Radio Controlled Soaring Digest

November 2005 — Vol. 22, No. 11

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Back cover: Another shot of Dieter Mahlein's *Stork-2 Pro*, this time with Mount Adams in the background. (1/500, f5.2)
Photo courtesy of Mike Poser

Photo by A. Lee Bennett <www.ATPM.com>

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

In the Air!

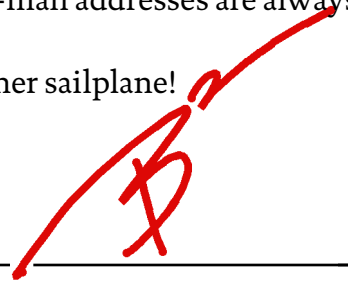
Central Valley RC put on another world class contest on October 1st and 2nd. What a wonderful weekend! *RC Soaring Digest* coverage of Visalia 2005 starts on page 4 of this issue. We hope you'll be enticed to attend the 2006 Fall Soaring Festival.

Our sincere thanks to Dave Beardsley, fellow Seattle Area Soaring Society member, for use of his fantastic Nikon D1X camera. There's nothing better than having a digital camera which can accept long focal length lenses with vibration suppression and autofocus, and produces images which are more than 3000 by 2000 pixels. With a 1.0 GB Compact Flash card, our PowerBook and a portable hard drive, we managed to take nearly 900 photos over the two days.

You'll notice that none of the Fall Soaring Festival photos are captioned. This was done intentionally to open an opportunity for *RCSD* readers who attended the event. If you see yourself and/or your sailplane in a Visalia photo, let us know by sending us an e-mail message at <rcsdigest@themacisp.net>. If you include your mailing address, you'll be rewarded with a CD containing all of the *RCSD* back issues which are currently in the PDF archives.

We always look forward to receiving feedback from readers. If there's something you like about *RCSD*, an area you'd like to see expanded, or a criticism you feel would make *RCSD* a better magazine, we're eager to hear from you. And feel free to write to the *RCSD* columnists as well. Their e-mail addresses are always provided.

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



32nd Annual Fall Soaring Festival

Visalia, California

The first weekend in October is simply noted on our calendar as "Visalia." That's because Central Valley RC puts on their Annual Fall Soaring Festival on this date each year in Visalia California. 2005 marked the 32nd time this event has taken place.

This two day contest is probably one of the largest in the United States, with nearly two hundred pilots entered in Open Class alone. In addition, there were entries for Two Meter, RES, and Junior Classes.

This level of participation requires extensive planning and a tremendous amount of work. Over the two day period, for example, the CVRC winches perform around two thousand launches.

We find it amazing that CVRC, with less than fifty members, is both willing and able to put on such a large event. To do it so successfully year after year is astounding.

Because of the large number of pilots, first launches of the day took place at 8:00 AM on both days. That meant the initial pilots' meeting on Saturday was at 7:30. Despite the early hour, everyone was excited to get started and enter the fray.

Weather this year was a bit different than in the past. A rain storm came through earlier in the week, so it was a bit more humid than normal.

Saturday morning was marked by downwind launches and downwind landings.

Thermals were farther apart than usual throughout the weekend, and seemed to peak out at relatively low altitudes. A sky filled with sink greeted

the majority of pilots during a later round on Saturday.

While the contest itself is the predominant reason for attending Visalia, there are other reasons for being there as well.

• Friday is a free-for-all practice day, and it's always interesting to see what individual pilots concentrate on improving — trimming, searching the area to find lift zones, practicing landings, etc.

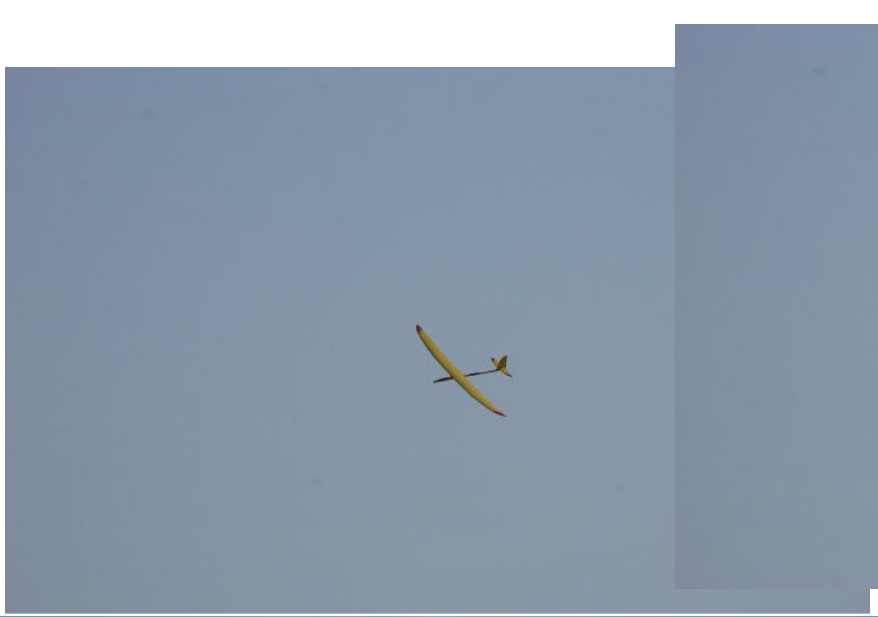
• Saturday evening always has a planned activity, and this year was no different. There was a free flight hand launch glider contest, followed by an RC-HLG contest.

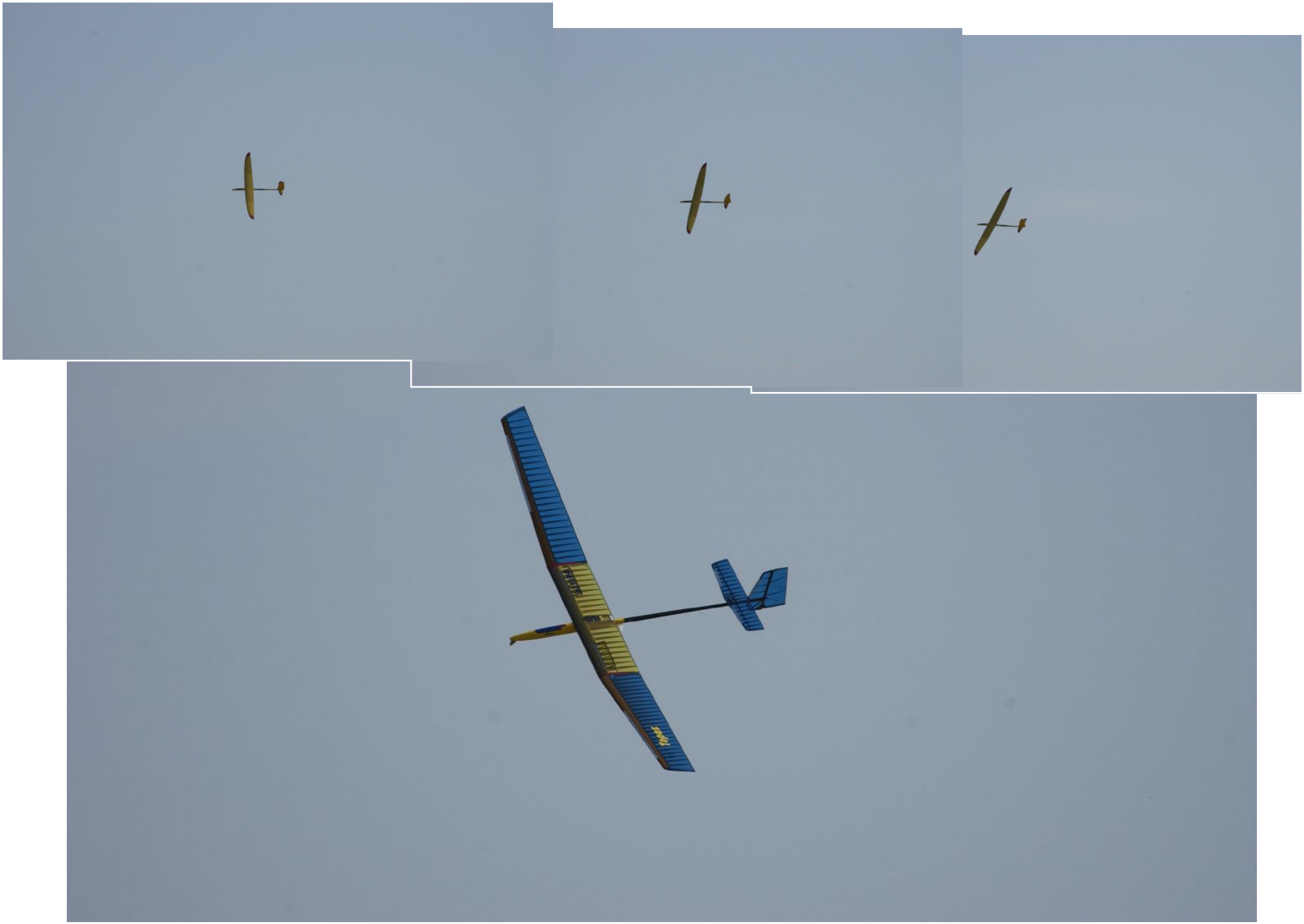
• A number of vendors set up tents and tables starting on Thursday. If you needed a replacement servo or a battery pack, or some other item, it was most likely available from one of the vendors in attendance. Just looking around this area was a kick.

