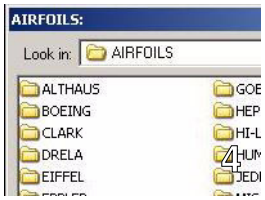
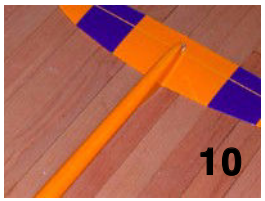
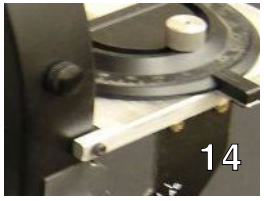
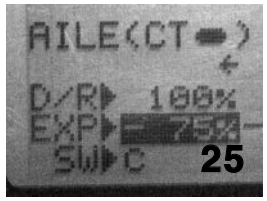
Radio Controlled Soaring Digest

February 2005— Vol. 22, No. 2









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Front Cover Tom Nagel's St. Valentine's Sloper Mark II tears up the hill at the little cow pasture slope in Linnville, Ohio. All from a couple of foam core hearts, a battery pack and receiver, and a couple of servos.

Back Cover A flash into the past. This photo was taken by Bruce Abell, Cessnock, New South Wales, Australia, during the 1992 NSW State Thermal Glider Championships.

About *RCSD*

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

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In the Air!

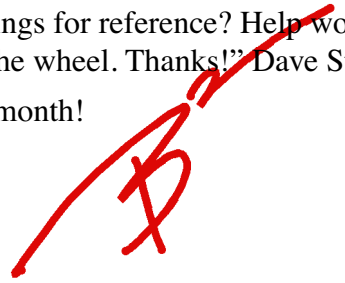
RCSD welcomes Steve Richman to the growing list of Staff and Columnists. Steve answered our request for a tool column writer with a well written e-mail which explained not only his love for tools, but also his qualifications as an unbiased reviewer. We jumped at the chance to have Steve write for *RCSD*, and we think readers will agree we made an excellent choice.

We don't get to slope fly very often (Washington's not called "The Evergreen State" without reason), but we find it downright invigorating when we are able to participate, and are otherwise envious of those who live in areas where there are flyable slope sites within a reasonable distance. This all leads to another exciting announcement — Greg Smith, *The Sloper's Resource* columnist and <www.slopeflyer.com> web master, is once again writing for *RC Soaring Digest*! Welcome back, Greg!

It seems like each month has brought at least one unexpected contribution from a member of the soaring community. This month was no exception, as we received a note from Dennis Mead in which he explained his script for plotting airfoils in AutoCAD. Dennis was a bit surprised when we combined his several messages into an article describing his software, but we believe *RCSD* readers who are designing their aircraft with AutoCAD will find Dennis' routine extremely useful. One of the added benefits to Dennis' creation is that it can be used within AutoCAD 12 for the Macintosh OS just as well as the Windows environment. As noted in the article, this plotter routine can be downloaded from the *RCSD* web site.

Lastly, we got a note from reader Dave Stewart... "I'm getting ready to build a Bird of Time and want to make it a four servo wing. My question is, does anyone have any drawings for reference? Help would be greatly appreciated as I'd hate to reinvent the wheel. Thanks!" Dave Stewart <stagerwing2001@yahoo.com>.

'Til next month!



An Airfoil Plotter for AutoCAD

by Dennis Mead
<meadfam@pacbell.net>

I have an airfoil plotting program here written for AutoCAD users who design their own planes using that program.

This is a routine written entirely in Autolisp, so it runs within AutoCAD without depending on any external resources. It can be installed or removed almost as easily as moving or deleting a folder. No fancy installation/ removal steps are needed

When designing a model plane in AutoCAD, the routine can call up and draw airfoils directly into the drawing without having to use any other programs or intermediate steps.

After the program is loaded, just type the word “airfoil” any time you desire and the routine is running. An airfoil can be selected and drawn to any length of chord and thickness desired.All that is needed is the airfoils’ X & Y coordinate data.

The data files may have any extension: .dat, .cor, .vec, and even .txt.Very fast, very simple.

For more info, see the “Airfoil.readme.txt” file. Airfoil.lsp is also a text file so it may be scrutinized easily if you wish.

The original program was downloaded from the web back in 1995 and was deficient in several ways. I re-wrote some of the code and added to it in order to make it work easily. The original author is noted at the beginning of the file, but so far all efforts to find him have been futile. I assume that since the original program has been in the public domain for quite some time, that the original author won't mind the improvements.

The “AIRFOILS.exe” file contains the program, the “readme” file, and also several folders of airfoil data.

The airfoil data files were gleaned from a number of web-based resources.

Inconveniences: Some airfoil coordinate data is tab delimited. For some reason, Autolisp cannot recognize the “tab” character, so it is not possible for the routine to sort this out.

Rather than having to manually edit out tabs in the data files, I have included a handy utility which can take a whole batch of files and convert all of the tab characters in all of the files into spaces and then place these converted files into a new folder.

This utility was written by a friend of mine for one of his projects and he kindly modified it for our use here. This takes care of the only real quirk in using Airfoil.lsp.

Other data requirements are easy to check and correct. See the “Airfoil.readme.txt” file.

The “Tab_2_Space.exe” utility takes a whole batch (folder full of) of airfoil data which is tab delimited and replaces all of the tabs with spaces. This is needed sometimes because Autolisp does not have the ability to recognize the tab character in data files. Most all airfoil data is space delimited, so 99% of the time, the utility is not needed... but it's nice to have because it saves so much time and the possibility of making errors when editing data by hand.

For Macintosh OS, too: The Autolisp routines and data files will work on a Macintosh if someone happens to be running AutoCAD Release12 (the last version for the Mac). The only thing that you Mac users may not be able to run is the “Tab_2_Space.exe” utility... unless you have one of the Mac programs that simulate a PC. An alternative to “Tab_2_Space.exe”

is a small text processor, Tex-Edit Plus, which can rapidly exchange the “tab” character for a “space” character and quickly go through a series of text files.

Final notes: You will find all instructions/descriptions in the “readme” files as well as in the header of the Airfoil.lsp file. Some of the readme files may not exactly reflect Macintosh AutoCAD usage.

I hope *RC Soaring Digest* readers will find this program useful. Now off to design that next model! We have to keep proliferating graceful flying objects y'know.

AIRFOILS.exe (PC) includes the routine, readme file, Tab_2_Space.exe utility, and folders of airfoil coordinates. <http://www.b2streamlines.com/AIRFOILS.zip>

AIRFOILS (Macintosh) includes the routine, readme file, and folders of airfoil coordinates. <http://www.b2streamlines.com/AIRFOILS.sit>

Tex-Edit Plus can be found at <http://www.tex-edit.com/>

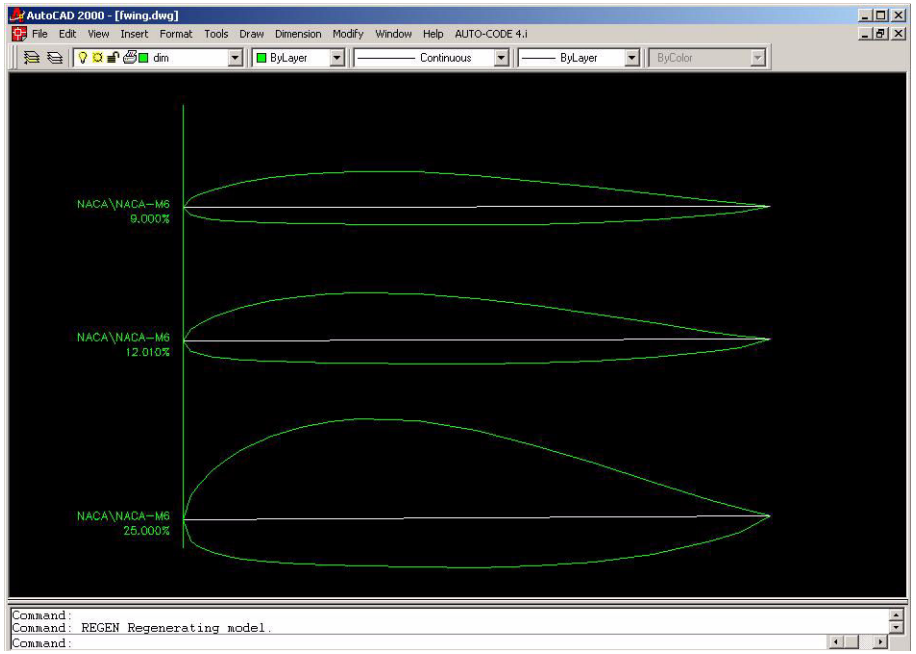
Here's a couple of screen shots.

