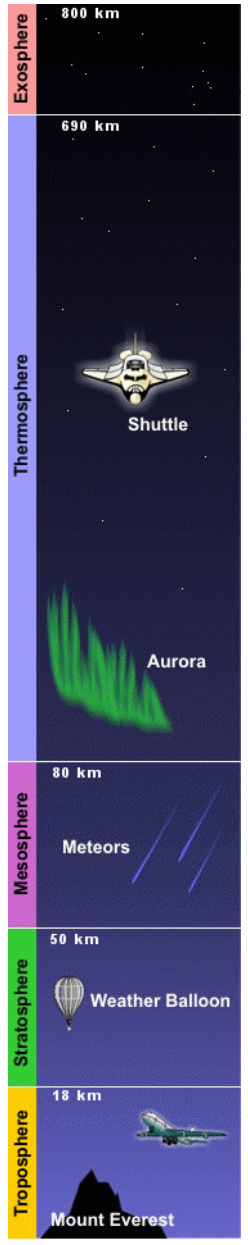


Figure 1. Layers of the atmosphere. (NOAA)

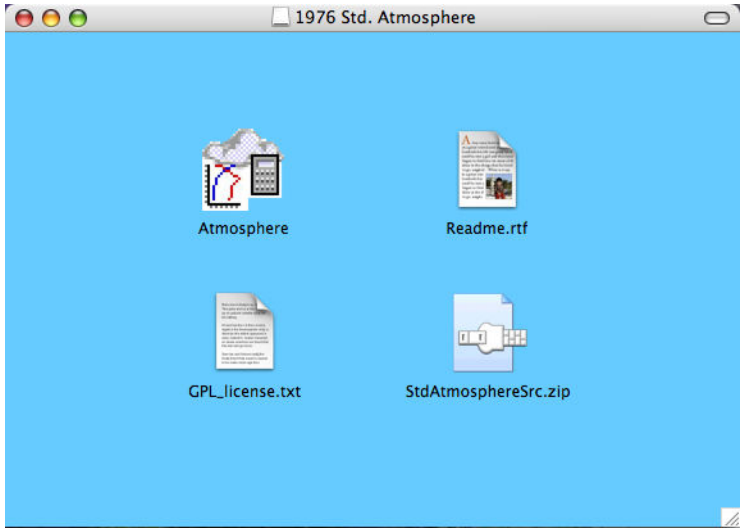


Figure 2. Mac OS X window showing contents of downloaded disk image (StdAtmosphere.dmg).

models that are available and to choose the one that is appropriate for the task at hand.

The most recent definition of the "US Standard Atmosphere" is the 1976 model developed jointly by NOAA, NASA, and the USAF. It is an idealized, steady-state representation of the earth's atmosphere from the surface to 1000 km as it is assumed to exist during a period of moderate solar activity. The 1976 model is identical to the earlier 1962 standard up to 51 km.

As an aerospace engineer and airplane designer, I make use of standard atmosphere models almost daily. For many years, I had a simple program for the first 62,000 ft. of the 1962 standard atmosphere programmed into my calculator. If I needed something at higher altitudes, I would have to look it up in tables or run a command-line FORTRAN program (see: <http://www.pdas.com/programs/atmos.f90> for a public domain example). In addition to this, there are related properties such as air speeds and stagnation conditions that aren't a part of the atmosphere model per say, but which are often computed with the outputs from the atmosphere model. For those reasons, I wrote my own Java program to calculate the properties of the 1976 Standard Atmosphere to an altitude of 86 km and associated airspeeds and stagnation conditions.

To use my 1976 Standard Atmosphere program, first go to <http://homepage.mac.com/jhuwaldt/java/Applications/StdAtmosphere/StdAtmosphere.html>. There you will find download links for the full source code and executables for the three most popular operating systems (MacOS X, Unix/Linux, and MS Windows). Select the appropriate file for your needs. Since this is Java, the actual program is exactly the same on all platforms, it is just the way that you install it that is different.

MacOS X: For MacOS X users, you will be downloading a disk image file. Open this disk image and you will get a window that looks like Figure 2. Read the Read Me file and the license agreement, then drag the Atmosphere program icon to your Applications folder (or anywhere you like actually). Note that the MacOS X disk image file includes the full source code in a Zip archive file. You don't have to download it separately. Finally, drag the virtual disk on your desktop to the Eject button on your Dock when you are finished to unmount it. That's it. Your ready to go.

Windows and UNIX/Linux: For these platforms I have included an installer program that will guide you through reading the Read Me file and installing the program. On Windows this will add a new item to your "Start" menu so you can run the program from there, and on Unix systems this installer will place a link in the location you specify so that you can run it from that location.

Command Line Users: Technically, this program doesn't require an installer or fancy icons or anything like that – it can be run directly from the command line (either Unix or DOS). If you have trouble with the installer or want to know how to run the program from a command line, let me know and I can tell you how to do that.

Now run the program – **on the Mac,** double-click the application icon; **on Windows** double-click on the application

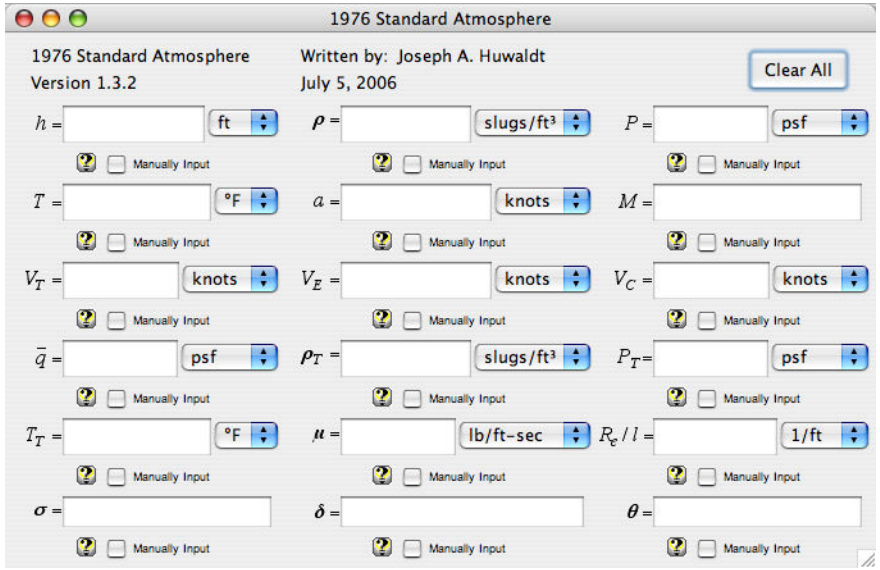


Figure 3. The initial program window of StdAtmosphere.

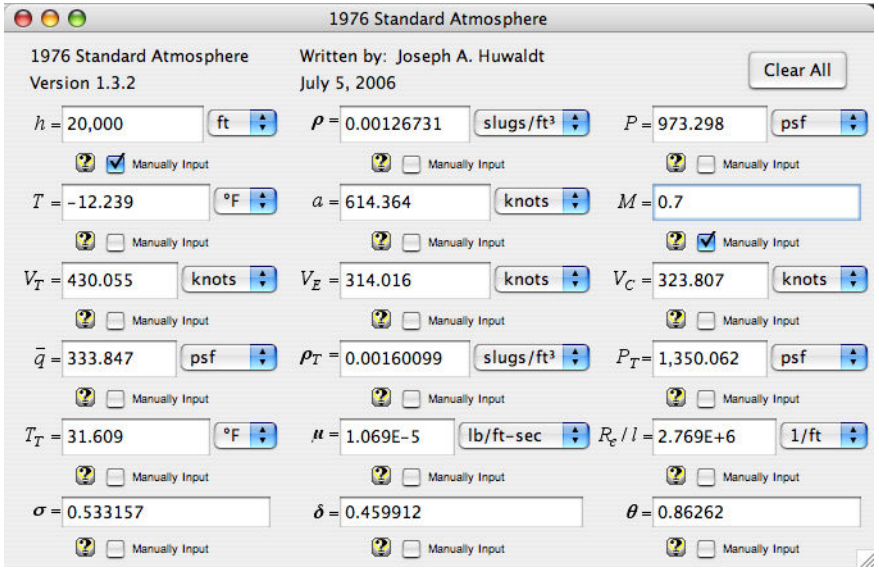


Figure 4. Enter altitude 20,000 ft. and Mach 0.70, and the "Manually Input" check box is set automatically for each and gradually all the other parameters are calculated for you.

icon or choose it from the Start menu, or **on Unix** execute the command to run the program. You should end up with a window that looks like Figure 3 (the MacOS X version is shown because it's the prettiest).