• The opportunity to watch world class pilots fly was ever present, and conversing with the notables of the RC soaring world was easy.

There are always a couple things which you just know will be permanently fused into your memory. This time it was Daryl Perkins signing a dollar bill for Brendon Beardsley after losing their landing points wager, followed by fellow SASS Junior Michael Knight winning a "Daryl dollar" of his own in the next round.

CVRC has tentatively scheduled the 33rd Annual Fall Soaring Festival for October 7th and 8th, 2006. Mark your calendars now!






THE UNITED STATES OF AMERICA
ONE DOLLAR

The Natural Side of Soaring

by Lee Murray, <lmurray@athenet.net>

RC Soaring on Overcast Days and Sunny Days

In an early article in my column on weather[1] I discussed the energy budget for the earth's surface. Ignoring the melting of ice and snow, the sun delivers energy which is dissipated in the following ways:

1. Radiation back into space (the cooling noted at night especially with clear skies)
2. Ground conduction (heating of the material beneath the surface)
3. Evaporative cooling (heat absorbed with the evaporation of moisture from moist soil and green vegetation)
4. Convective cooling (warmed air, heated by the surface, rises because of its lower density)

When convective cooling becomes organized into plumes and thermals, we can use it to gain altitude with our sailplanes (thermal soaring).

I've mentioned previously that the Anderson Sod Farm in Appleton Wisconsin is in a wetland area. During much of the year evaporative cooling is a significant way solar energy is dissipated. As a result the sod farm doesn't produce many strong thermals. The roads around the farm, and dry vegetation are often the most reliable places to find rising air. By August the surface is usually dry and the soaring conditions become more like other places and we do see stronger lift. This article is about an apparent marginal day when the lift was more than expected.

This July 4th, we had planned to go flying but we were checking with each other that morning because the weather looked marginal. We had thundershowers overnight and rain in the morning. Long time friend Fran LeClercq, who runs our launch equipment, brought his *Falcon 600* which had been in storage for years. I brought a *Li'l Scorpion* (2M). It was kind of a throw back sailplane format day for Fran and me. Bob Johnson and Mark Miller (Isthmus Models) had their Ukrainian *Soprano* and *Trio* models to practice for the AMA Nats.

I decided to make an article about this day because my expectations for the day didn't match the soaring we enjoyed. I had six to 12 minute flights with the two meter ship even though I never got much above launch height, perhaps as high as 1,000 ft. once. The soaring forecast indicated I could get to about 2,000 ft. above ground level (AGL) — more on that later.

By contrast, two days earlier, July 2nd, was a day when we expected good lift. We had a good turnout of flyers in great weather. Fran counted 75 launches in three hours. While most of the seasoned fliers had some 10+ minute flights, there were lots of three to four minute flights in sunny blue skies with occasional fair weather clouds. The temperature and wind history for that day[2] is shown in Figure 1 and the

1. Murray, Lee, *The Natural Side of Soaring,* RC Soaring Digest, Vol 16, No. 3, Mar 99, pg 10

2. Weather Underground Weather Station in Oshkosh. http://www.wunderground.com/weatherstation/WXDailyHistory.asp?ID=KWIOSHKO5

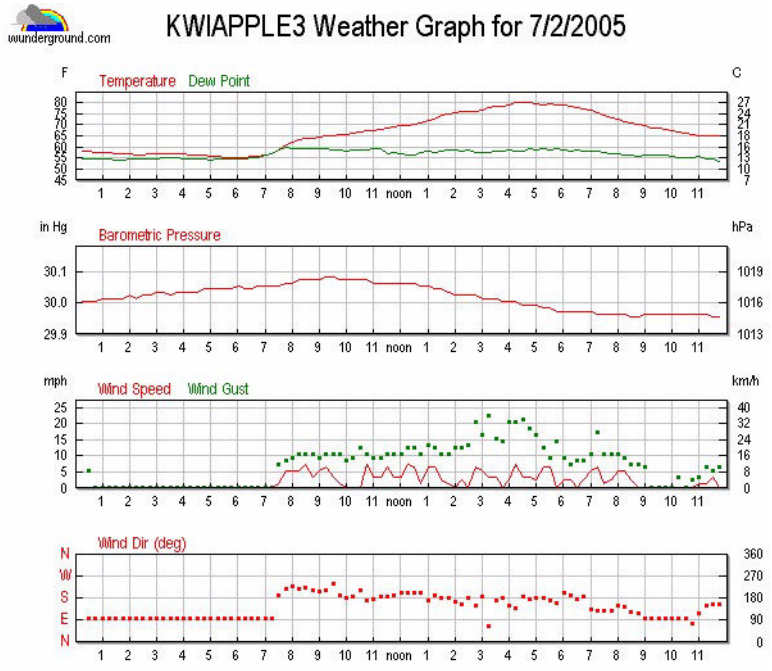


Figure 1. Weather History Saturday July 2, 2005

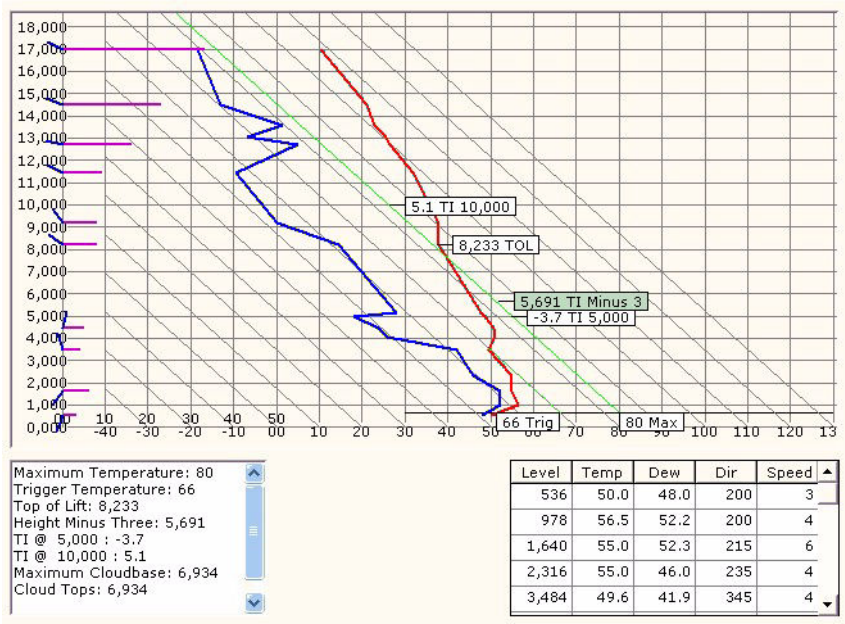


Figure 2. Soarcast Saturday July 2, 2005

Soarcast[1] prediction from lapse rate data in Figure 2. I'm going to use some tools that I have described a few times previously. If you are new to the topic or want a review you can download that article from the on-line *RCSD* archives, the June 2004 issue[2].

July 2nd had potential for the thermals to rise over 8,000 ft. An unwritten axiom of days with great lift is that there will be times when you are going to experience sinking air. The best fliers can often recognize each local condition, lift or sink, before they launch. Note that the weather history shows increased gusting to 15 m.p.h. starting about 2:30 caused by thermal activity. See the wind speed plot in the weather history (Figure 1).

What stands out as different on the July 4th outing was that we had good light lift with no direct sun. More people were having long flights compared to what we experienced on July 2nd. The rule of thumb is that if you have clear skies or even partly cloudy skies, you will get thermal development and when you have no direct solar heating the thermals will be weak and infrequent. After the flying I decided to look into the conditions just to see if my previous theories were wrong or only my assumptions about the prospects for lift on overcast days.