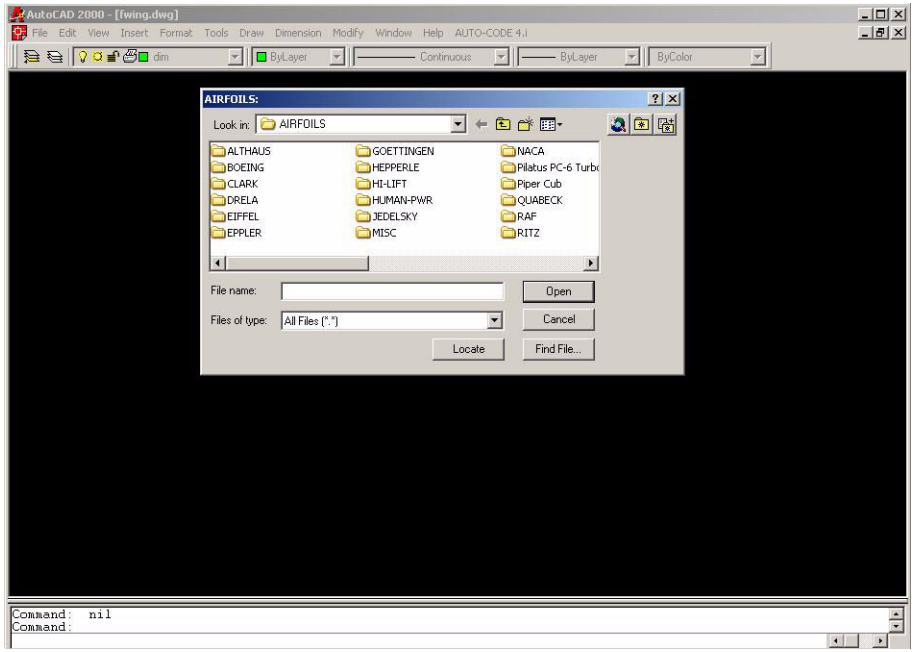
The upper image shows that airfoil which everyone usually starts with... if they're into flying wings... the good ol' NACA M-6.

The mean airfoil is in the center, the top one has been thinned to 9%, and of course... a fat version (for Dumbo)... maybe to be used for a root fairing... or the start of a wing fence?

The program can plot out an airfoil to 50% thickness where it becomes useful for visualizing subtle variations in curves... even though it looks totally absurd.

The lower image shows the airfoil selection dialog box that pops up when the routine is invoked.





The St. Valentine's Sloper

by Tom Nagel
<tomnagel@iwaynet.net>

Late last January as I was leaving the office the custodian asked me if that big box by the front door was mine. I told him no, but then stopped to look at it. The printing outfit upstairs was for some reason discarding a big flat box full of large foam core heart- shaped bright pink Valentine's Day signs. Times must be tough at the Hallmark Store.

The big flat glossy heart shapes sure reminded me of something---maybe it was a sentimental flashback to the Pibros. That was it! These tacky foam core signs were meant to be airframes! I checked with the printing folks to make sure they were discards, and then hauled them home. Nancy, of course, was overjoyed. I am always hauling useless dreck home, where it accumulates in odd corners of the basement. And as a result, our basement has some very odd corners indeed.

OK, so what I had was an assortment of 3/16" thick heart shaped foam core signs. The smallest was about 18 inches across and 15-1/2 inches top to bottom. Cut in half I figured those would make vertical stabs.

The middle size was 31inches in span across and 28 inches front to back. And the giant economy size one had a 44 inch wingspan and was 38 inches front to back. I noted the proportions were identical. I decided to try building a test model out of the medium sized one. Nancy decided to hang one of the medium sized ones on the front porch to gross out the neighbors. We were off and running.

All of the signs had fairly heavy brass grommets press fit into the upper lobes, places to tie a cord or wire when hanging the sign. For aerodynamic and weight reasons, the grommets had to go. I attacked the grommets from the inside with my trusty Dremel tool, and ground away enough brass to let the grommet pop loose. I used scraps of white Ultracote to cover over the holes.

Next I cut elevons off the upper (atrial) lobes of the heart. I used the time tested formula for determining the area of an elevon control surface on a heart shaped planform. "Four inches looks about right." The core board looked a little flimsy, so I decided to cut the hinge bevel into the TE of the main wing rather than into the LE of the elevons. That way the screws holding the Dubro control horns onto the elevons would have a solid surface to work on.

I laid a strip of clear packing tape down along the beveled edge of the main wing and wrapped it around to the bottom. I did the same for the elevons. I used Blenderm medical tape to hinge the elevons in place. (Blenderm makes great hinge tape and is my favorite hijacked piece of medical technology since the hemostat.)

Next I cut a small heart in half and slapped it on as a vertical using hot melt glue and some light triangle strip stock balsa.

Finally, I laid down a strip of adhesive backed Velcro about 6" long from the nose back. I figured I would use the Velcro to hold the battery, receiver, and any necessary nose weight in place. I picked up some cheap used (and fairly heavy) servos at a swap shop, and I was ready to go. The servos would fit in holes cut through the sign board, and be taped in place. The Hitec 555 receiver would ride on the Velcro, right behind the battery, and the antenna would get taped to the leading edge of the vertical.

Here's a picture of the SVS Mark I in its pre-testing configuration. (Center, page7.)

Now I needed to find out where the balance point should be for a heart shaped planform. I opted to ask Mark Mech, proprietor of Aerofoam and connoisseur of

Stages of development.
(Left) Tom started with a discarded foam core heart- shaped bright pink Valentine's Day sign. (Center) Adding battery, receiver, and two servos, he had himself a 31 inch span SVS Mark I. While not successful, the Mark I was a learning experience, allowing Tom to come up with his successful 44 inch span SVS Mark II (Right), shown here at the recent Westerville Model Aviation Association static show and swap shop. The bright pink color certainly shows up well on the slope!

fine delta wing foamy gliders. He suggested that since the heart shape was basically a triangle, I could start about half the distance back from the nose to the elevon hinge line, and carefully adjust from there. I was very grateful for this advice.

Unfortunately it turns out that a heart shaped planform is not a whole lot like a triangle. I learned the hard way, and almost didn't have the heart to tell Mark. I almost didn't have the heart because it wouldn't fly, and it was a very close thing between finding the proper CG and smashing the St. Valentine's Day Sloper into a little pile of cardboard and Styrofoam.

First launch was actually on February 14th, in a friend's ice and snow covered cow pasture near Bellefontaine, Ohio. The CG was set 12" back from the nose. The romantic setting didn't help. The SVS did lots of very tight loops and flops, but definitely no gliding. I moved the battery all the way forward on the Velcro, to no avail. Then I switched from a 275 mah battery to a bigger, heavier 600 mah battery. The SVS still did not act even remotely like an aircraft.