The program window has a series of text entry fields where you can enter numbers. Note that each text entry field or parameter has a label to it's left telling you what that parameter is, dimensional parameters have a pop-up menu to the right that you can use to select the units that you want used for that parameter, and below each parameter there is a help button with a "?" icon and a check box indicating if that parameter has been manually input (or automatically calculated if unchecked).

First some basics. You can enter a number into any parameter by clicking in that parameter's text field and typing in the number. It won't let you type anything but numbers. If you don't want to use the default units when entering a number, change the units with the pop-up menu first, then enter the number. Otherwise, you'll enter the number in kilometers, realize that the selected units are feet, change them to kilometers and get a tiny number because the program interpreted your input as being in feet, converted it to kilometers for you, and you will have to change it again. Hold the mouse pointer over a parameter label and you will get a short description of the parameter.

If you click on the question-mark icon, a help page for that parameter will be opened in your default web browser. In this case, the help pages define the parameter and list out the equations that the program will use to calculate it depending on which other parameters have been input or calculated.

One of the major features of this program is that you can input the various parameters in almost any order you want. As soon as enough information is entered to calculate any other parameter, that

parameter is calculated automatically. For example, in Figure 4, you can see that I have entered an altitude of 20,000 feet and a Mach number of 0.70. As the parameters were entered, the "Manually Input" check box is set automatically for each and gradually all the other parameters are calculated for you. The air density is 0.00126731 slug/ft^3, pressure is 973.298 psf, calibrated airspeed is 323.807 knots, etc. These parameters could be entered differently and get the same result.

Say you knew that a test condition for your airplane was Mach 0.70 at a calibrated airspeed of 323.807 knots and you wanted to know what altitude in the standard atmosphere corresponded to that condition. I've entered those parameters in Figure 5 and you can see that the results for all the other parameters are essentially the same (within round-off error).

I've attempted to program in as many combinations of parameters as has been feasible and in practice I almost never run into a combination that I haven't programmed although there are some rarely used combinations that don't work that could in theory (I haven't had time or motivation to program them all).

Often I run into situations like I just described, where I have various types of airspeeds because they were measured during flight or documented in a report and I want to know all the properties of a standard atmosphere that corresponds to those airspeeds. This program has been a life-saver for that task.

Simply enter any two airspeeds (or dynamic pressure and an airspeed) and all the other parameters will be calculated for you.

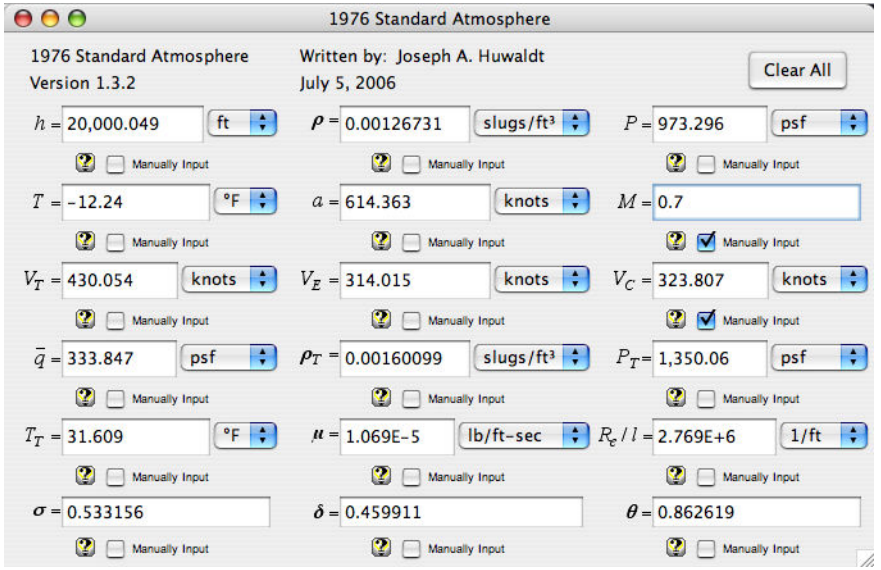


Figure 4. Enter Mach 0.70 at a calibrated airspeed of 323.807 knots and the other parameters are automatically calculated.

Another example... A while back, I switched from working on hypersonic re-entry vehicles to working on helicopters for a time (I've now returned to high speed vehicles). I was stunned when I found that a helicopter simulation system my organization was using assumed that equivalent airspeed and calibrated airspeed were the same. I thought I had found a major bug in the simulation. Turns out it was a "feature."

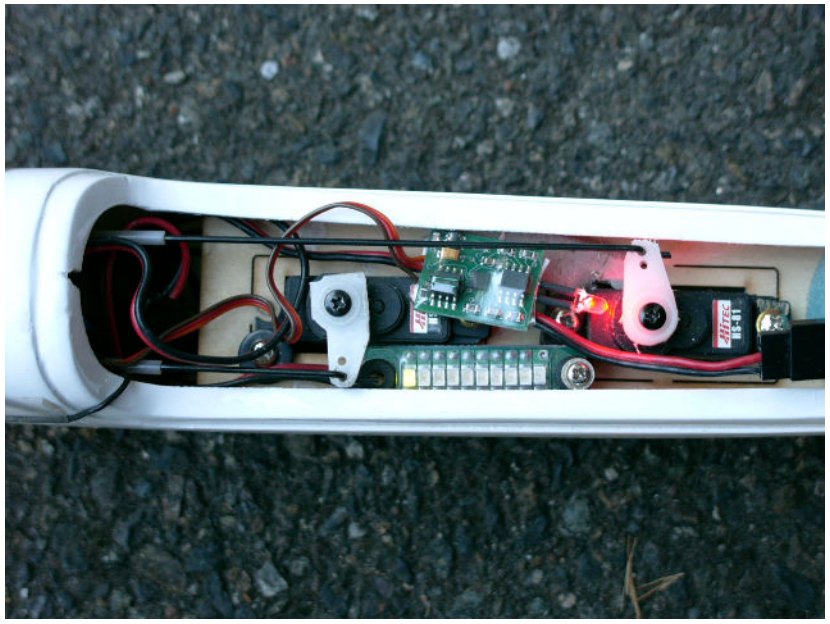
Using my atmosphere program, plug in the highest altitude that a conventional helicopter can reach (about 20,000 ft.), then enter the highest equivalent airspeed that a typical helicopter can reach (generally 150-200 knots). How different is the calibrated airspeed from an equivalent airspeed of 200 knots at 20,000 ft.? A whole 2.6 knots. Easily close enough for the work we were doing at the time.

For reference, a 747, at a Mach number of 0.80 at 30,000 ft. sees a difference between equivalent and calibrated airspeed of almost 16 knots, and an X-15 going Mach 4 at 80,000 ft. sees a difference of 705 knots!

I hope that my 1976 Standard Atmosphere program will be as useful to you as it has been to me. If you have any questions about the program, suggestions for improvements, and especially bug reports, don't hesitate to contact me. I'd love to hear from you.

“How High” Model Aircraft Altimeter

A review by Seth Arlow, arlow2@msn.com



The How High device nestled between two HS-81 servos.

Sunday, August 6, 2006, 11:15 am. Out at the local field, wind from the northwest at about 8 m.p.h. Warm and clear, and I'm about to try launching my Pike Superior from a hi-start for the first time. As I pick up the line, a dust devil, rare in our parts, blows through. I pull back and let go, and make it up to a whopping 75 feet before drifting off the line — nothing like the usual winch launch. Heading east to land, I catch some lift. Three circles, and I'm back in business. A few minutes later, and I'm up, higher than I've ever been. I can just make out the wings, black with yellow stripes against cloudless blue skies. But how high? High enough to put the fear in me, and I spiral down.

When I land, though, I will know, thanks to an on-board altimeter, the “How High” by Winged Shadow Systems of Streamwood, Illinois.

The tiny device, powered by the receiver pack, claims to be accurate to one foot, and resets to zero with each launch over 50 feet. On landing, you can read the altitude of the just finished flight by waving your finger in front of the blinking red LED. When the LED lights steadily, take your finger away and count: a pause, then blink-blink, pause, blink... A rapid double blink indicates zero, and a pause separates each decimal place. If you mess up the count, you can repeat the process — the reading is stored until the next launch, even if the power is turned off.

The device is small (0.8" x 0.6" x 0.16", not including the LED which sticks out about half again as big) and light (2.2 grams) and can be mounted anywhere, except where it might be exposed to high pressure, such as prop wash — not an issue with gliders. Drilling a hole in the fuse or canopy for the LED allows you to take readings without opening the plane, although chances are you'll only check the readings on those really big flights. Finding out how high (or low) your launches are can be a real eye opener!

The “How High” is rugged and reliable, but like most electronics, probably should not be exposed to excessive moisture. The hardest part of use seems to be getting the initiating “finger wave” right . It often takes me several tries.