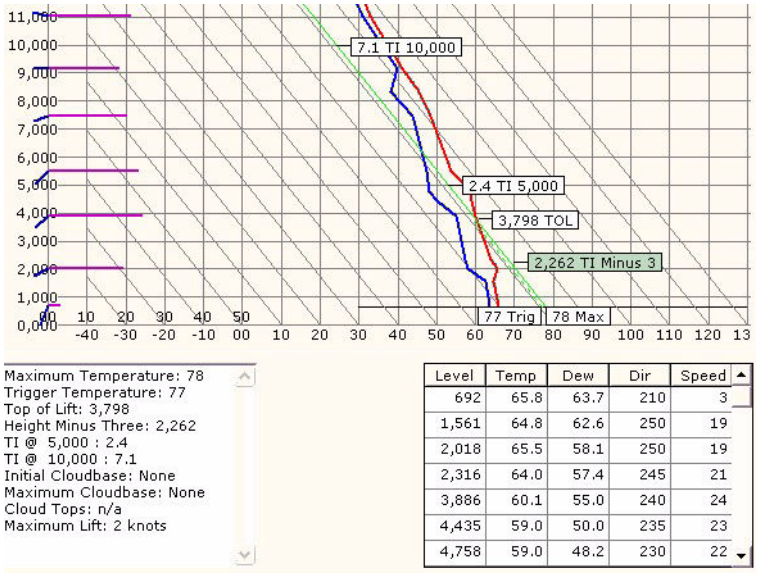
The air temperature by altitude (lapse rate or sounding data) was downloaded from the ROAB source[3] for Green Bay[4], Wisconsin, the closest US Weather Bureau station to the sod farm. The data

1. Soarcast is a software product downloaded from the Harvard University s SSA web page. Kevin Ford is believed to be the author. (I don t see it being offered for downloading at this time)

2. Murray, Lee; The Natural Side of Soaring, *Forecasting Thermals*, Vol: 21 No: 6 Jun 04 Pg: 17

3. http://raob.fsl.noaa.gov/

4. Green Bay WI US was selected from a list of station identifiers provided by the NOAA website.



Level	Temp	Dew	Dir	Speed
692	65.8	63.7	210	3
1,561	64.8	62.6	250	19
2,018	65.5	58.1	250	19
2,316	64.0	57.4	245	21
3,886	60.1	55.0	240	24
4,435	59.0	50.0	235	23
4,758	59.0	48.2	230	22

Figure 3. Soarcast Monday July 4, 2005

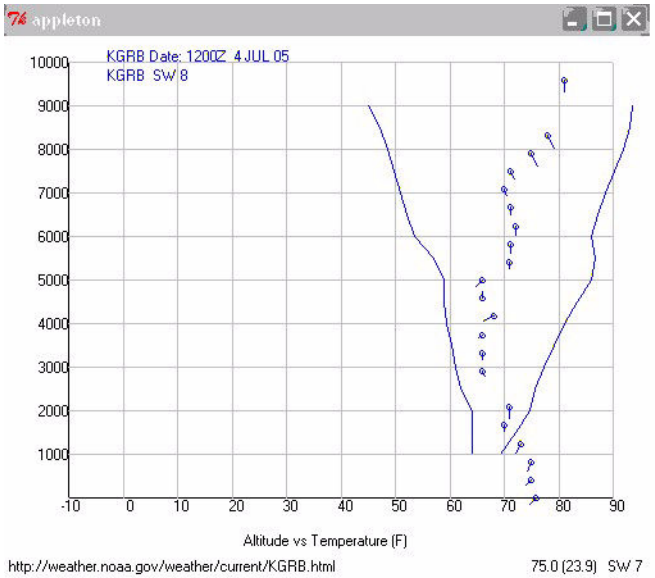


Figure 4. Tcl Lapse Rate Monday July 4, 2005

was uploaded to Soarcast and displayed. (See Figure 3) The data was uploaded to Soarcast and displayed (See Figure 3). The black lines running from lower right to upper left are the adiabatic lines. Those lines indicate how ground level air will cool as it rises in the atmosphere due to falling pressure and expansion. Useful lift is predicted when ground level air at some temperature can rise several thousand feed moving along the green line before it reaches air of the same temperature as represented by the red line (measured from the lapse rate sounding). Soarcast was showing the rate of rise to be 2 knots (3.4 f.p.s.). I'm thinking that rate of rise would barely work for RC sailplanes but not for a full size sailplane turning in the lift.

I also used the plot developed by Greg Ciurpita using Tcl Script[1] (Figure 4). This is easily interpreted since the air temperature at altitude is corrected back to ground level temperatures based on the adiabatic lapse rate. A right leaning air temperature line which would indicate that air packets at a temperature below the right tilting line will rise to meet the line. In this case the dry air adiabatic line does show this behavior. Greg made a script that I activate from an icon on the desktop. The program goes out and gets the latest ROAB lapse rate data and plots the data in a few seconds.

The temperature history for the day was taken from Weather Underground at an Oshkosh site which might be the closest to Anderson Sod Farm with full history data.

<http://www.wunderground.com/cgi-bin/findweather/getForecast?query=54915>

Note the last 5 digits of the URL is the local zip code. The temperature history can be seen from the plots in Figure 5. These ranged from about 70˚F at Noon to 78˚F when we stopped flying at 3 PM. The Soarcast trigger temperature was 77˚. Looking at the plot suggests that lower air temperatures, 72˚ for example, would

1. Ciurpita, Greg, *An Adjusted Lapse-Rate Web Script,* RC Soaring Digest, Vol 18, No. 2, Feb 01, pg 20

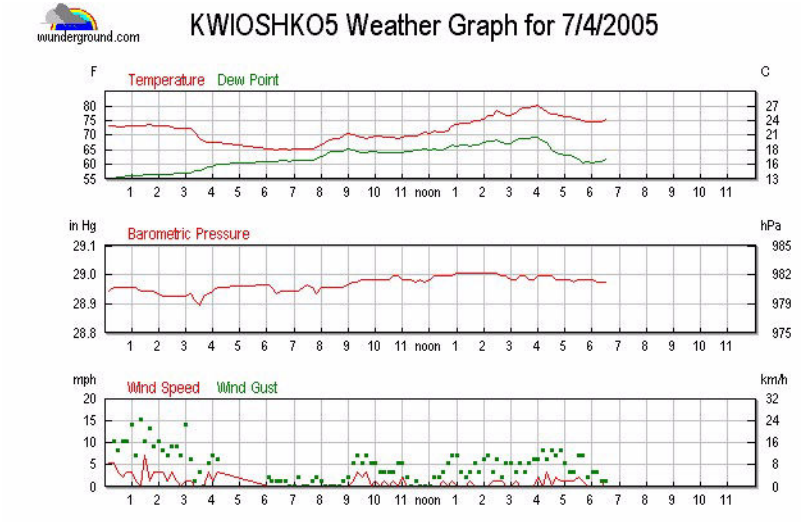


Figure 5. Weather History Monday July 4, 2005

work for RC soaring. A road and a tree line were down wind of the launch site, and these were two places were I flew much of the afternoon. I think the lift was not easily energized to lift off the sod farm surface and it took the slightly elevated road with the dark macadam surface or the tree line about 60 yards behind that to break the packets of hot air away from the surface. Because it is very quiet on the sod farm one could hear the trees rustle when the lift went by. Of course you could also feel the wind speed change. The weather history shows that while the average wind speed was only a few m.p.h., the gusts were 8-10 m.p.h. The occurrence of gusts corresponds to a change in the weather at about 9 AM when the rain stopped. The gusts indicate convective cooling in our area.

My conclusions for the overcast day include:

1. Do not underestimate the ability to fly RC gliders on a cloudy day.
2. The laws of physics still say that some objects will heat up faster than others and the packets of air will probably leave the ground where you usually find them on other days with bright sun.

On a personal note having to do with weekend fun on September 25th: I want to thank the members of the Las Vegas Valley Soaring Association, Bill Tisdale (Flight Operations Officer for the club) and Air Force Pilot Keith Colmer for helping me fly the club Grob 103. I enjoyed very much your hospitality and also the opportunity to help Jim assemble his *Speed Astir* and talk about our similar backgrounds in modeling.

Keith Colmer, Lee Murray, and the Grob 103

Sled Driver Chronicles

Jay Decker, <sleddriver@monkeytumble.com>

Tri-Slopes Six-Pack... Growing an Event

A couple years ago, Dieter Mahlein asked if I would be interested in putting together a spring slope soaring event in the Tri-Cities, Washington, area. Unencumbered by any knowledge of slope events and the history behind previous slope events in the area, I said "Sure! What do you have in mind?"

Dieter's idea was that we could have an event, where if the wind was blowing from the right direction and at a good speed, we could fly at three different slopes in six different styles of flying.