The next launch attempt, with a big 50 cal. maxi ball embedded in the nose fairing, was at the sailplane club's annual meeting later in February. CG was now one and a half inches further forward. Andy Litsky, an experienced sailplaner. gave me careful launches. More wild loops, flops, dings and whacks. No flying.

I was running out of February. The St. Valentine's Sloper was going to be a Super Tuesday Sloper or maybe the Ides of March Sloper, if I wasn't careful. On February 28, I had the servos moved forward about 3/4". I felt like I was almost on the spot, with the CG moved up two inches from my first guess. Full scale sailplane pilot Paul Wiese gave me some expert launches at the club field. Still more wild loops, flips and flops. Paul thought maybe a discus launch would help. We quickly discovered that when a heart shaped planform goes into a spin, it just keeps spinning. We also found out that the vertical stab wasn't attached

all that well after all. Back to the workbench and drawing board.

Luckily, it was a leap year, and I had one more day in February. Also, the weather was on my side. Sunday February 29th found me at the slope over in Newark, Ohio, with more lead in the nose fairing, and the servos moved again, as far forward as I could go without running out of pushrod and airplane. I had also moved the vertical stab forward, which helped the CG, too. Another addition was a short landing skeg on the underside, mostly to give me some way to hold and launch the SVS. And SUCCESS!! (Of a very modest and unimpressive sort.) The SVS kind of flew. It did short, unimpressive, but controllable flights. I definitely needed more wind and a lot less elevon and maybe a little more nose weight, but the SVS Mark I ver. 4.0 was sort of flying. And, for the record, the CG was about 9-1/2" back from the nose, or about 33% back in terms of the heart's overall length, or 40% back from point to elevon hinge line.

I now had two things: a good starting figure for the CG, and a really beat up and ugly prototype. Photo 4 shows SVS Mark I starting to show some wear and tear.

It was time to move on to the 44" span SVS. I figured I would just move the battery, receiver, servos and weighted nose fairing over to the larger airframe. I used the same sized vertical stab on the 44" Mark II heart as on the 31" span Mark I, so it was proportioned better, and would cause fewer CG problems to start with. Wing loading would be down.

Since I had an extra 15" heart on hand, I trimmed the upper lobes off it and used some 3M M-77 to glue it to the top side front of the 44" wing, to strengthen that area. The double layer of sign board would serve to give it a little airfoil shape maybe, and it gave me a deeper foam surface to set the servos into. It also helped bring the CG forward on the big table-top sized wing. I added a third layer of foam board along the center-line on the underside of the wing—a strip about 4" wide and 20" long fore and aft. I laid a big strip of Velcro on the underside, a place to hang a big candy-bar sized hunk of tape-wrapped lead ballast. That got the CG just about right, based on the Mark I test bed. I moved the landing skeg to the big wing, so I'd have something to hold on to while launching. Finally, I reduced the percentage size of the elevons on the bigger wing. Mark

Photo 4

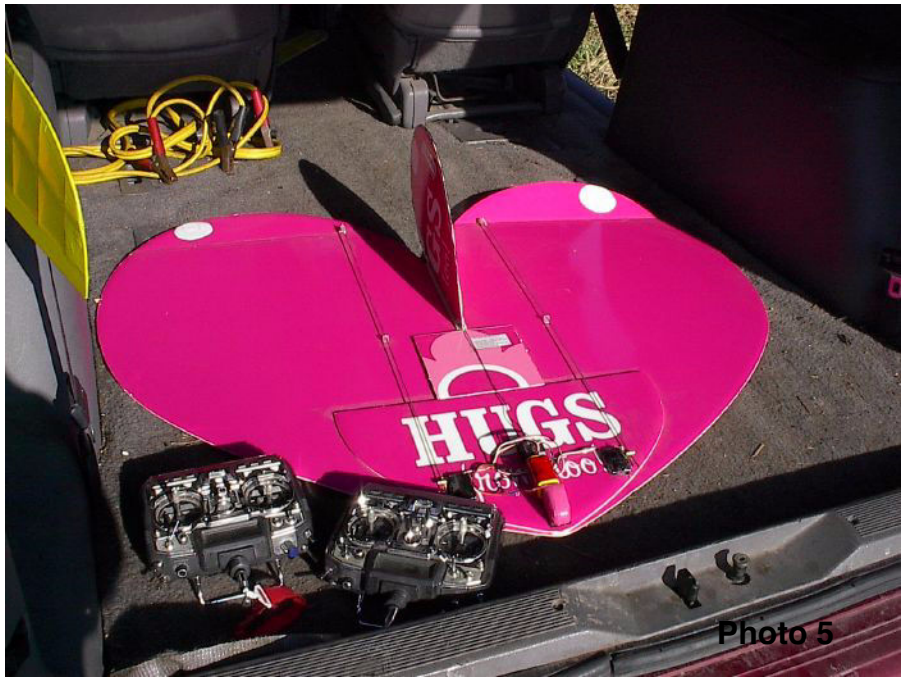


Photo 5

Photo 6

Photo 7

I had elevons that were over 14% of the overall "airframe" length. SVS Mark two trimmed that down to about 10%.

I took the St. Valentine's Sloper Mark II to the Westerville RC Club's annual static display contest and swap shop, just to gross out the scale guys, and to get a photo before the plane started to get beat up in flight testing.

And there the project sat. Months passed before I tried flying the big St. Valentine's sloper. It was the start of 2005, and St. Valentine's Day was coming up again. Still, I wanted just the right day, on a nice easy slope, because SVS Mark II did not look very durable to me.

On Sunday January 9th, 2005 the gray skies of scenic Central Ohio suddenly parted and the sun came out. The ice and snow had melted and temperatures miraculously rebounded to the fifties, with gentle winds out of the south. The cabin-feverish members of the Mid Ohio Soaring Society spontaneously began migrating to the little cow pasture slope in Linnville, Ohio, just like swallows coming back to Capistrano, or Buzzards returning to Hinckley. I took the St. Valentine's Sloper Mark II along with me.

As you can see from Photo 5, SVS Mark II pretty much takes up the entire floor space in the back of the minivan. Greg Bell (Photo 6) and Don Herbert (Photo 7) agreed to help launch and photograph. Multiple LSF-V flier Don Harris was on hand to witness.

And SVS Mark II took off and flew! See the cover photo! What's more, it flew pretty smoothly and well, with coordinated turns and no control problems. And it landed on the gentle Linnville slope without self destructing. We gave it about a half dozen flights and called it a day.

I don't expect this paper and foam board creation to last more than a couple of outings, but it was a fun experiment from start to finish.

The St. Valentine's Sloper proved once again that "form follows funky" and that if there is enough slope lift you can get by without an airfoil, an aeronautical engineer or even good taste.

So, don't let the winter get you down. Go out and fly something funky!

The Sloper's Resource

by Greg Smith, <greg@slopeflyer.com>

The importance of the receiver battery

Howdy! It's been a while since the last column. Coming up with something useful to write is sometimes a struggle!

This column is as much about mourning the loss of my favorite plane, with a little cathartic self-pity thrown in for good measure, as it is about anything else, but if you've ever lost a treasured plane you'll know where I am coming from. Like my daddy used to say, there are only two kinds of RC Pilots, those who've lost a favorite plane and those who are going to. Well, he said it about motorcycles and crashing but it still fits.

First, a word to the wise, make sure you form and cycle your new rechargeable battery a few times before throwing your beautiful Wizard Compact BPV off the slope for the first flight! Or any other plane for that matter. I know, there was just a great article on this in the hallowed pages of *RC Soaring Digest* in the May 2004 issue. I didn't find my mistake until I was in the shop the day after the colossal blunder outlined below. Here are the pertinent details of why I am reiterating this recommendation.