And how high was that flight? 2302' above ground level. Now I know how high a real “speck” is!

The “How High” altimeter is priced at $39.90 and is available directly from <www.WingedShadow.com>.

P.S.: On August 16th, I got to 2849' (over 1/2 mile) during a 44 minute flight.

Two Hundred Forty Minutes to Go!

Text by Bill Rakozy, LSF Level III, <billrakozy@charter.net>
Photos by Kevin Kavaney

Bill ready to launch his Soprano on its four hour flight.

August 5, 2006 will be remembered as a special day for Augie McKibben and Bill Rakozy as they completed their four hour slope requirement for LSF Level IV. The flight was made at the MRCSS Hager City slope with Paul Johnson, Kevin Kavaney, Ib Jensen, Ken Savage, Emil Weiler being on hand to witness and add support for Augie McKibben and Bill Rakozy's four hour attempt. Bill Rakozy is the first RC sailplane pilot in the history of MRCSS to fly this long on the slope!

I want to say right at the get-go, the team spirit, support and advice from these five individuals was absolutely crucial to the completion of this effort. Their coaching, helping to get things (food and water) for Augie and me, timing and landing experience played an important role in our eventual success in completing this huge flying task.

Preparation We learned from other LSF pilots who had completed their four and eight hour slope flights, the best battery system are not your usual soaring battery packs, but a Radio Shack battery holder/with four ordinary store bought AA batteries for your receiver.

The reason being that dry cell batteries loose their power at a steady, predictable rate and won't suddenly die without warning. So we followed their advice for both our receivers, and I made up a special booster pack with a quick plug in for my transmitter as well. Both worked as expected. I had 4.6 volts of receiver battery at the end of the flight. Augie had something like 5.3 volts.

The winds at Hager City were forecast to reach 17 m.p.h. by mid day out of the south (180 degrees). However, I was greeted by light rain and VERY calm winds (140-160) which produced almost no lift at that angle and velocity. My longest flight was only 20 minutes at 11 AM. The

Above, left to right: A high capacity alkaline battery pack runs the transmitter, the built-in stopwatch shows 4:00:06, Emil Weiler's digital voltmeter shows Augie's receiver battery still putting out well over 5.0V at the end of his four hour flight.

Right: Bill Rakozy and his Soprano immediately following his four hour slope flight and one step closer to LSF Level IV.

revised forecast called for much better winds later in the day (2 PM), so we waited it out for a couple of hours.

The Launch Sure enough, the winds began to build and by 1:30 pm I launched my fully ballasted Soprano, determined to be successful on this try. Augie arrived and launched about 25 minutes after I did. So for the next four hours we battled heavy sink, strong gusty winds approaching 20 m.p.h. at times, choppy air. There would be no relaxing today just lolling around the sky, sipping a

Coke. No sir'ree, this was two fisted, bronco busting slope flying at its best!

The most difficult part of a four hour flight for me were the first two hours. Once you are over the half-way point, time seems to loose its meaning. (Or your brain quickly goes numb for the last half!) This is a potential problem. Besides finding rising thermals or slope generated lift, one of the most difficult things is maintaining your focused level of concentration on your airplane.

After a short while, I found my gaze wondering off in other directions or day dreaming.

Trying to always stay ahead of the plane is important and you constantly need to be watching for signs that it was either rising or falling out of the sky!

Close Call at 3:58 The plane started flying funny. I was in full sink and it was wallowing around on the verge of a stall. By this time it was 50 feet below the ridge where I was standing and things were beginning to happen very quickly.

Like a bad dream, my mind flashed backed to recall those moments just before other monumental sailplane crashes in my life. Kind of a sick feeling... Not a good thing.

I was sure my battery pack had run low and my servos were not working. I managed to gain enough altitude to be slightly above eye level once again and I flew the plane back behind me over the LZ. However, I still had one minute to go and I was not ready to land yet! I reversed direction and started flying into the wind again. My plane was only four or five feet off the ground when it flew right past Kevin, Emil and Paul, and over the edge of the slope.

When I needed it most, the guys (Emil and Kevin) calmly said, "You're OK Bill. You have enough battery power for two or three minutes. Put the nose down and let the plane fly into the wind."

Somehow, the Soprano barely cleared the end of the drop-off and momentarily sunk out of my line of sight, only to emerge straight and level as it cruised over the valley below. I was now looking down at my airplane, but I was out of danger. Clearly, this was the hand of God! The plane slowly began to climb in some slope lift and I was able to gain enough altitude to make a safe landing behind me in the alfalfa LZ with a time of 4:02:22.

I had completed the four hour slope challenge to become the FIRST person in MRCSS history to slope fly for this length of time without landing!

For the moment, I held the Hager City slope endurance record as well. All this time, Augie was doing his best not to pay any attention to the potential disaster which was developing behind him. He still needed to fly another 25 minutes after I landed. He continued to fly flawlessly and landed without incident. Augie flew a minute or two beyond my flying time and he is now the hill endurance record holder! Way to go my friend!

Looking Back So, what was going on with my plane with two minutes to go? Kevin said when my Soprano flew past him at eye level, all my control surfaces were moving fine. My battery pack was not the problem.

The problem was my fatigue and anxiety of being so near the end. I was unconsciously pulling back on the stick, slowing the plane down and stalling it. This was a rookie mistake to be sure. But after four hours, your brain can go to mush and evidently, mine did! Augie confessed to me privately that at one time during the flight, he was dizzy and felt like he was going to pass-out. But he kept going for the full four hour time.

Once again, my thanks to Kevin Kavaney and Emil Weiler's coaching and assistance during the critical final minutes of my flight. Without their coaching, this story might have ended much differently.

To complete LSF Level IV, Bill needs a 2km (1.24 mile) goal and return cross country flight and a 60 minute thermal ride. Augie only needs the cross country task.

On the 'Wing...

Bill & Bunny Kuhlman, bsquared@themacisp.net

Redwing XC, Part 1


1

Our Redwing XC is slowly taking shape. The structure is simply an enlargement of the two meter version which has been flying successfully for the last few months. The spar system is strong enough for full power winch launches, and the control surfaces make for a very responsive aircraft.

As is usual with our construction projects, all of the ribs are cut out using templates of aluminum sheet. The basic framework is assembled over a large ceiling tile, so pins can be used to hold the pieces in place.

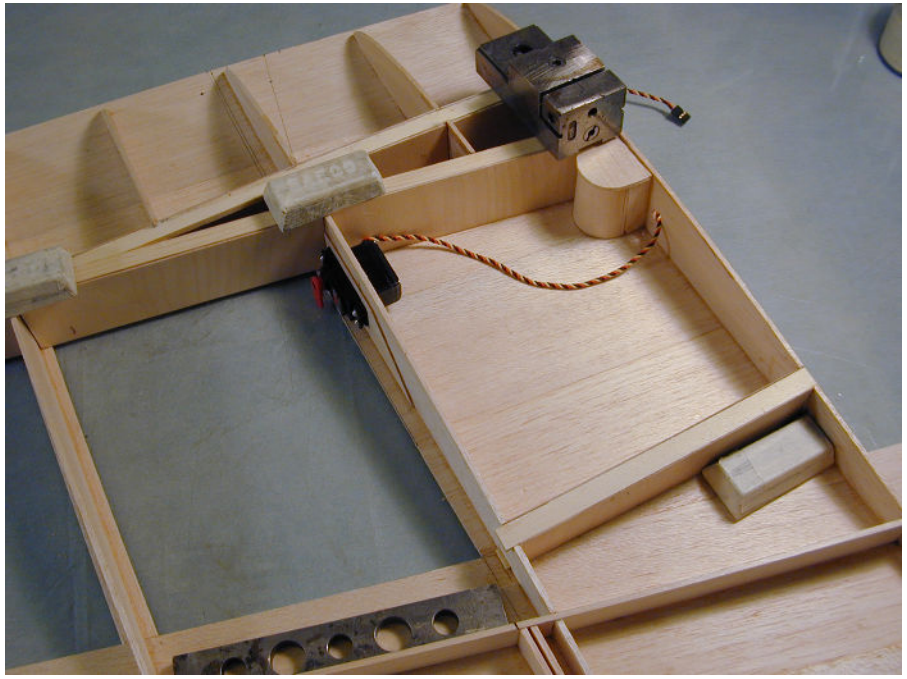
The spar webbing is fitted and glued with the wing on glass and held firmly in a fixture. This assures accurate alignment and prevents warps from creeping in. The photo on this page shows all of the ribs in place and the spars completed.

A few items in the photo at right may not be immediately obvious, so we've also included some close-up photos for clarity.

The white tube in front of the main spar is a paper conduit for the aileron servo wiring. The wiring goes through a small circular hole in the spar webbing directly in front of the servo.