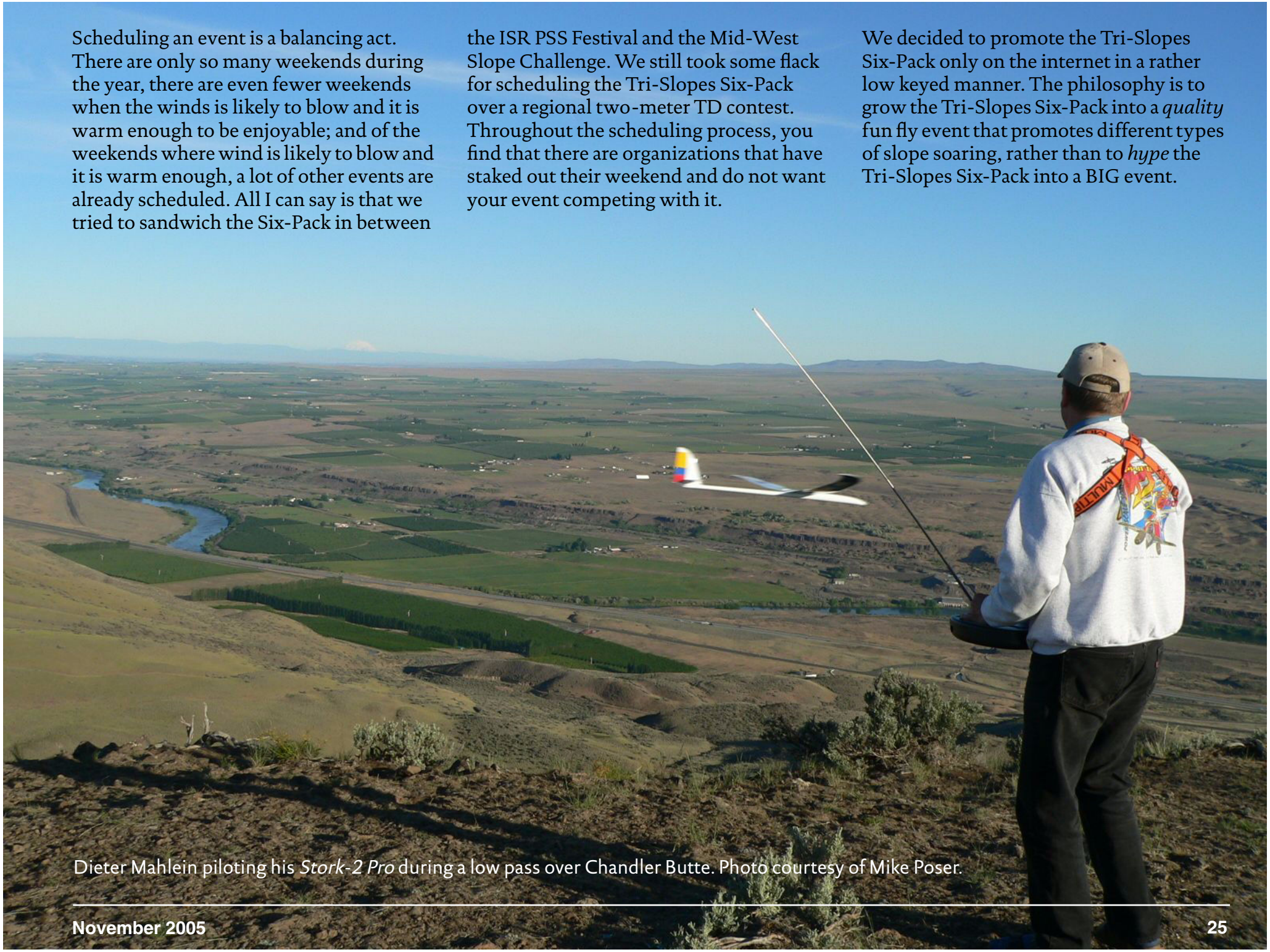
The three slopes are Eagle Butte, Kiona Butte, and Chandler Butte. The six styles are modern scale, vintage scale, power slope scale (PSS), lead sleds, high performance slope gliders, and dynamic soaring (DS).

After thinking about an event name for some time, Sharon, my wife, popped off with "Tri-Slopes Six-Pack." So, we had a named fun fly slope event.

Though coming up with a name for the event seemed difficult, this was nothing compared to choosing a weekend to schedule it.

Scheduling an event is a balancing act. There are only so many weekends during the year, there are even fewer weekends when the winds is likely to blow and it is warm enough to be enjoyable; and of the weekends where wind is likely to blow and it is warm enough, a lot of other events are already scheduled. All I can say is that we tried to sandwich the Six-Pack in between the ISR PSS Festival and the Mid-West Slope Challenge. We still took some flack for scheduling the Tri-Slopes Six-Pack over a regional two-meter TD contest. Throughout the scheduling process, you find that there are organizations that have staked out their weekend and do not want your event competing with it.

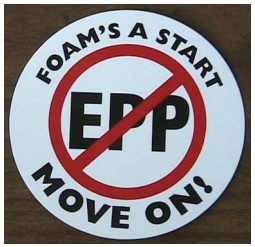
We decided to promote the Tri-Slopes Six-Pack only on the internet in a rather low keyed manner. The philosophy is to grow the Tri-Slopes Six-Pack into a *quality* fun fly event that promotes different types of slope soaring, rather than to *hype* the Tri-Slopes Six-Pack into a BIG event.



Dieter Mahlein piloting his *Stork-2 Pro* during a low pass over Chandler Butte. Photo courtesy of Mike Poser.

Clockwise from upper left: Greg Smith's *Barracuda* looking fast just sitting on Eagle Butte. Photo by Jay Decker. Brian Courtice and his sharp LEG P-51D *Mustang* came all the way from Hawaii. Photo by Eric Bean. Ron Hollenbeck's well built and great flying 4-meter *Lunak*. Photo by Eric Bean. Two well built planes built by the late Eric Molstead, brought to the Six-Pack by Eric's family. Photo by Mike Poser.

We also leapt into a fray on "no EPP foamies" rule for the Six-Pack. The intent is to clear the hill of EPP combat and other EPP "beater" type aircraft for the guys who brought up high performance, high dollar planes, or the irreplaceable labors of love. We took crap from some folks for being exclusionary elitists and for being ignorant of the high quality scale EPP planes that some guys had started to build. And, we stoked the flames with a little attitude…



The intent of clearing the hill of combat and beater flying to provide clearance for nice iron is a good thing. However, having now seen some of the really nicely finished and performing EPP planes, we will not discriminate against EPP in 2006, and we will have to create a definition that keeps the sky clear of combat and beaters.

The first Six-Pack was in May of 2004. The weekends before and after the first Six-Pack, the wind rocked. However, the weather forecast for the weekend of the Six-Pack was for calm winds. And that's what we had the entire weekend.

Despite the forecasted lack of wind, we had 36 registered pilots for the first Six-Pack. While folks where disappointed that the big air did not happen, everyone seemed to have a good time BS'ing and looking at each other's toy airplanes without the howl of wind in their ears. The photos of this event must be pretty funny, a bunch of guys sitting on tailgates BS'ing and other guys flying HLG's or electrics… (see <shredair.com/3s6p/3s6p04.html>).

The second Six-Pack held this past May and there were 40 entrants. The weather was split between calm winds on Saturday and 35 to 40 m.p.h. winds on Sunday. There was a light wind early Saturday morning, but by mid-morning it was calm. Sunday was the day. Doug Boyd's wind meter indicated 38 m.p.h. at Eagle Butte mid-afternoon. The guys with heavy, slick planes where in heaven and the guys with light airplanes received the excuse they needed to go buy a lead sled. While you are looking through the photos you should get a sense of how much fun everyone had.

The following observations are shared for those who host, or are thinking about hosting, a slope event, and also thoughts which might guide the future of the Six-Pack:

One of the objectives of the Six-Pack was to create a venue for — and to promote — scale slope soaring in the Pacific Northwest. This objective has not been met as far as large scale gliders are concerned. Scale glider pilots have migrated to aero-tow, and apparently only a few are willing to commit their ships to the rigors of slope flying.

There is an apparent lack of willingness for some pilots to fly at Chandler Butte. I suspect that these pilots felt more comfortable flying at Eagle Butte with easy landing conditions. Chandler Butte is a great place to fly with amazing compression lift, but this site does require a little more landing skill and significantly more landing discipline to fly there successfully, i.e., without damaging your plane.

The high quality EPP planes Jack Cooper had with him have convinced me that excluding planes on the basis of EPP construction is no longer justified when one wishes to exclude combat wings and flying "tape balls." Anyone have a good definition we could use to keep the combat and beater planes out?

Fun flies are fun, but the inherent lack of focus makes it difficult to promote any particular objective.

Advice to those considering organizing your events:

- Pick your event
- Name your event
- Stake your weekend (and don't budge from that weekend)

Whether this was interesting to you or blows… let me know at <sleddriver@monkeytumble.com.>

Have Sailplane — Will Travel

by Tom Nagel, <tomnagel@iwaynet.net>

Sloping the Shoe

This story is about my first experience with slope flying. The story takes place many years ago, so many years that the memories are all sepia colored with age. Or maybe it was just the dorm coffee I was drinking back then.

The year was 1965, and I was a sophomore at The Ohio State University. I was living in Unit EE, along with about 16 other guys, on the top floor of the Stadium Scholarship Dorm.

At the time, the Stadium Scholarship Dorm was nestled under the bleachers, hung from the rafters actually, on the west side of the great horseshoe shaped Ohio Stadium.

When the stadium got remodeled and expanded a few years ago, the university decided to move the Stadium Scholarship Dorm out of the Stadium and up onto Neil Avenue in what used to be Mack Hall. It is now called the Not Exactly At The Stadium Scholarship Dorm or something like that.

Back in 1965 the SSD was not yet a co-ed operation, and in fact there wasn't a women's residence hall within a half mile of the stadium. We were similarly distant from classrooms, the main library, High Street bars and civilization in general. So we were a lonely, scholarly, impoverished and socially deprived bunch of guys.

The Stadium Dorm rooms didn't have any windows to the outside world. The only windows were out in the common areas. Sometimes it felt like we were in prison, not college. We found all kinds of ways to amuse ourselves in the absence of sunlight, money, women and alcohol.