I've had several Wizard Compacts and always set them up so the wings and fuses are interchangeable in case I need to mix or match for some reason. And so it was when I got a new cross-tail version of the Wizard Compact fuselage. I already had a beautiful set of BPV (Bullet Proof Version) double carbon wings that would fit nicely. The goal for me here was to see if there was a noticeable difference between the original standard V-tail fuse and the new cross-tail. Since the wings were exactly the same pair I figured this was a good control for the experiment.

So, I proceeded to mount the gear in the new fuse and when I was finished there was only an ounce difference between the cross-tail and conventional V-tail versions of the planes.

BTW, there is a third Wizard fuse I could have thrown in the comparison, a full flying v-tail, but I did not have one handy. It seems to have fallen out of favor with pilots because the DS guys have discovered its propensity to disengage at 186mph. No biggie for me, just keep the full flying V on the front side where I still think it is a great choice. My new RaceM F3F uses the same style tail and I love how it flies.

Anyway, back to the story. With my new fuse and trusty wings ready, the battery peaked on the way to the slope, a nice, stiff 15-20mph breeze and anticipating Wizard nirvana, I heaved the plane out into the lift.

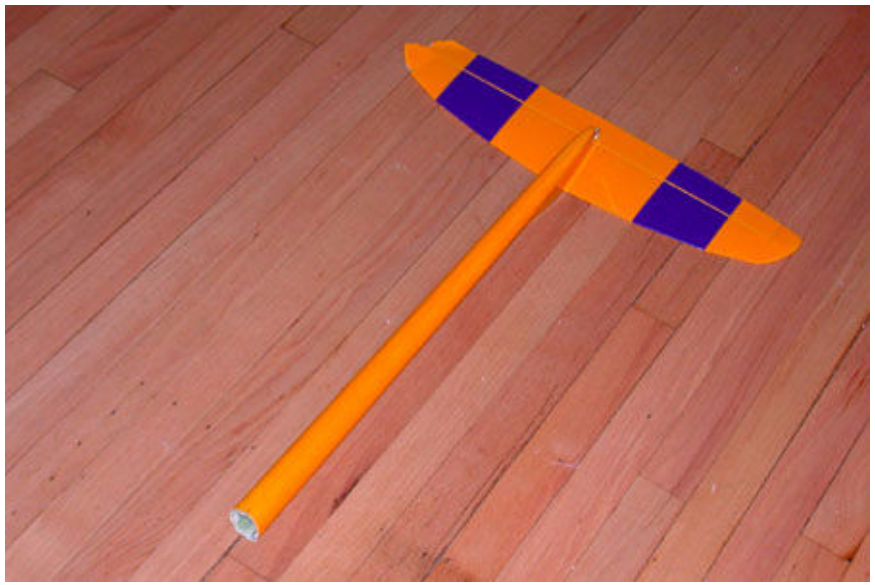
Heaved is pretty apropos here too. The double carbon Wizard is a STOUT ship and at 85 ounces RTF no light weight. No problem. The plane was flying great! The Wiz carries weight really well.

One benefit of flying the same model, especially a molded one, is that I can get it set up and flying almost exactly like I want it from the first flight. And so it was with this plane. I put it through its paces for a few minutes and really liked how it flew. The only difference I noticed was that the cross-tail seemed to have a different reaction to CROW than the V-tail when I tested the landing setup at altitude. The initial pitch down seemed more pronounced, while the V-tail seems more linear, but it settled into a nice, controllable decent. Unfortunately, it will be several months before I can again try the comparison. Shortly after the CROW testing I noticed the controls getting spongy. At first I

thought it was winds aloft but it was soon apparent that something was wrong. I was bringing it in to land, but before I made it back to safety I lost control of it. Nobody home.

The Wiz went into Lake Michigan about 75 yards off shore at about 100 m.p.h. with a resounding WHUMP. I'm not sure but we may have felt it hit. Mirko said at the angle it went in it looked like a Cormorant diving for a fish. A few seconds later it bobbed to the surface and from all indications was seemingly intact. Yep, those Wizards are STOUT! We found a path down the 170-foot bluff and saw it bobbing 75 to 100 yards offshore.

Dave Kramer and I briefly talked about making an attempt to get to it but this was an unknown beach bottom and, with the water temperature about 40 degrees, it was way too cold to swim! Flying buddy Michael made a valiant effort to get his sea kayak to the scene on time but it was not to be. Darkness was coming and the boat was not going to make it in time. The last I saw of my Precious she was heading out towards Michigan about 300 yards off shore still intact.



The recovered remains of Greg's BPV Wizard Compact.

I found the tail the next day about 2 miles up the beach, but the overnight storm we had killed it and I haven't found the rest of the plane. However, there is a fellow who lives near the retrieval site and walks his dogs along that stretch of the beach so the final chapter may not be written yet. He is going to keep an eye out for any more remains.

So, you may still be asking what was the colossal blunder? I mistakenly put a new battery in the plane and thought it was a previously used and tested receiver pack. I only noticed this when I got back to the shop and said, "What is this pack doing here? It is supposed to be in the BPV!" There it is, the blunder that cost me a very special plane. A most likely preventable battery failure cost me my beautiful BPV.

There is one minor wrench in the works for this whole scenario. An OFB brought up the possible specter of a receiver crystal failure causing the same symptoms and ultimately the same result, an uncontrollable plane.It has been so long since this has happened to me that I hadn't even thought of it. Well, if the rest of the Wiz ever surfaces maybe I can get to the bottom of the mystery.

For the best in battery life and conditioning I use Sirius Pro chargers and at least twice a year I run a couple of cycles on the Sirius Super Test. After this episode I am plunking down for the Sirius Pro Former as well. What's $50 compared to the $1700 bucks I just lost in Lake Michigan! I'm also making sure I keep the new batteries separated from the old.

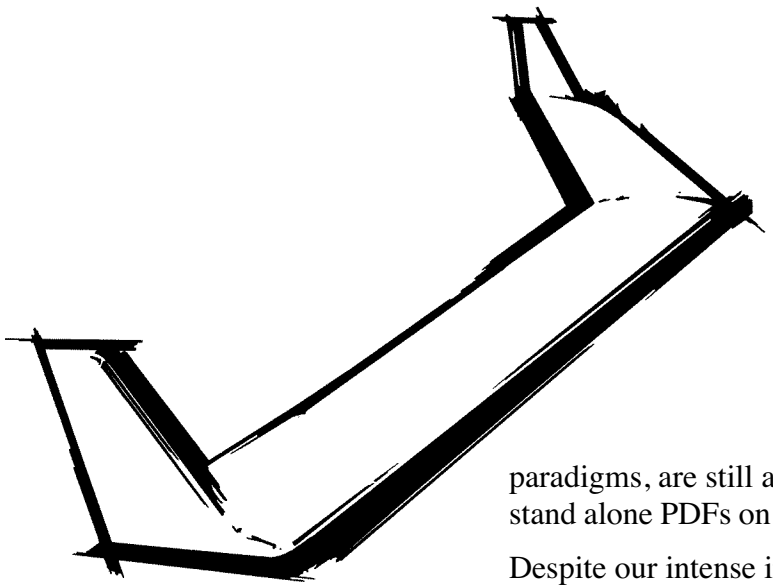
So there you have it. I'm feeling a bit better about the whole thing since I think I figured out what happened and I know the fate of the plane. (Sorry, Mr. Hauch, I guess it won't be making it to the Michigan shore like I thought!) I hope this never happens to your favorite ship but if my dad is right, I guess either it already has or some day it will.

I've already started a column for next month with information on several upcoming slope contests so you'll hear from me again sooner rather than later.