The main spar consists of a long straight component which runs along the 30% chord line. The back of this spar is webbed with 1/16" plywood near the root, and 1/16" balsa at across the outer wing panels. This webbing forms the back of the leading edge D-tube.

The main wing rod goes into the short angled spar so it traverses the fuselage and enters the wing at 90 degrees to the wing root. This component is filled with vertical grain balsa to support the brass tubing which is the wing rod receptacle, and has plywood webbing front and back. It's tied to the main spar with 1/32" plywood gussets on the inside of the caps.



The sealed compartments immediately behind the main spar are used as finger holds to firmly grip the aircraft during launch.

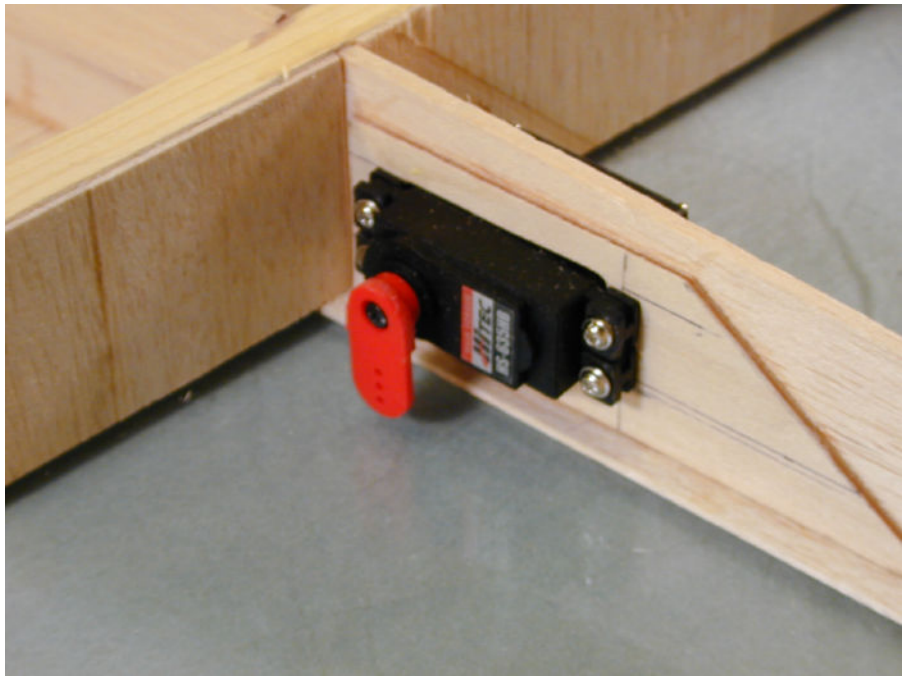
The rear spar will hold the secondary wing rod and is webbed front and back with 1/32" plywood.

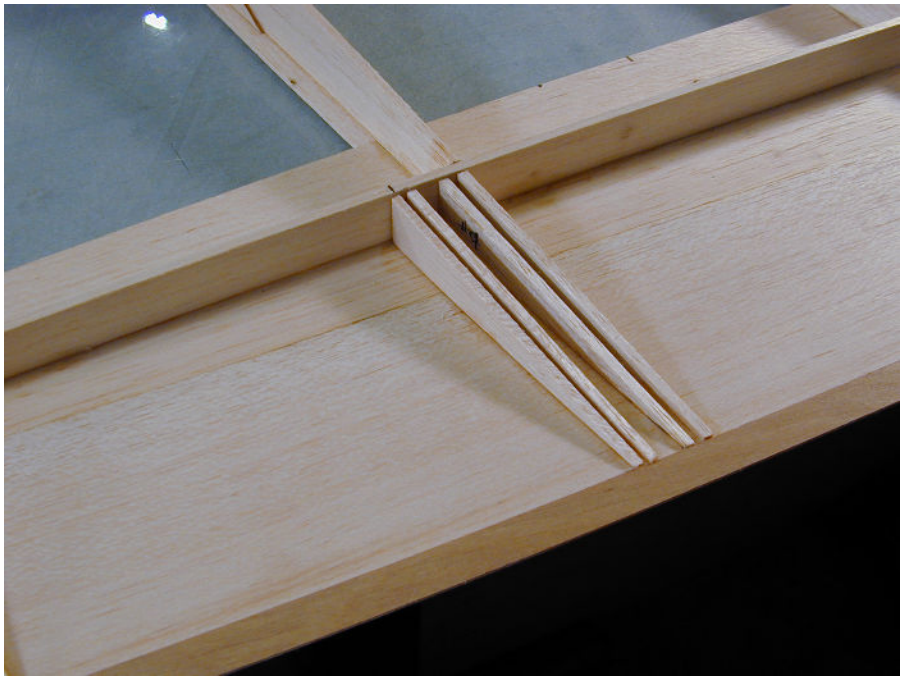
The elevator servo (Hitec HS-605BB, inboard) and aileron servo (Hitec HS-635BB,outboard) are mounted to the respective wing ribs using wood screws through 1/16" plywood reinforcement which is glued to both sides of the rib.

Additionally, there are specially placed balsa reinforcements in the control surfaces. These will be used as anchor points for the internal circuit board control horns.

The next major steps will be to install the upper surface sheeting and the remaining cap strips, cut the control surfaces free and face the open leading edges, and add the wing tips and leading edge.

From there, it's on to the fuselage!





Maple Leaf Design *Encore*

Fabrication walk-through, Part 5

by Phil Pearson

http://www.mapleleafdesign.com/encore.html

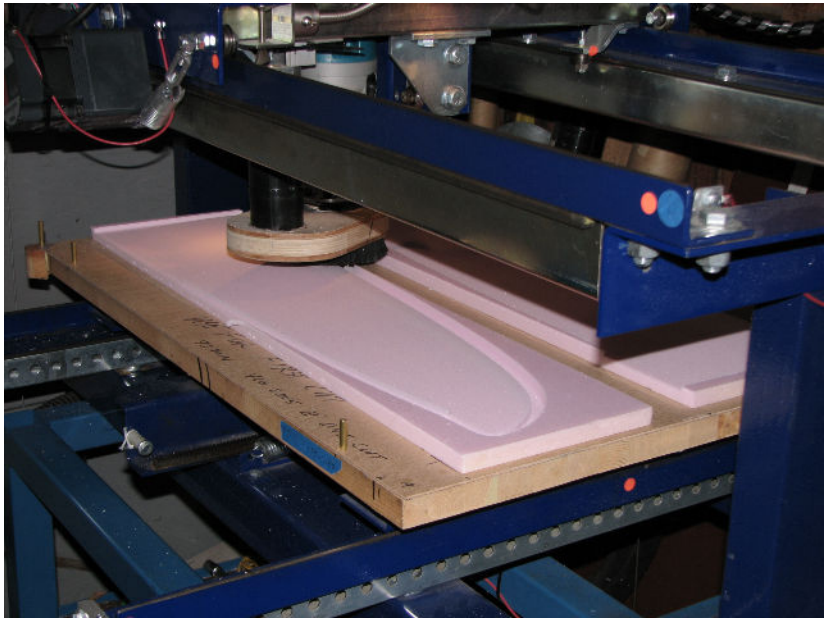
This month we will cover CNC milling of the Encore wing panels, preparation of the wing cores for vacuum bagging, and cloth cutting and table lay-out.

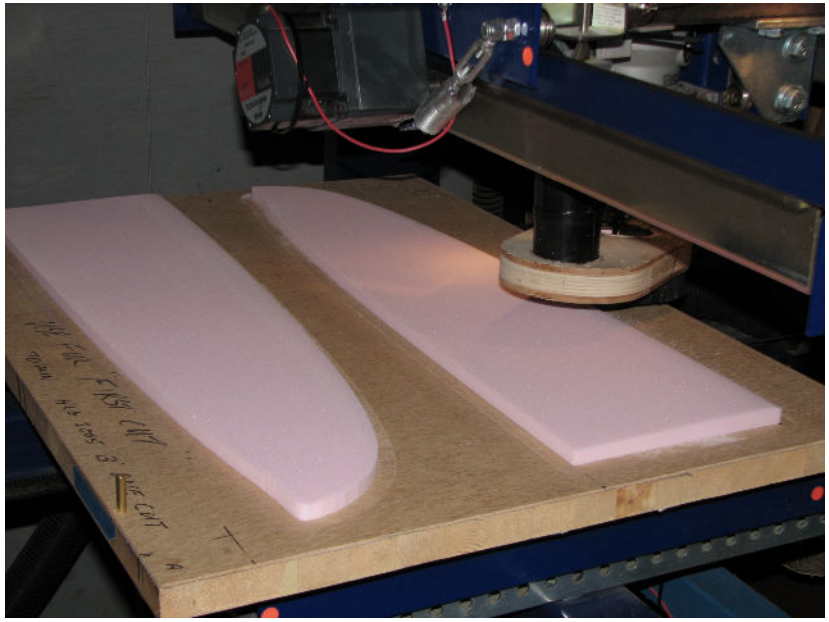
Next month will cover the actual resin application and vacuum bagging process.