We pretty much had the run of Ohio Stadium, except on game days. One of the guys used to hunt stadium pigeons with a blowgun he made out of apiece of electrical conduit. Another bunch of guys carried on a running battle with the football ground crew, coming up with a new way to sabotage the football field each week.

But I digress. Those are other stories. Remind me to tell you some time about the time we sneaked out onto the field the night before a game and taped the feet of a stuffed stadium pigeon to the top of one of the goalpost uprights.

But for now, back to Sloping the Shoe.

One of the guys in my unit had brought his pet python to school with him that fall. He had also brought a cage full of hamsters, which were basically python fodder. One of us, fondling a hamster and looking out the floor-to-ceiling hallway windows on the top floor of the Stadium Dorm, devised a scheme to parachute a hamster from the top of C-Deck down into the parking lot where the marching band practiced. Soon we were all on board.

We made a parachute out of a plastic dry cleaning bag, and fashioned a hamster capsule out of a single serving cereal box. Somebody else scrounged up some walkie talkies, and the Unit EE gang split up into two crews. Rodent Launch Central would take the chute and the hamster up to C-Deck. The other crew, Rodent Control, would retrieve the hamsternaut in the parking lot after splat down.

I headed up to the top of C-Deck, 93 feet above the parking lot according to the published stats for Ohio Stadium. The first launch went well. The chute drifted down and out into the parking lot, and after the landing the hamsternaut scrambled out of his cereal box and scuttled across the parking lot, only to be snatched up by Rodent Control.

It still kills me that for four whole years I lived RIGHT INSIDE the best slope flying site in the state of Ohio, and didn't have the money to buy the RC equipment to fly it.

It was on the second launch that things began to go wrong. It was a warm early fall afternoon, and the sun was baking the west facing wall of the stadium, and heating up the parking lot. It seems to me now that there also must have been a light wind out of the southwest.

We stuffed the hamsternaut back into his cereal box and launched, but instead of floating down into the parking lot, the chute, capsule and hamsternaut started floating UP! UP and AWAY!!

The chute floated gently up until it was 30 or 40 feet higher than the top wall of C-Deck, and then it started drifting off to the northeast. The chute continued to gain altitude and gradually started heading off across past the site of the Jesse Owens Memorial and toward what his now called Woody Hayes Blvd.

We got on the walkie talkies: "Rodent Control! We have a problem!"

Soon the Rodent Control personnel were scrambling off across the giant Ohio Stadium parking lot, crossing what wasn't yet Woody Hayes Blvd. and making their way through the narrow passage between St. John's Arena and the ROTC building. All the while we watched from the top of C-Deck as the chute and hamsternaut continued to gain altitude and drift away from us.

By the time Rodent Control had made it over to Lane Avenue and the Varsity Club, officially off campus, both teams had all lost sight of the chute and the valiant heroic hamsternaut. And I had discovered the power of combined slope and thermal lift.

Nowadays I would give what is left of my eyeteeth for the chance to slope off the top of C-Deck, but of course the Stadium Scholarship Dorm is long gone and Homeland Security has Ohio Stadium locked down so tight you can hardly get a pack of Tic Tacs, let alone a whole case of beer, into a football game anymore. No chance at all of getting in there with a transmitter and sloper. Back in the day it would have been no problem at all.

It still kills me that for four whole years I lived RIGHT INSIDE the best slope flying site in the state of Ohio, and didn't have the money to buy the RC equipment to fly it.

And somewhere on the northeast side of Franklin County, maybe in the wilds of Worthington, or Westerville or New Albany, there is a hamster clan sitting around the fire and one of the old timers is telling a family legend to the children about how their great-great- granddad devised an ingenious scheme to make an aerial escape from Stadium Scholarship Stalag EE.

Some Stadium Scholarship Dorm History
SSPAMH, SSPAMH, SSPAMH and SSPAMH

In 1933, a group of 75 young male students with limited financial means moved into the bowels of Ohio Stadium and started a tradition of cooperation and scholarship that remains alive today.

Those young men lived in barrack-like conditions in the stadium's southwest corner, which would become known as the Tower Club. In exchange for a break on rent, the young men did all of the chores in the no-frills dorm, except cooking, while they attended classes at The Ohio State University.

In subsequent years, the dorm expanded along the west side of the stadium, and the facilities improved. The co-op operation and scholarship orientation continued, however. Through the years, the unique dorm gained national attention. First Lady Eleanor Roosevelt even visited the student living quarters housed in the Horseshoe. And, in more recent history, the dorm was featured several times during nationally televised OSU football games.

In June 1999, renovations to the stadium forced the program to move to another building, Mack Hall. In a Pythonesque move the program name was changed to Stadium Scholarship Program at Mack Hall (SSPAMH). It was not a seamless transition, but after living through a year of construction delays and other moving headaches, residents returned in 2000 to find one of the most impressive dorm facilities on campus. It is also the only OSU dorm that has its own Alumni Society.

(Excerpted mostly from the OSU web page
for the Stadium Dorm and its history)

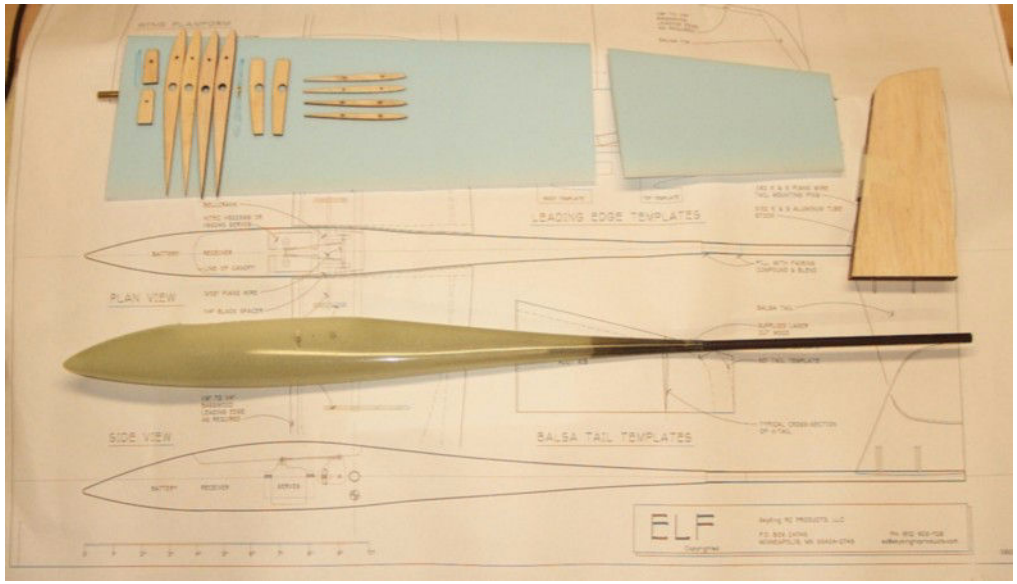
Sky King Products *ELF*

A review by Dave Register, <regdave@aol.com>

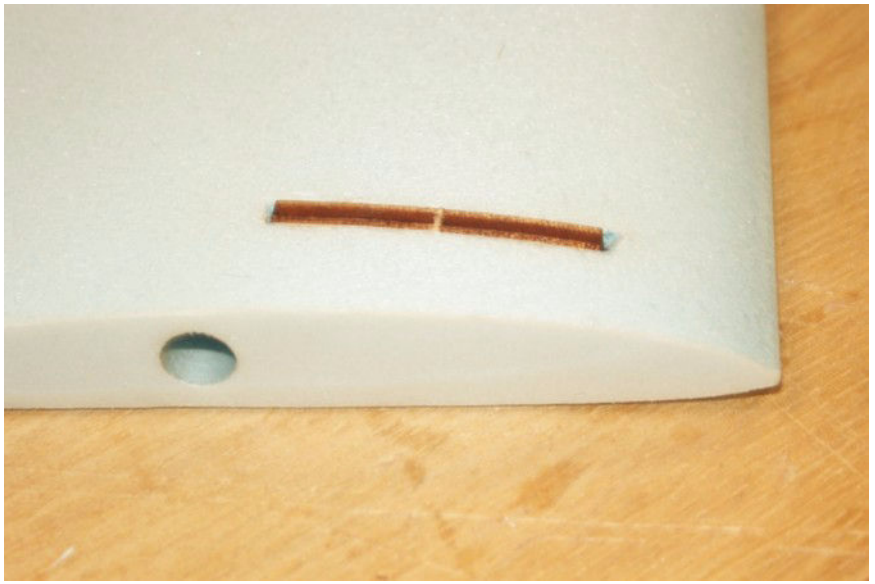
By now most of the slope community knows that Ed Berris of Sky King RC Products has re-introduced many fine kits that had, for one reason or another, gone out of production. Perhaps the most widely known of these were the EPP kits of Dave Sanders of DAW (Dave's Aircraft Works).

Although we're a bit slope challenged here in Oklahoma, a number of DAW kits had been made in our local club, TulSoar. Several club members recently put together a KA-6 from Sky King and the overall kit quality was outstanding, as was the finished project.