Say Bye!

On the 'Wing...

by Bill and Bunny Kuhlman
<bsquared@themacisp.net>



Redwing

As many followers of this column will attest, our primary interest has always been tailless aircraft with swept back wings. In fact, our interest in tailless sailplanes began with a swept wing design by Curt Weller, his Elfe 2.

Over the years, we've explored various aspects of swept wing planforms, starting with spar structures, then moving on to a discussion of wing sweep and required wing twist. Two articles on rather specific topics, sweep and effective dihedral and a comparison of various wing twist paradigms, are still available as stand alone PDFs on our web site.

Despite our intense interest in swept back wings, we now find ourselves gravitating toward wings which exhibit more of a "plank" planform. While wings with sweep back have a number of positive aspects, we're finding their negative points make design of a viable planform more difficult. The internal structure must be able to remain rigid along the spanwise dimension and withstand substantial torsional loads. Despite this extra strength, the wing twist is always being changed by even small amounts of wing flex.

After attending the first of two of Jim Markse's workshops, our focus began to shift to wings with little sweep. This planform makes the spar structure and connecting mechanics a lot easier to build while making them both stronger and lighter.

This thinking has been subtly reinforced over the years through our flying of several Dave Jones designs - the *Model Builder* Raven, a Raven 2M, the Blackbird planform, and the R-2.

All of these have been to our mind very good flyers. They have excellent stall characteristics, behave as expected, and thermal in exceptional fashion.

Our current interest in wings without significant sweep came about while building and flying Michael Richter's Alula. This EPP foam wing delivers performance which is greater than would be expected from an aircraft of such small size (34 inch wing span, maximum chord under nine inches).

This Alula has the same positive qualities as the various Jones designs, with the exception of the stall characteristics. This is not to say anything negative. The Alula stall characteristics are just different. It exhibits a more dramatic blanking of up elevon as the angle of attack is increased, and a more mushy flight at the stall. Some or most of this is no doubt due to the full span elevons, but there is also a bit of influence from the slightly swept forward quarter chord line.

While a swept back wing has outboard flow, a wing with sweep forward can be made to have some amount of inboard flow, changing the stall characteristics.

For more predictable thermal turns, the Alula planform needs to have a bit more dihedral. But incorporating that increase means a deterioration of SAL performance — less height and a lot of yaw-roll coupling which makes control difficult. For a winch launched sailplane, however, an increase in geometric dihedral does not adversely affect the launch, and so can be easily incorporated.

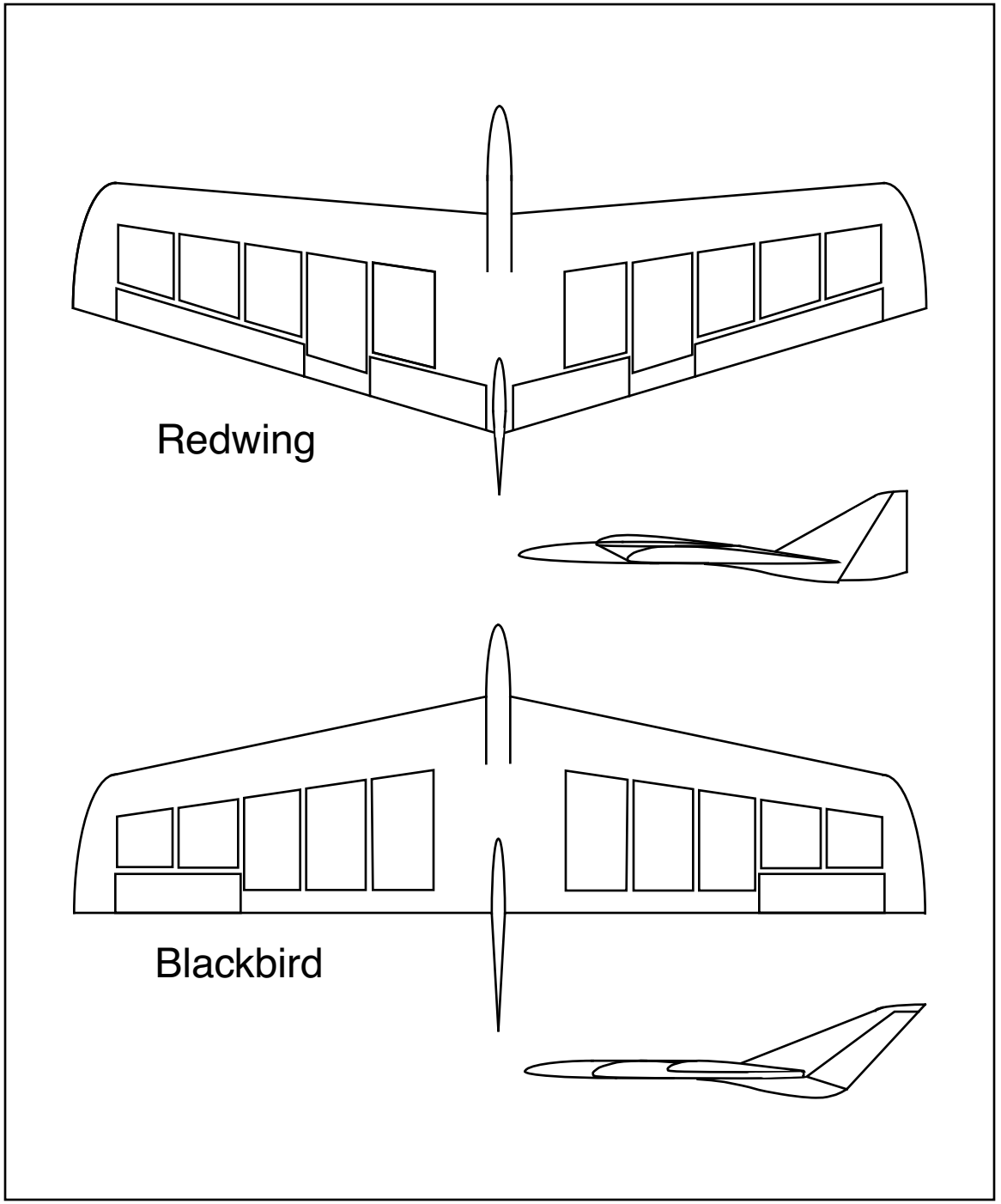
The Akaflieg Berlin B-11 has a large amount of dihedral to compensate for its 18 degree quarter chord line forward sweep, but for wings with lower aspect ratios and less forward sweep, such severe dihedral is not at all necessary.

In formulating a design for TD competition, we decided to start with a known quantity — Dave Jones' Blackbird 2M. We have built seven versions of this design, from 59 inch span all the way to XC size, always with very good results, so we felt confident in making a single major change to the planform.

The drawing to the right shows the results of this redesign philosophy. We simply took the spar, which originally had eight degrees of sweep back, and flipped it forward. From there, the overall wing planform was drawn using the new spar location as a reference.

Additionally, we separated the control surfaces so there is now a central elevator, and we enlarged the span of the ailerons while reducing their chord. We also reshaped the vertical fin and rudder to reduce the hinge line sweep and aspect ratio.

We're planning to build both a two meter and XC version of this new planform, code name Redwing, and will keep *RCSD* readers up to date!



The Tool Room

Steve Richman
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Proxxon 10" Variable Speed Disk Sander

Welcome to the first installment of "The Tool Room," a new monthly column written by a confirmed tool junkie who enjoys using well designed, precision made hand and power tools to enhance his RC hobby experience.

Together we'll be exploring both "wanna have" and "gotta have" tools.

In all cases, reviews will be about tools purchased for personal use and in my workshop for at least a year. You won't be reading about products supplied *gratis* by manufacturers for review who expect several pages of glowing remarks.