A couple of errata stand out in the August issue:

– Page 50 (*PSSF RC-HLG Clinic and Barbecue*); the wing accuracy is off a few zeros and should be 0.005" or less. If I could do 0.0005" I would probably be building spacecraft!

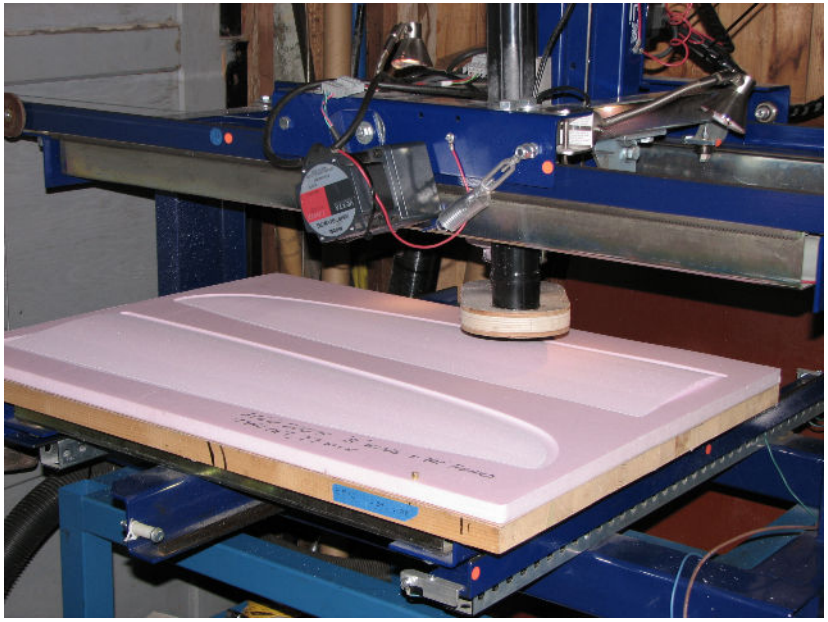
– Page 17; in the upper caption that should be "1/8" door skin," not "1/4" door skin." Actually, the door skin is a metric size and somewhat variable in thickness.

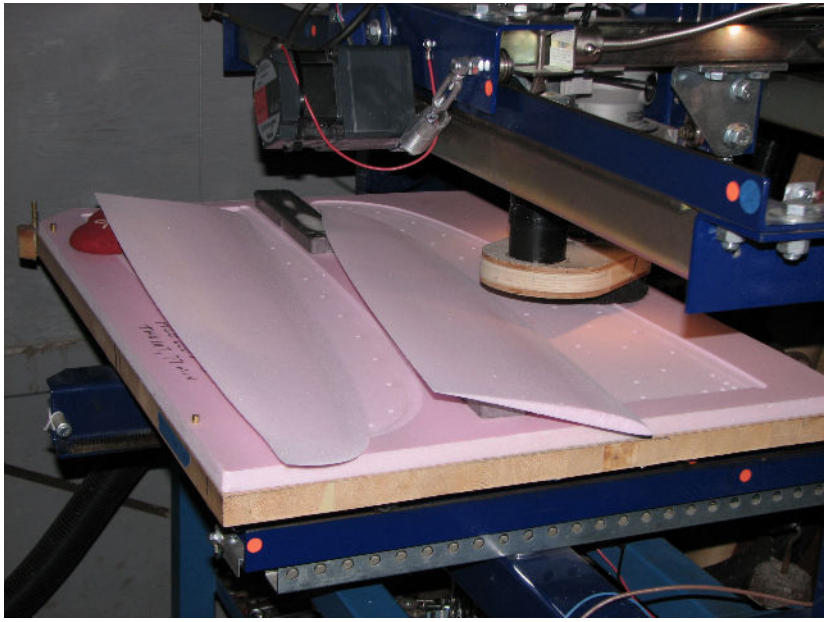




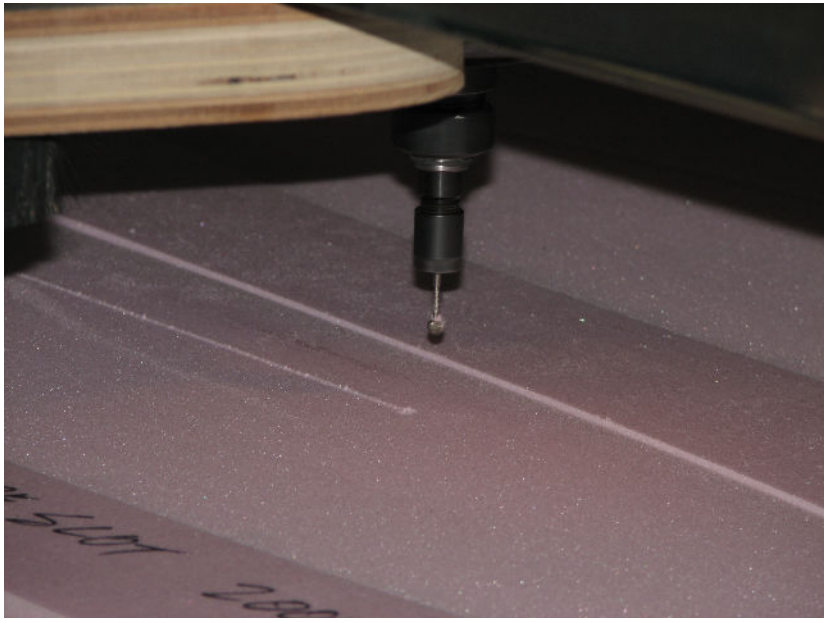
Left: Final contour cut defining a right-half wing blank with the bottom milled. Cutter is a 1/2" six flute carbide square end mill. Tool path is parallel to the wing chord. Step-over is 0.060" and is smoothed by the use of 0.014" thick mylars during vacuum bagging process. Right: Left-half wing blank milled and ready for the top-surface milling.

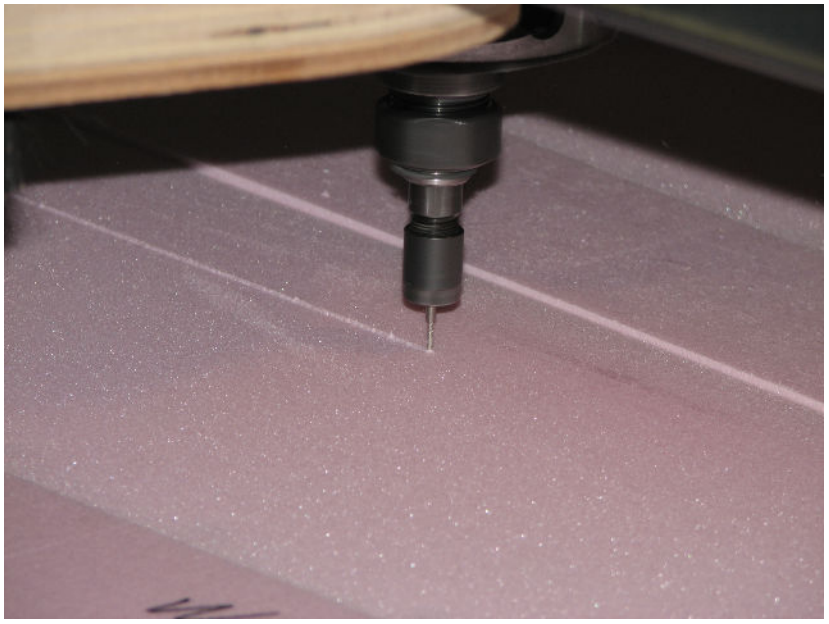
The lead-in photo on the opposite page shows an early Encore "prototype," the Maple Leaf built by Don Peters in 1996. The Frank Weston influence is quite apparent, Don also used Frank's airfoils. Don's masterful use of composite materials is readily apparent at this early stage and was responsible for attracting my interest, as very few builders were having this degree of success in working with composite materials for hand-launched gliders.