When the opportunity arose to take a look at the *ELF* kit from Sky King, it seemed a perfect opportunity to check out the engineering of a pitcheron ship from a quality supplier.



The *ELF* parts as they come out of the box



Plywood inserts forward of the wing rod.

Realizing that our local slope activity is constrained, a primary intent was to bungee launch this ship and, when the wind was right, get out to the local slope for some good aerobatic action.

The *ELF* is one of several Harris Nelson designs that Ed has re-issued. The *ELF* and *SHRIKE* are similar in many features with the *ELF* being a smaller (50" wing span), bent wing version of the *SHRIKE*. This allows a little more roll stability but does not detract from its aerobatic capabilities. For bungee launching, the added roll stability of the *ELF* seemed like a good choice.

Although I'm reasonably experienced at slope flying, others are better able to comment on the overall slope performance of this ship. I refer you to several build/fly threads for additional information. Please see:

<www.rcgroups.com/forums/showthread.php?t=309605>

as well as a number of references and comments on the Sky King web site:

<www.skykingrcproducts.com>

The primary emphasis of this article will be the kit build and preliminary flying results.

Experienced buyers know to check the box when it first arrives. There are more horror stories about shipping damage than any of us want to know about. The *ELF* came very well packed with parts arranged and wrapped so that it should be immune to the most arduous efforts by any shipper.

Next impression was – "how can Ed make a profit on these kits with all the sweat equity that goes into putting them together?" The parts layout and bagging were superb. The pitcheron parts were supplied in a separate pouch from the tail group parts. The plans were detailed and very well printed. The CD-ROM supplied had several informative articles and a very well designed build sequence. A complete packing list of everything that should be in the kit was supplied and everything was just as described.

A preliminary look over the parts was equally impressive. The glass work on the fuselage is excellent. The core cuts are very good. All the balsa and ply

Wings prepared and ready for vacuum bagging.

One wing in the vacuum bag, ready in 24 hours.

parts are laser cut and are of excellent quality. The fit and finish for everything was as good as any builder could want. All the supplied linkages (ball links, clevises, threaded stock) were from quality suppliers. The obechi skins for the wing were excellent. I've used obechi quite a bit over the years but found most suppliers to provide "splitty" or "knotty" obechi which led to a lot of scrap. These skins were among the best I've seen and were very easy to trim and finish.

At this point, it's time to get going on the build and I started on the wing first. Following the instructions for aligning the ply inserts, these were glued into the wing slots with epoxy and the inner and outer panels were joined with 3M77. A little finish sanding and a check of the trailing edge (pre-trimmed, by the way) and we're ready to go.

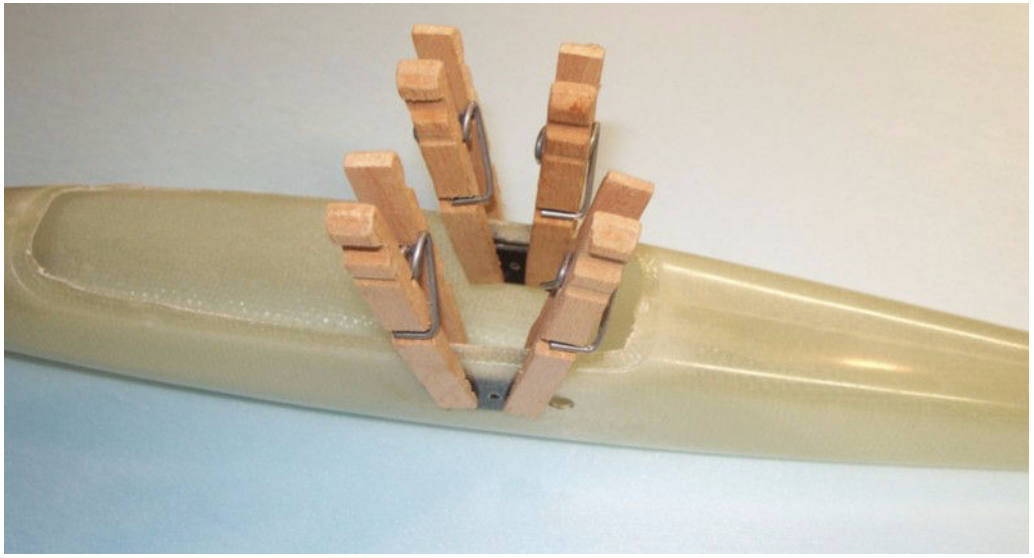
Since I vacuum bag quite a bit, it was decided to assemble the wing using conventional vacuum bagging techniques. In this case, the obechi was trimmed to the proper outline for the wing, the carbon felt trailing edge and glass reinforcements were trimmed to proper size and some West Systems resin was mixed up.

As usual with obechi, use glass micro-balloons to make a "ketchup-like" paste before applying or it will sop through the skins.

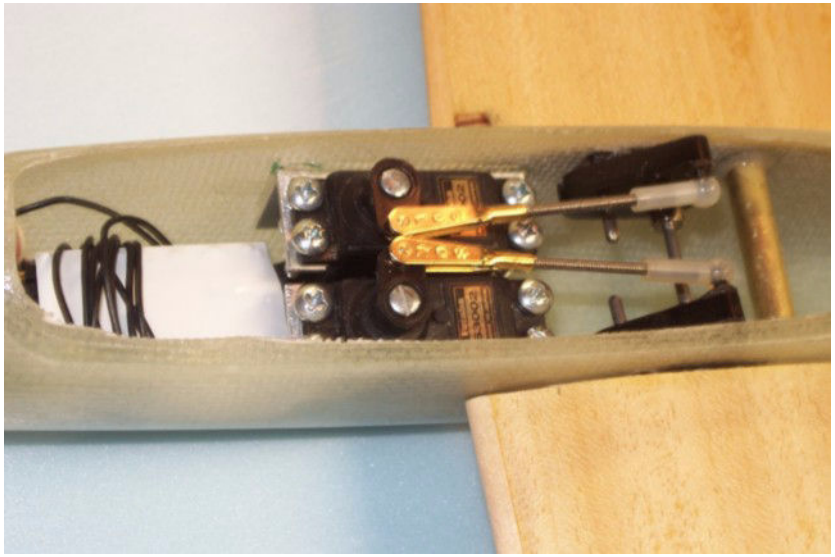
The resin/balloon mixture was squeegeed onto the skins, the various glass reinforcements were added and small amounts of resin dabbed on where the layup looked dry. Finally, the carbon felt was added at the TE. Not having used this material before, I found it easy to lay down but a little hard to wet out.

There's a temptation to apply a lot more resin to make the felt look wet but I'd suggest resisting that urge. Add a small amount right at the TE to be sure there's good adhesion and then pretty much leave the rest alone. The one area where I had some "bleed-through" on the obechi skins was near the TE where I added resin to "wet" the felt better.

The wings were covered with polyethylene film with a felt backer as a breather as described in Phil Barnes vacuum bagging videos, sealed in the vacuum bag (22in Hg), then sandwiched in the cores and weighted and covered with a heating blanket and left to cook for 24 hours. With the exception of the bleed-through



Gluing in the fuselage side supports for the drive mechanism.



Fuselage with servos mounted and linkages installed.

on one wing, they came out extremely well.

At this point, take a straight edge to trim the trailing edge. Square up the leading edge for the basswood stock, trim the tip angle for the tip balsa block and you're pretty much ready to go.

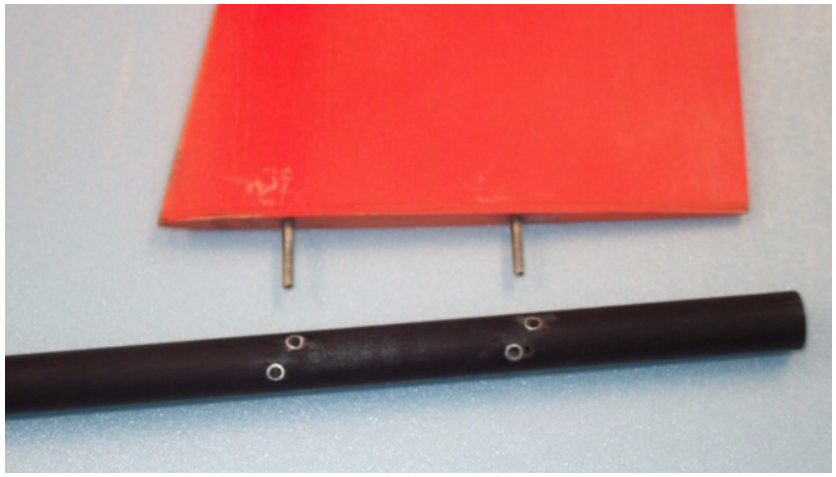
One small deviation from the instructions - on one wing I trimmed the root rib as Ed suggested (crack it at the support rod hole and bend/trim to accommodate the fuselage) while on the other I just flush mounted it to the core. In both cases, final trim to the fuselage was done with a belt sander and then some sandpaper mounted on the fuselage. The final result was fine either way.