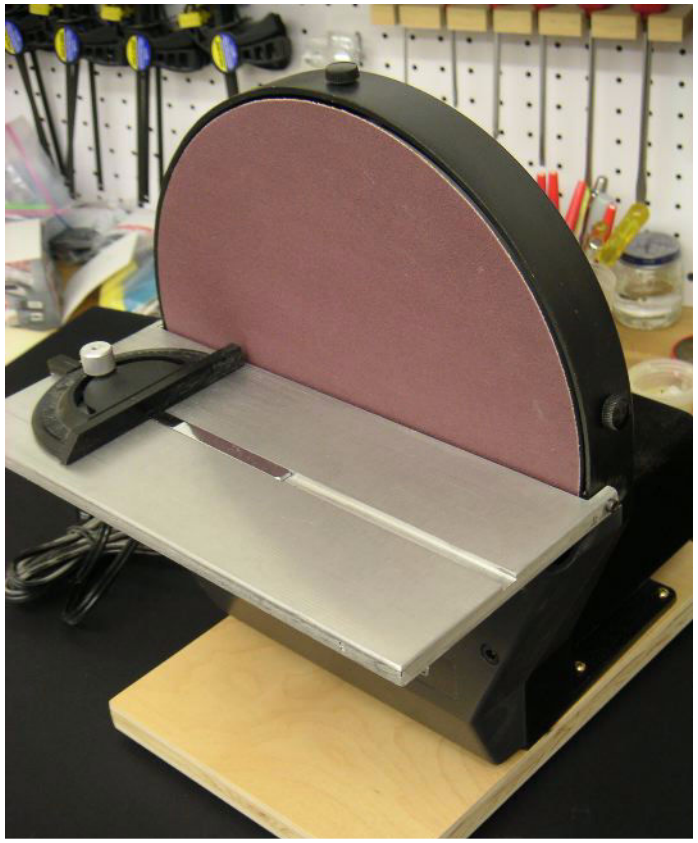
This month's column is all about the Proxxon 10" Variable Speed Disk Sander, a "wanna have" tool that became a "gotta have" tool in my shop.

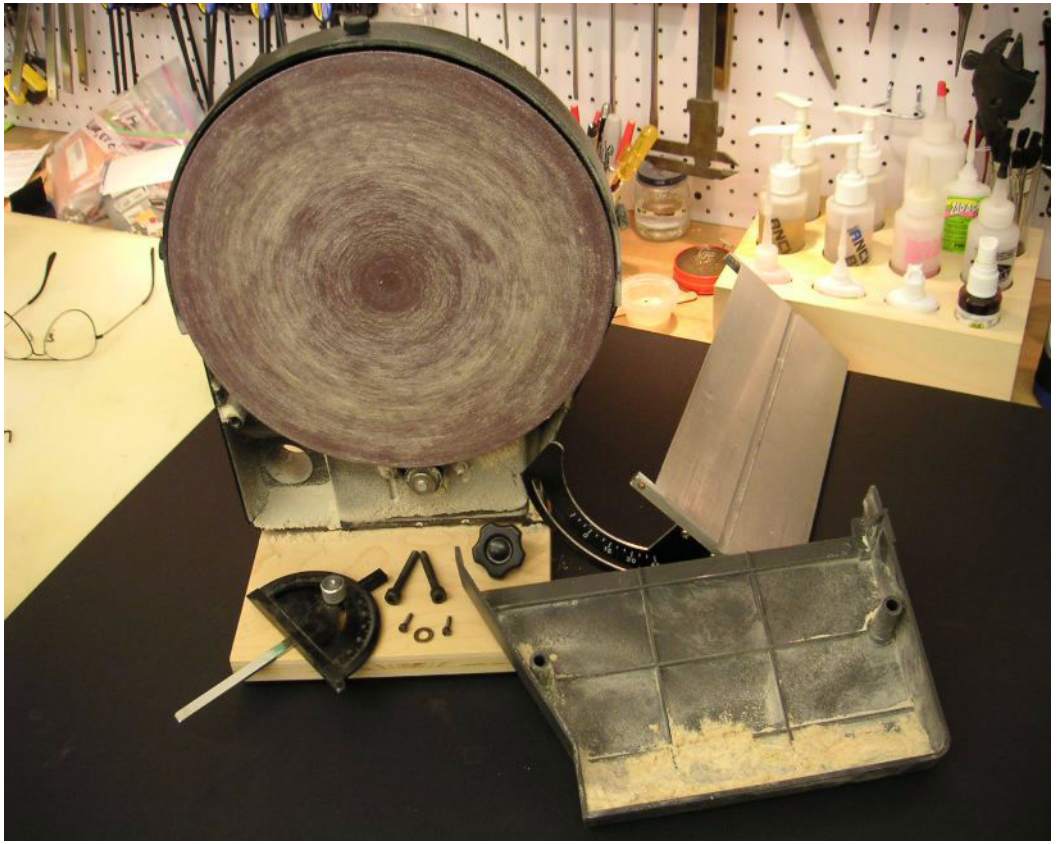
I bought this disk sander about three years ago. At the time I wondered if my $200 investment would ever pay off with regular use.

Fact is, this precision sander is a real pleasure to use and is in regular use all the time. Coincidentally, it's the same disk sander Phil Barnes uses in his excellent video "Vacuum Bagging Made Easy."

Skeptics might ask: does the Proxxon disk sander do anything a good sanding block can't do with enough elbow grease, skill and patience?

Not really, but it sure makes precision sanding a pleasure for those who want to make short work of what can be onerous jobs.





Left: A right front view of the Proxxon 10" Variable Speed Disk Sander, ready for a sanding project. Right: When the sanding disk is ready to be changed, removing a few easily accessible screws can give better access. Article talks about what disks to use for performance and long life.

Here are just a few hobby tasks this sander does exceptionally well:

• Precision sanding of wing dihedrals

• Quick, precise squaring of balsa, basswood, spruce and plywood stock, brass tubing, etc.

• Sanding dead flat surfaces on wood stock, motor mounts, servo cases, etc.

• Sanding precise simple and compound angles in wood stock

• Cutting plywood circles with square or beveled edges

• Shaping formers with square or beveled edges to match fuselage contours

• Freehand shaping of wood parts and other materials.

In addition, the Proxxon sander is helpful with many unconventional tasks.

When bobbing the nose of a conventional glider fuselage to convert it to electric, I make a rough cut with a Zona saw then sand the fuselage nose to final size and angle by guiding the cut off fuselage nose against the spinning disk. I take off exactly the material needed to fair the fuselage into the folding prop spinner.

Left: Rear view of the Proxxon 10" Variable Speed Disk Sander showing the on-off switch and speed control. Right: All cleaned up and ready for a replacement sanding disk. This well made machine is easy to use, has a number of beneficial features, and is reasonably priced.

Let's take a closer look at this "wanna have/gotta have" power tool. The heart of this Japanese built power sander is a cast aluminum disk about 1/4" thick with a finely machined front surface mounted in a twin ball-bearing spindle. I checked the face run-out of the disk with a dial indicator for this article. Run-out is about .005" at the outermost edge of the disk and about .003" halfway out where most sanding is done. To put these numbers in perspective, .003" is about the thickness of a sheet of paper.

A variable speed motor spins the disk via a toothed belt at 280-480 RPM (mfgr info). This is a relatively low speed range and is ideal for sanding typical hobby materials without burning or overheating. It also facilitates sanding and shaping with great precision.

The Proxxon sander is a substantial machine with an all-up weight of 11-1/4 pounds mounted on a plywood base. The sanding disk and motor are supported in a heavy molded plastic housing that rigidly supports all major components without vibration.