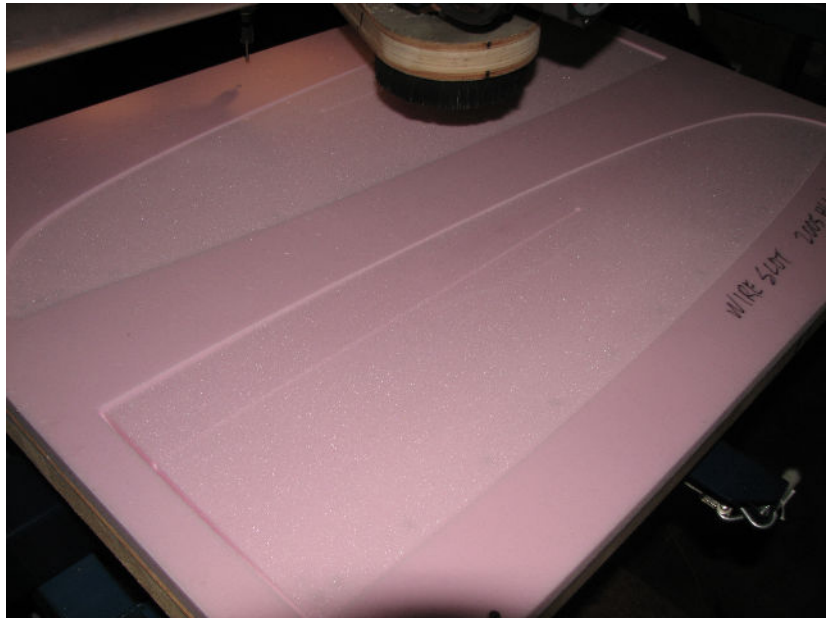


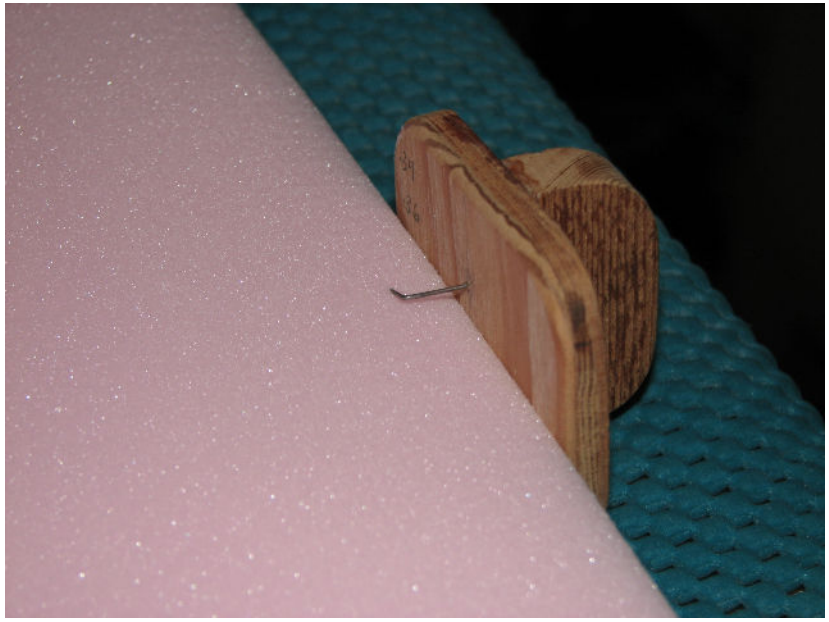
Left: Second wing surface, top, after milling. Female vacuum beds are used to hold the wing blank during milling. Right: Wing blanks milled. Vacuum holes in female bed allow air to be evacuated for hold-down. The trailing edge area has a fine network of "vacuum channels" to hold the delicate thin area that may be lifted by the propeller effect of the rotating end mill.



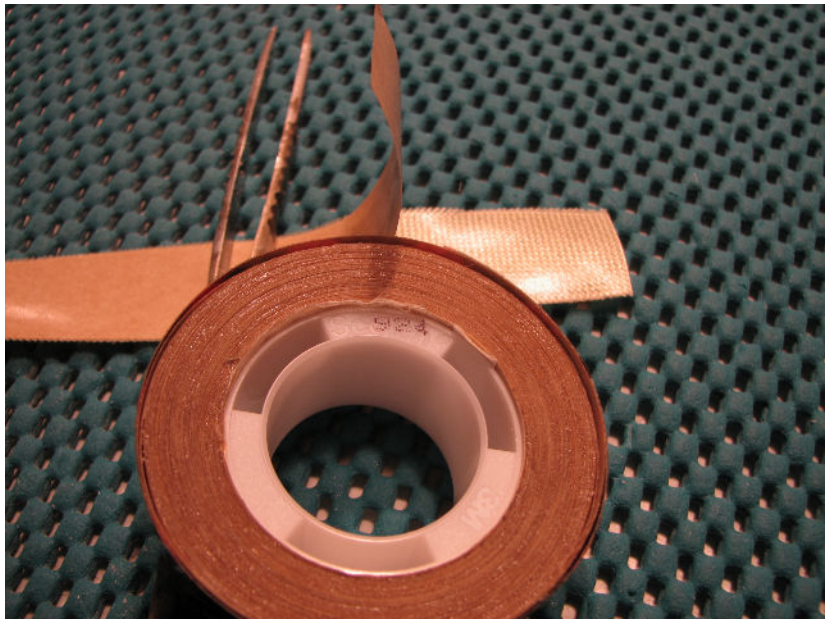


Left: A lollipop shaped mill bit is used to cut a wire channel for four-servo wings. Right: The lollipop mill cutting the wire channel.

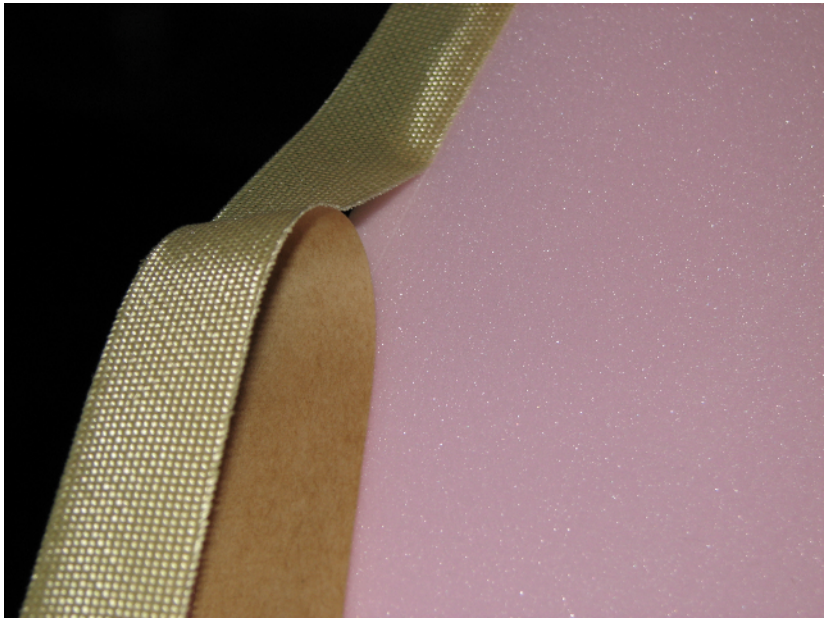


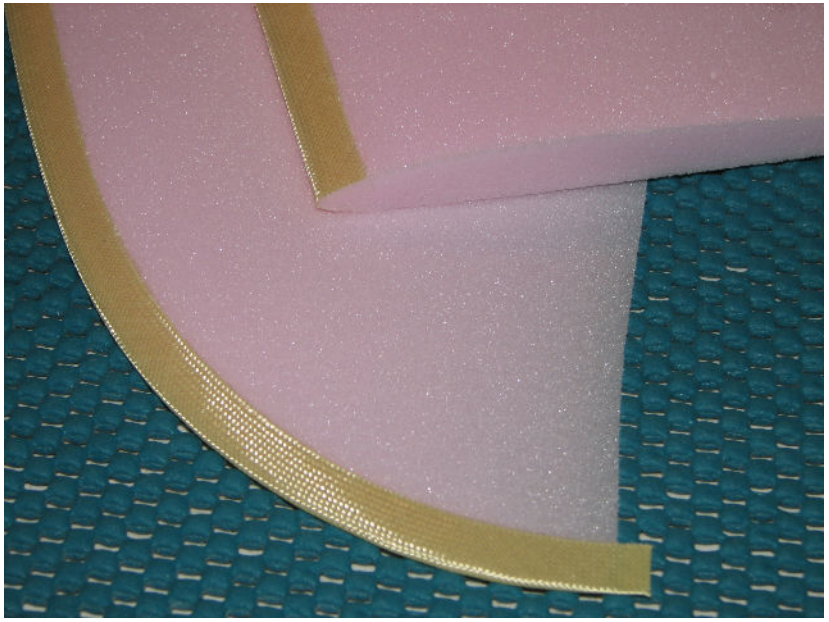


Left: The finished wire channel. No attempt is used to fill the slot as the mylar spans the depression with negligible distortion.
Right: A guide-line is scribed into the leading edge to align the leading edge protection Kevlar strip.