At this point, the basswood leading edge stock and the balsa tip plate were applied and left to dry. One comment - the basswood LE stock was generous in width so I ripped it down with a table saw and added a surface taper so it better aligned with the curvature of the upper surface. This made it a little easier to contour with a hobby plane for the final finish.

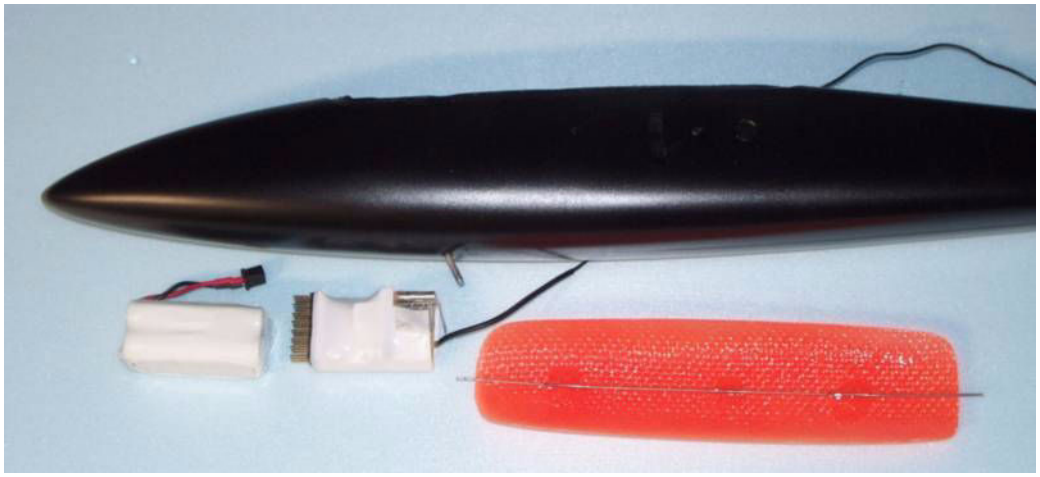
Form the wing leading edge and tips and then (gulp!) cut off the wing tips at the poly break. I did this with a single edge razor blade and then used the tilt arbor on my bench saw to get the joining angles right. Epoxy the poly joint at the proper angle, add the supplied glass reinforcement and the wing is ready for final finishing.

Since the intent here was to keep things pretty light, the finish was simply two coats of water based polyurethane with a little sanding in between. This does not give a highly polished finish but provides sufficient protection for the way this ship is to be used.

Moving on to the tail group, the templates supplied for the V-tail are excellent. Mine were pre-drilled for the mounting rods and there is a right and left side pair. The design suggests using one template on the balsa tail surface and the other on the tail boom with some fairing material to make an attractive contoured surface for the stab mounts. I did not use the template on the tail boom – again, trying to keep weight to a minimum.



V-tail mounting, different than stock. See text.



The painted fuselage with battery pack, receiver, and canopy.

Also supplied for the V-tail are the music wire rods and the aluminum tubes to receive them. An original construction method is to seat the rods in the fuselage and place the tubes in the stabs so they will slide on. I've gone a slightly different route and, after corresponding with Ed, I think this may be the preferred mounting method - glue the tubes in the fuselage and the rods in the stabs. That way, when the stabs are removed, there are no extraneous rods sticking out the aft end of the fuselage to interfere with packing.

For the stabilizers, the template was glued to the base of the balsa and then the balsa was shaped using my belt sander. Doing the same job by hand will take more time so if you have a belt or oscillating sander, it's probably the way to go. However, be aware that belt sanders can remove a lot of material in a hurry so make haste slowly if you use these tools.

Making the mounting job a whole lot easier were the pre-drilled holes in the fuselage for the stabilizer receiving tubes. These appear to be very well aligned - consistent with the overall quality of the kit - and made the stab mount very easy. The music wire rods were first glued into the stabs. The tubes were then mounted on the rods which were then inserted into the fuselage with some epoxy. Be careful to not get any epoxy in the gap between the stab and the fuselage - a little wax paper poked over the rods may help. Mounting the assembly this way insures that both rods and tubes are well aligned.

Again, to keep things light, the stabs were shot with two light coats of fluorescent orange paint. The first coat was sanded down until it remained only as a filler for the wood grain. The second coat was applied to obtain a reasonably uniform opacity.

With the wings and stabilizers done, it was time to dig into the pitcheron assembly. Not having done one of these before, there was some trepidation at approaching the task. Careful review of the procedures described on the CD-ROM and a couple of "dry" fittings suggested it would be a pretty straight forward assembly.

About the only critical issue is placement of the servos relative to the pitcheron support plates. If you "trial fit" things according to the building instructions and recommended spacing, you'll find this works out very nicely.

In several implementations of the *ELF/SHRIKE* build, the servos are staggered on either side (servo arms at opposite ends for the left and right pitcheron drive). After looking over my assembly, I opted for replacing the ball links at the servo end with metal clevises and mounting the servos side by side with the arms aligned with each other. This is by no means a critical issue but it helps me determine if I've got the linkages the same length and other little details that make for uniform control setup. Old habits are hard to ignore!

The aluminum servo mounts supplied with the kit are designed for the recommended Hitec metal gear servos. Since I had a set of Futaba S3002 metal gear servos handy, I took a look at them and they were a perfect fit in the supplied mounts. The aluminum arms were tapped to accept the supplied mounting screws and the mounts applied to the fuselage sides with a generous dollop of Goop. When mounting to the fuselage, it may be best to mount one side first and then align the other carefully with the first. Adds an extra 12 hours to let the Goop set but I think it's worth the wait.

The only other critical issues in the pitcheron setup are aligning the fuselage side supports for the drive mechanism and mounting the ball link in the drive cam. In both cases, that was done with 30 min. epoxy after roughing up the surfaces a bit. Be sure to remove the adhesive covering on the drive cam before doing this step. Guess who almost missed that?

At this point, all the critical work is done. If you've already done the wing root fit to the fuselage, all that's left is to egg out the drive rod hole. There's an outline on the plans that's useful but I'd mount the rod in the wing and then trace the path on the fuselage to be sure it's centered exactly where you want it.

Several *SHRIKE* folks have commented that the allen screw/collet used to secure the wing on the cam support rod could be replaced with a wing bolt. I can see the point that a field installation of that Allen screw can be tricky. In my case, the *ELF* is compact enough that I do all assembly at the house and then carry it in the rear of the truck. So I stuck with the Allen screws but can see the utility of the other method.

With all the engineering done by Ed, and the instructions followed as outlined, the wing was attached and the servos wired up. Guess what folks, it worked EXACTLY as advertised. In one of those unusual quirks of fate, I even had the servo travels in the right direction! The wing attachment felt very tight with no slop or wiggles. Side play of the wings on the rod is minimized by proper placement of the collets. The throws were adjusted to the recommended values. We're almost done.

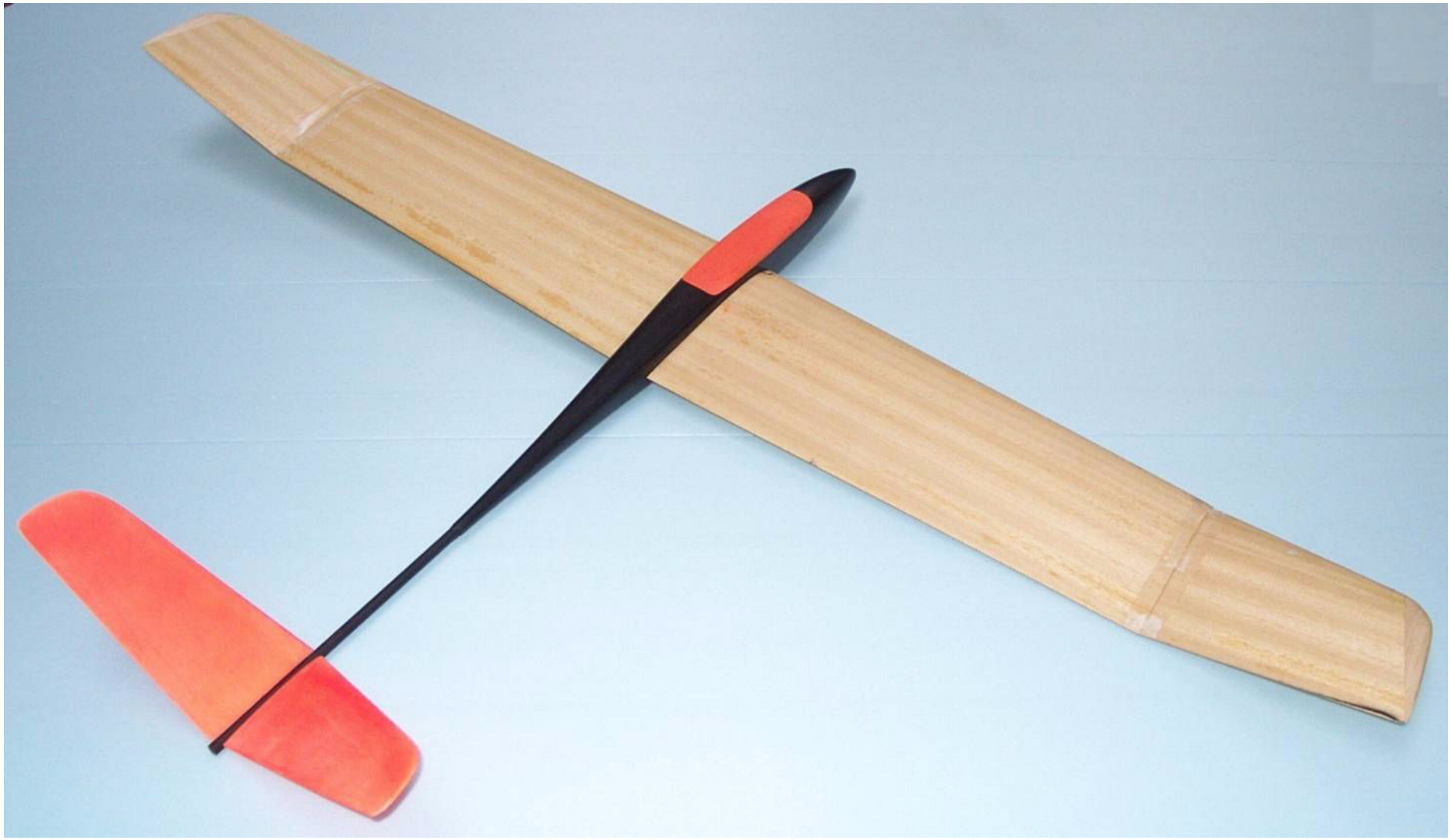
After masking off the servo/drive linkage area, the fuselage was given two light coats of satin black. This was painted back to the carbon boom but the boom itself was left "natural."