The generous 4-3/4" x 9-7/8" work table is die-cast aluminum with a machined surface. It pivots up about 15 degrees and about 50 degrees down. A protractor and pointer facilitate setting the table at all angles within its adjustment range.

The work table also includes a machined slot that holds a remarkably accurate miter gauge.

Used together, the miter gauge and tilting table allow you to make very precise compound cuts with very little effort.

Commercial grade 10" pressure sensitive sanding disks are available in 80, 120, 180 and 240 grits and last a long time in everyday use. I find the 120 grit is a very good all-around choice. It produces a very smooth finish on a variety of woods yet cuts very quickly.

That's all the good news. Now for the bad. Actually, there really isn't very much.

My main gripe: changing sandpaper grits isn't as easy as it could be.

Proxxon claims you can change grits without taking the sander apart. While it's possible to do this, I find it much easier to remove the work table and front housing (four metric Allen bolts and a thumb screw) to gain full access to the face of the disk.

Changing the worn sandpaper requires a bit of tugging to convince the pressure sensitive adhesive to release its grip on the aluminum disk. Invariably some adhesive residue remains on the disk but cleans up quickly with either lacquer thinner or Bestine solvent.

Applying a fresh 10" grit requires care to accurately center it on the aluminum disk. I remove a small portion of the grit's liner paper to expose the pressure sensitive adhesive. Then I press the new grit in place and spin the disk slowly by hand to be sure the sandpaper is centered. If all goes well I peel back the balance of the liner and press the new grit in place. The entire sandpaper changing process takes less than 10 minutes.

Two minor complaints: the sander requires you to supply a wood base for the unit. It will not stand upright without this addition. I fabricated mine from a piece of 3/4" plywood and applied rubber feet to insure the machine does not slide around in use.

Also, the on/off switch and speed control are located on the back of the unit. You have to reach around the sander to operate these controls which is a little awkward.

There's little in the way of maintenance with the Proxxon disk sander. Eventually the toothed drive belt must be replaced but my original is still going strong after three years of regular use.

About a year ago, my sander started squealing in use and the disk stopped quickly after the power was turned off. I was concerned that perhaps the disk or motor bearings was burning out.

A single Phillips head screw holds the aluminum disk and its bearings in place on the spindle. I took this assembly apart, vacuumed out the dust then reinserted the screw with some thread locker. I snugged down the screw just enough to eliminate any play in the bearing assembly. It's been running like a fine Swiss watch ever since.

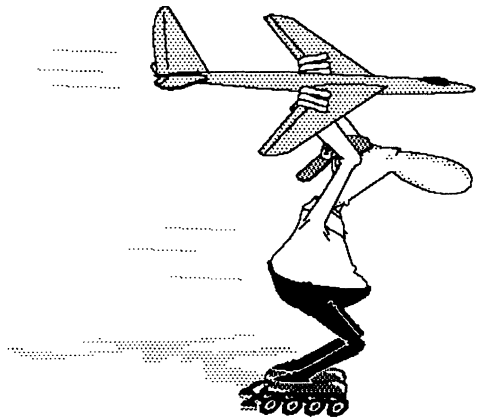
My wish list for future enhancements includes a built-in, positive dust collection system. While there's a supplied 1-1/2" vacuum port in the rear, I suspect most don't bother to use it. As a result, sanding dust tends to fly around the shop. With the machine open to change grits, I take a moment to clean out the accumulated dust with my shop vac.

If you're interested in purchasing the Proxxon 10" variable speed disk sander, it's available for about $200 through a number of Proxxon distributors. Check out <proxxon.com> or Google for a listing of retailers in your area.

The machine is also sold by Micro Mark Tools <micromark.com> under their private label. The Micro Mark sander is identical to the Proxxon branded machine. The only difference is the color. The Micro Mark is molded in black while the Proxxon is a mustard colored plastic.

That's it for this month. Regards from the workshop,

Steve Richman



Gordy's Travels

Gordy Stahl
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The League of Silent Flight and Cleaning Tx Antennae

"I was a power flyer."

I know it sort of sounds like the intro to some 12 step program, but in fact I was… and I enjoyed it. I was as much involved in it as I am now in soaring, but even while I was doing power I had a sailplane of some ilk. I recognize I really didn't understand what soaring was about, like most I just liked the looks and idea of sailplanes. Of course everyone I owned got wrecked, because they didn't have motors. That was when I lived in Milwaukee.

My passion/addiction to soaring started when I met the local "pusher" Mirko Bodul (he is now serving a life sentence of fun sloping with the Slopeflyers.,com guys in Milwaukee). We met at a Milwaukee Thermal Soarers club meeting, which I had found out about from a notice posted at the hobby shop.

At this point the thermal guys were strictly RES style planes but Mirko being a Euro-sloper, showed up with some really sexy and full house scale sailplanes. He regarded the thermal guys as "Cro-Magnon" since they weren't into slope, speed, aerobatics or... ailerons. At this point I has attempted some thermal flights and had even stumbled into a big thermal (it was my first taste of a really hard soaring drug… and I liked it!)

The power planes I had been flying were fast, and extremely maneuverable, so Mirko (like most pushers) was like a Siren-on-the-Rocks, this talk of unlimited energy really got my interest up. It wasn't too many days before I had found myself sneaking away from work to meet him at the Lake Michigan slope, and like that first taste of a great thermal experience, he had me hooked! I went home, got out my sailplane catalogs and got some slope ships.

I continued flying power but it was clear soaring was where my needs were.

Slope turned out to be a disappointment... well not the slope soaring, but while I got all geared up for it, Milwaukee's slope is on Lake Michigan and that needs an East wind, which it turned out seldom happened, and most often when it did, it came with rain or snow. I got so far into anticipation and withdrawals, that I'd be out in 16 degree, heavy snow.

Well that was the "how" of the way I got hooked in to sailplanes, but soaring didn't really happen for me until I moved to Louisville.

A job change made the move happen, but it was the local soaring club that made the complete change from RC power to soaring. The Louisville Area Soaring Society had existed for a lot of years prior to me arriving and they were very active.

Hand launch (discus didn't exist then) was becoming very popular and the club had plenty of Monarch and Chrysalis handlaunch sailplanes flying. So since I was a hot RC power plane pilot, I ordered a full house version of the Monarch and figured I would dominate.

Boy did I get a surprise, soaring was nothing like flying power RC planes, I'd launch with the other guys and would be on the ground in a minute and they'd still be floating around. I didn't like it and I wanted to learn what sailplanes were all about.

And that's what lead me to the League of Silent Flight. Sounded like some army organization but in fact its a set of soaring tasks created by RC sailplaners to move a new soaring enthusiasts along a path of competency and understanding.

There are 5 tasks (LSF I through LSF V), beginning with some simple landings of just under 10" from a spot, two 5 minutes thermal flights, or one 5 minute thermal flight and one 15 minute slope flight. Each level brings longer flight tasks and then add in contest points earned and even some distance tasks. The idea being to help a new soaring pilot progress in a natural progression to hone his ability to read air, and control his model with ever increasing precision... and have a lot of fun doing it!

The LSF provides a form to record your accomplishments and each task needs to be witnessed and signed by a fellow member of the LSF.

Gordy wins the Pumpkin Fly and is closer to his LSF Level 3

Here's some of the program "catches"…

• Only one thermal flight can be accomplished in a single day, that means if you had a great day of thermals, you can't knock out both thermal tasks on the same day. The reason is to help you do well in varied conditions.

• You can not jump ahead! You must complete each level's tasks and have the form sent in before you can get "credit" for a next level task.

(This one gets a lot of us… I completed my LSF I in June of 1997, then sort of forgot about it. From that time to when I restarted in June of 2004, I had actually done many of the requirements for all of the levels. However, I hadn't bothered to get them witnessed and sent in my form to get it recorded, so it was like having to do it all again... DUMB… But I'm not the only one who made the error.)