Left: Another view of the marking device and line. Right: 3M scotch 924 adhesive is used to secure the Kevlar leading edge cloth. When the paper backing is removed a thin layer of glue is left on the Kevlar. The paper backing is used as a guide when cutting the leading edge Kevlar strips.

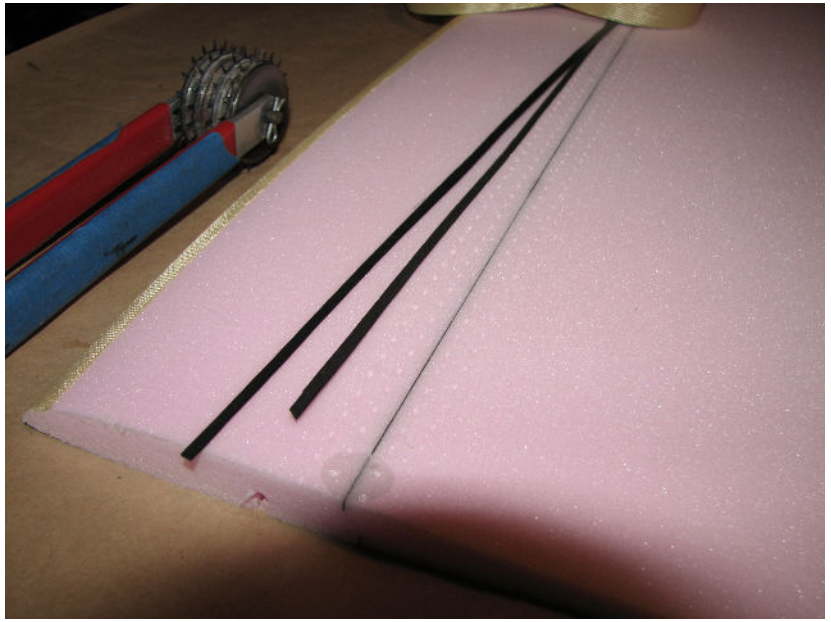




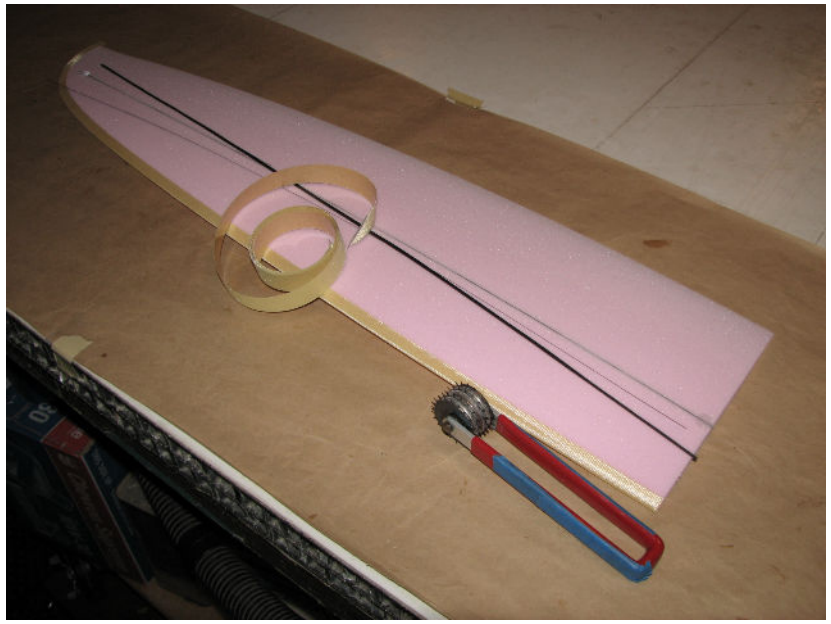
Left: The paper backing is removed and the kevlar is applied by pressing along the scribed line on the upper surface of the leading edge.Right: Wings showing finished application. The Kevlar is cut on a 45 degree bias and easily conforms to the curved wing tip.

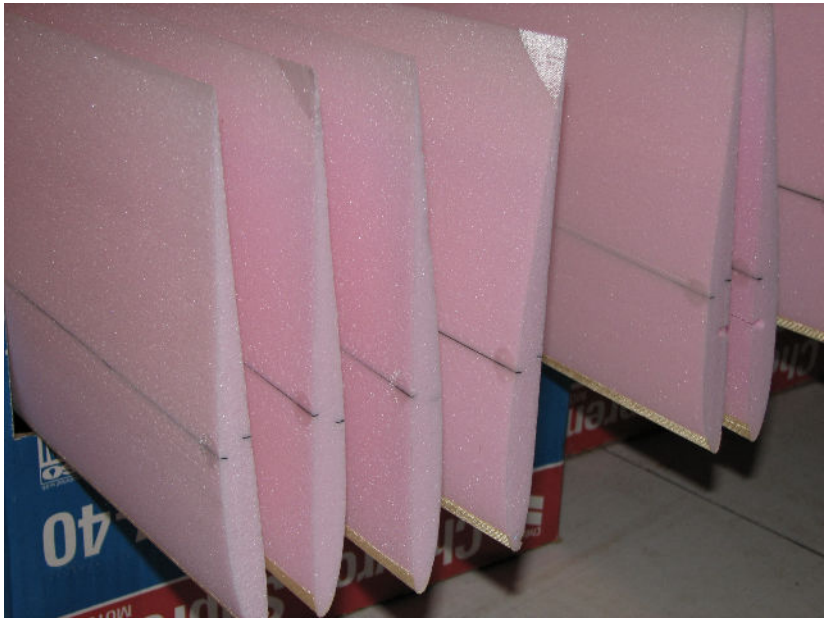
Left: Dritz electric shears are used to cut fabric, one ounce Kevlar. Grooves cut into the plastic styrene table surface guide the scissors for accurate curves and straight lines. Right: Kevlar cloth is folded neatly allowing handling of bias cut cloth with minimum weave distortion.

Left: Each bundle is enough cloth for a complete wing. Bundles are stacked with paper separators in a cardboard box to lessen contamination from dust or disturbance.

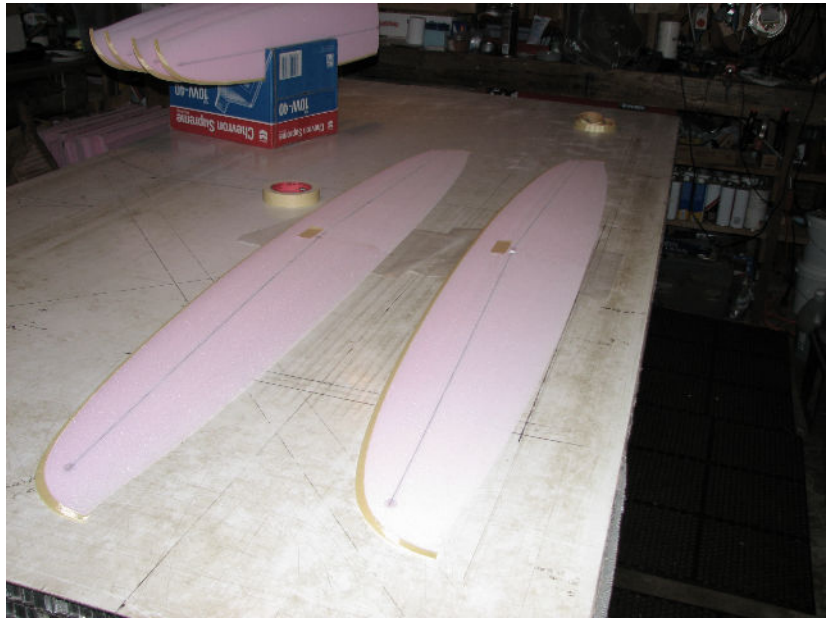


Left: Further wing core preparation entails cutting vertical slots for prepreg 0.005" vertical carbon “weblets.” An Olfa 300 snap-blade knife makes a suitable cut in one pass. Right: The top weblet in place and secured with thin discs of fiberglass cloth sprayed with adhesive. The area around the weblet is scored with the toothed roller in the back-ground. This allows excess epoxy to migrate from the spar caps and increase the compression strength of the foam in the spar area.