Final project was fitting the canopy. For the *ELF*, I used a piece of music wire running down the center of the canopy and extending about 0.5 inch on either end. This is Goop-ed in place in the center and then about 1.0 inch in from both ends. When the Goop sets, the canopy can be slid on with the wire catching the inside of the fuselage at both ends. With the excellent fit of the canopy to the canopy outline in the fuselage, this makes for a simple and secure canopy mount. The canopy was also painted with two coats of fluorescent orange to match the V-stabs.

Last item is a pine block mounted in the bottom of the fuselage just ahead of the servos (Goop, what else?) with an angled piece of 0.125 inch music wire for a bungee launch peg.

With the equipment installed, the CG came out right on the suggested starting point on the plans. Servo throws were checked. The Futaba 9C was tuned up; I used V-tail mode for the pitcheron setup. Time to head for the field.

At this time of year, our winds are quite variable but the real complication is the landowner for the local slope has bulls in that pasture and the face of the hill is over grown with brambles. So if the cow flops or



The finished *ELF*. Excellent speed to altitude conversion, extremely maneuverable, no bad habits. Who could ask for more?

horns don't get you, the thorns will pretty much tear you to pieces. Sometime this winter (Jan-Feb-March) the slope will open up and we'll have some fun with this ship. But for now, this is a bungee report.

First toss with any ship is always a time of high anxiety. In this case, a new control system (for me) added to that. However, it was all energy wasted as the *ELF* ran straight and true with that first toss and every flight since. After settling down a bit, and throwing harder with each successive attempt, it was found that the *ELF* responded exceptionally well in roll and

pitch with very little adverse yaw tendency. The only observation that could be made at this point was that it liked to run and, if asked to slow down on approach, it would but with an increase in sink rate just before stall. No tip stall tendencies were observed. Left and right turns seemed equally nimble.

Next step - the bungee. Now this isn't a real he-man bungee. More of an Okie bungee – a doubled over high start with about 25ft of braided winch line on the plane end. A modest stretch of the tubing and we're off.

Placement of the launch peg was about right as there was no tendency to zoom or tuck until the launch line released from the plane. After that, it was another story. Wow! The *ELF* climbed out to about 150ft (pretty good estimate based on DLG experience) and stalled at the top as I stood there and gaped at it! I did NOT expect that type of climb-out from that little stretch.

OK, nice stall recovery. Good cruise around the field. Stable turns to either side. Nose tracks well on turn entry. The loop was a bit ragged but maybe we need more speed. Time to set up for a landing.

I have a tendency to get down in ground effect and bleed off speed for landing. The *ELF* did this very well and, as in the hand tosses, it bled off speed nicely until finally doing a straight ahead "stall-mush" into the grass field.

Meanwhile, back to the bungee. Quite a bit more stretch and a truly spectacular launch – with a decent recovery at the top this time. This is a very clean ship and does an excellent job of airspeed to altitude conversion. So let's check out the loops again. A little longer dive and smooth pull up and it tracks around like it's on rails – and again – and again – and again. Neat!

Next launch, full stretch, great altitude. Now let's see how this little puppy rolls. A little dive, then level out and . . .. cow-a-bungee!!!! Folks, us flatland soarers just aren't used to this kind of roll rate. Especially as axial as that! Rolls to the left and right are equally facile. I wouldn't want to imagine the roll rate on this plane – maybe a second per roll? Took a little practice to come out level but after a while the pilot gets with the program and it's way too much fun.

The next several flights, and several flying sessions, have been spent bungeeing and exploring the flight envelope and CG of the *ELF*. Inverted flight is very good but, as with any poly, it wants to roll out so you have to stay with it. Inverted turns are about the same as upright; set the bank angle then push a little down elevator (er, wing pitch) is all it takes, and a little anticipation to stay ahead of the roll out tendency.

Roll rate continues to be a really enjoyable part of this neat little plane. It's about as axial as you can get. I've made several traverses of the flying field just cranked over full left (or right) and lost count of the number of rolls before neutralizing.

Loops are also excellent, although it prefers to enter fast and stay cranked up to speed to keep them going OK.

The wash out in the tip panels appear to neutralize any tip stall tendencies. I have yet to have it go over on a wing tip in a stall.

Overall, this is among the best quality kits I've built in the past 30 years. The instructions are clear and readable. I took a few minor deviations from Ed's write-up, all due to personal preferences. If you go exactly by the kit instructions it will come out perfectly.

Flight handling is delightful. Although my experience is limited to bungee flying for now, this will be an excellent slope ship for aerobatics and just plain fun. Stable enough that it's easy to handle yet agile enough to do just about anything you'd want.

My AUW came in at 20.5oz which has worked well for bungee soaring. For a stiff breeze at the slope, some ballast might be advisable – and there's plenty of room behind the wing mounts for that, too.

All-in-all, a great design and another excellent kit re-introduction by Sky King RC. For additional information on the *ELF*, *SHRIKE* and other kits from Ed Berris, please see: <www.skykingrcproducts.com>.

Miscellaneous

NASA Dryden Flight Research Center Photo Collection
http://www.dfrc.nasa.gov/Gallery/Photo/index.html
NASA Photo: EC05-0198-12 Date: August 12, 2005 Photo By: Carla Thomas

A NASA model motorized sailplane catches a thermal during one of 17 flights to demonstrate that updrafts can extend flight time and save energy for small UAVs.

The name Michael Allen may seem familiar to some long time readers of *RC Soaring Digest*, as he and his "Hortenized" Klingberg Wing appeared on page 8 of the June 2003 issue. Now working for NASA, Michael has more recently been involved in a project to utilize thermals to increase the duration of UAVs.

<http://www.dfrc.nasa.gov/Gallery/Movie/Autonomous_Soaring/HTML/EM-0090-01.html>

While a lot of the interest in this project has been because of the hardware used - Piccolo Auto Pilot, Cloud Swift UAV, AutoSoar software, etc. - there is some fundamental research is the real innovation within this project.

Our friend Al Bowers says, "The models of thermal updrafts and the fine tuning of that analytical model to allow the software, flight control computer and UAV to soar autonomously is what we should be really excited about."

Al went on to say Mike attended a workshop recently. With Mike were three other NASA folks, Stephen Cumming (the DFRC lead for Planetary Flyers), Casey Donohue (meteorologist and expert on convective and wave lift), and Chris Ashburn (meteorologist and expert on wave lift and atmospheric shear). The workshop was put on by the USGS on "Earth and Mars Dust Devils" <http://gaspra.la.asu.edu/dustdevil/>.

Al asks, "Soaring on Mars, anyone?"

<http://marsrovers.jpl.nasa.gov/gallery/press/spirit/20050819a.html>

FAI has received the following Class F (Model Aircraft) record claim:

Claim number: 12006

Sub-class: F5-P (Aeroplane, electric motor, non-rechargeable sources of current)

F5: Radio Controlled Flight Category

Type of record: N°181 - Distance to goal and return

Course/location: California Valley, CA (USA)

Performance: 25 km

Pilot: Gary B. FOGEL (USA)

Date: 07.10.2005

Current record: 11.21 km (21.05.2005 - Gary B. FOGEL, USA)

Note: There is also another record claim for this category: 19.92 km by Jüri LAIDNA (Estonia) on 19.07.2005 at Kiia (Estonia).