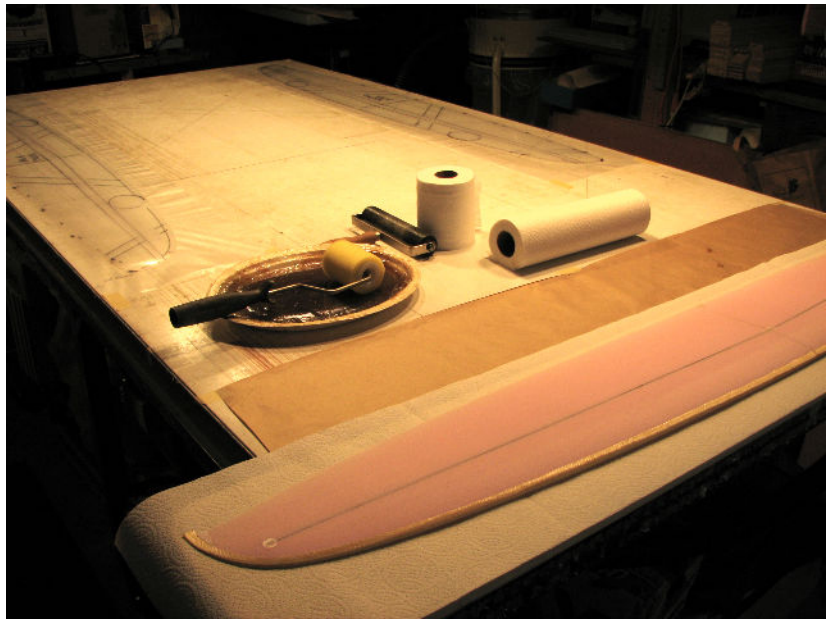


Left: View of leading edge "tape," carbon weblet strips, toothed roller and the prepared wing core. Little or no cleaning of the surface is necessary as the milling process leaves no dust or fibers. Right: Wing cores ready for joining together for vacuum bagging. Note light fiberglass cloth covering repairs made to broken corners.



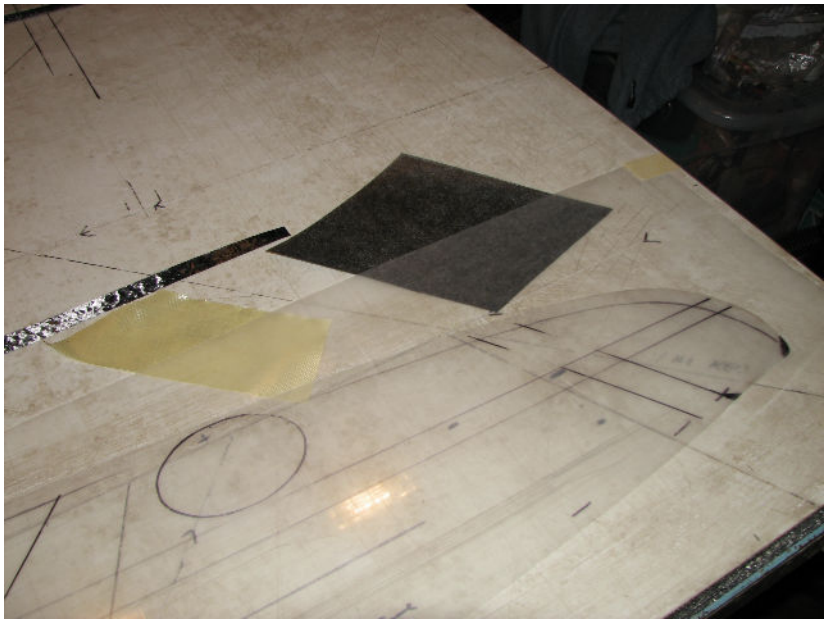
Left: Wing cores are glued together for vacuum bagging. Right: Hairs and small pieces of debris are lifted with stick masking tape.

Left: Mylars are scraped with an old credit card and waxed with Partall wax. Right: Waxed paper is taped to the work table and the mylars are placed wax side up. Top mylar on one side of the table and bottom mylar on the other.



Left: Table arrangement prior to wetting the cloth with epoxy resin.

Right: Consistent locating of wing reinforcements minimizes lay-up errors.



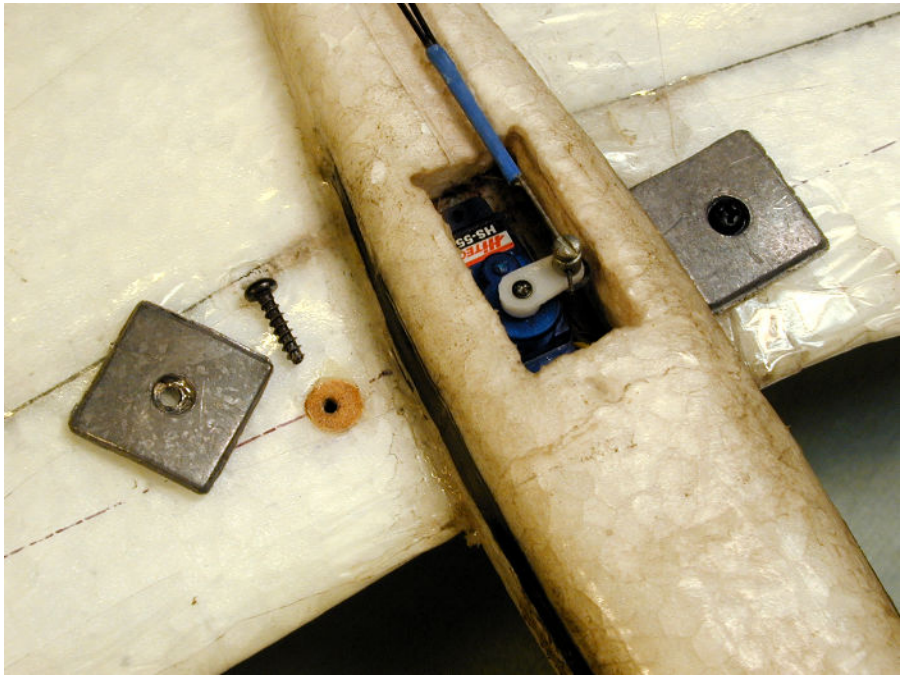
Left: Detail showing wing tip reinforcement cloths and locator marking on back of mylar.

Right: Tack rag is used on mylar to pick up dust prior to lay-out of cloth wing skins.

Kevlar cloth is carefully smoothed with old drafting brush.

Adding ballast to the Richter RC Alula RC-HLG

by Bill & Bunny Kuhlman, bsquared@themacisp.net



This year Seattle Area Soaring Society added RC-HLG to the Multi-Task event. Entrants can now fly their HLGs in the Duration, Distance, and Speed tasks.

No one had flown any of the Multi-Task tasks with a HLG, so I decided to try my hand at the Speed course with my well-worn EPP three-servo Alula.

Launching high and diving through two laps of the 37.5 meter course gave times of 14.4 and 12.8 seconds. The wind was from the north at about 8 mph, so the Alula had a hard time getting from the Base A entry gate to the Base B turn point.

Brendon Beardsley asked if he could try flying the course. His first attempt netted a time of 10.4 seconds. He then flew a 10.1 second round trip. His third successful attempt was 9.2 seconds.

Brendon then switched launching strategies and began throwing the Alula directly into the wind and very low to the ground — about three to five feet — using the launch preset to maintain a straight flight path going upwind. Staying on course after the turn was a bit more difficult than he had anticipated, but his times dropped substantially as he became accustomed to the new technique.

A total of 16 successful runs gave him three low times of 6.0, 6.1, and 6.2 seconds. That's an average speed of around 27 mph over two laps of the course.

I promised Brendon I'd figure out a way of firmly attaching an ounce of ballast (a weight increase of 20%) in an effort to further increase the speed.

My solution was to use a sharpened piece of brass tubing to cut a circular hole all the way through the wing directly in line with the CG and an appropriate distance from the fuselage. A short segment of wooden dowel was then epoxied into the hole. Once the epoxy had cured, a pilot holewas drilled in the center of the dowel, and then tapped for a coarse thread screw.

For ballast, I used half ounce drapery weights I picked up from JoAnn Fabrics. These are lead weights which can be easily bent by hand to conform to the lower surface wing contour.

A few twists with a screw driver firmly attach the removable weights to the airframe.

The added mass significantly increases the aircraft inertia, and this is quite noticeable during and immediately after launch. The flying speed is definitely higher, and turning ability does not seem to be too compromised. Because the weights are directly on the CG, no major retrimming of the control surfaces is necessary.

We haven't yet had the chance to get any timed runs, but Brendon's hoping to get down to five seconds or better with the ballasted Alula. We'll let you know if he succeeds!

Here's a typical Chris Erikson landing zone, on Grayback Mountain, near Goldendale, Washington. Okay, above the cliffs there is a gentle slope, but Chris did fill his usual rock quota.

Below the cliffs a few hundred yards is a 150' Ponderosa pine, still adorned by Erik Utter's 60" Banshee, which flew great, until. I found a local sharpshooter who was ready to shoot the branch off, but Erik found a Portland tree service guy who keeps promising to retreive it gently, and then go mountain biking.

I took this picture from a ledge halfway up the cliffs, on my way up a talus chute with Erik.

The Boomerang you're looking up at could be Steve Allmaras's or Mike Daily's. From this perspective it was hard to tell them apart.

— Philip Randolph