•You have to use a high start or winch for your thermal tasks, so Handlaunch doesn't count for thermal flights or landing accomplishments... because its thrown. (Slope tasks can start in any way you want).

• Contests... they have to have at least 10 pilots for LSF IV and below, and 20 minimum for LSF V. They can't be done "postal" as in you fly in your town and submit your results via the mail. And it never fails when you are looking for some contest points to finish up a level, it will always be only 9 guys that make it that day! LSF V takes "wins." LSF II and 3 just take minimum of six contest with 10 guys or more and an accruement of contest points, LSF IV takes a minimum of 15 pilots, but LSF V takes 3 wins with 20 guys or more and lots of points. When you have 20 guys or more, the odds on winning, even if you have been hot, get pretty long!

• Finally LFS5 is tough to complete because of people. Have to get to 3 contests with at least 20 pilots, have to have two LSF II witness who have time to watch you do the tasks, have to have a team to help you do the 1 kilometer go and return distance

task, have to two LSF II's watch you thermal for 2 hours and on a slope for 8hours!

• And of course there is the waiting for having the form processed each time!

• Finally the let down after achieving all the levels!

But no worries, because its all followed by the exhilaration that you can start the whole process over again! Many LSF V have gone on to do it a second and some have completed a third!!!

You can find out more about the League of Silent Flight and begin your journey of soaring growth and achievement by checking out it's web page

<http://www.silentflight.org/>.

I have to tell you that this is one trip worth taking! Contact the LSF for a local member to help you get started… they are everywhere.

Me? I only need to "attend" three more contests to complete my LSF III. From LSF I to LSF II took me 7 years, LSF II to almost done with LSF III took me a month (just ran out of season for contests).

Get Your Antennae Cleaned Up!

Green Antenna Syndrome

I was browsing around Radio Shack the other day and I remembered something George Steiner had mentioned to me years ago (George is RC's leading Tx/Rx mind, past columnist for RCM and other publications and in general, guy in the know when it comes to our RC radios) he said, "Clean your transmitter's antenna."

And coincidentally right in front of me was their can of Precision Electronic Cleaner (p/n 64-4345). Its main ingredients are Dipropolene Glycol Monomethyl Ether, Hydrotreated Glycol Methyl Naptha and of course Dipropylene Glycol Methyl Ether Acetate, with a bit of Carbon Dioxide just to smooth out its mountainy flavor…

Certainly most of us wander through the hobby wondering where we might find all those wonderful chemicals in one easy to use aerosol can, well no more wondering because it's at Radio Shack! It doesn't seem to affect plastics so no worries about getting some on your TX's body

(but put some on a cue tip and check a small area to be safe on your TX!).

I went home; collected up the various transmitter antennas I had around and went to work cleaning them up. Now I hadn't done this in some time and the last time I just used alcohol to do the job.

Its ironic that we spend a bunch on radios, and take care to located the antenna in the plane for optimum range and reception but we almost never service the source's antenna to insure that all the power we paid for, is actually getting out the end of the radios antenna.

I extended the first antenna and sprayed the sections liberally with Precision Electronic Cleaner, then simply wiped it with a paper towel. I was pleased to find that it seemed pretty clean (in spite of the fact that I fly in rain and dust and well lots of conditions). I sprayed it again, retracted the sections, then extended it all again. This time when I wiped it I was unpleasantly surprised at how much filth and corrosion was hiding inside the section joints.

Our antenna's are mostly steel tubes, but they each have two 'plates' of copper keyed to each

section's base. This provides a positive, low resistance contact to transfer the output energy from the Tx's module. A loose, dirty connection between the joints equals a shortened antenna and that equals a crash.

From the photos you can see how green the paper towel is from the copper's corroded surfaces and I suppose the bore of each of the sections where the copper plates rest and ride during extension and retraction.

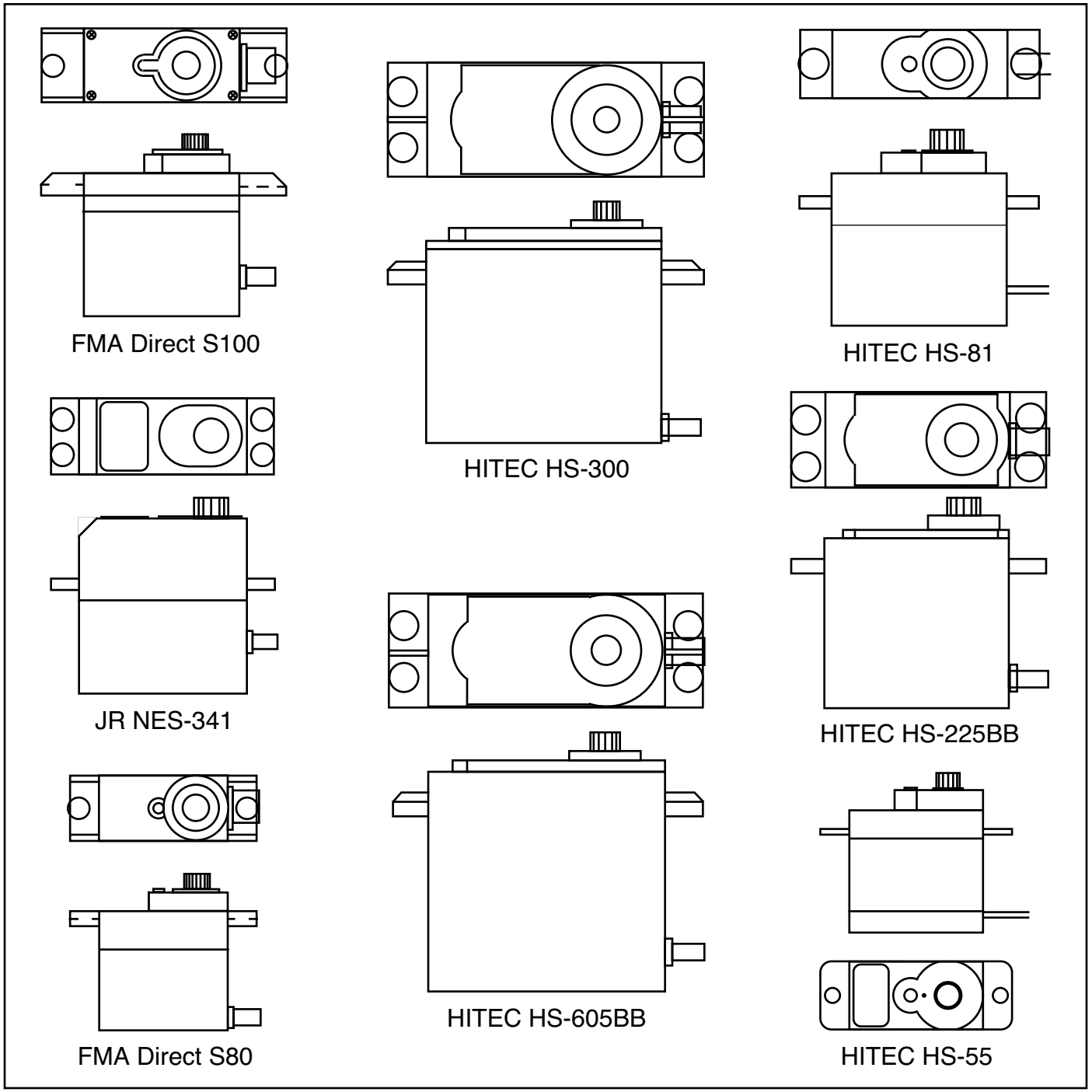
Hand oils, and humidity that gets inside the antenna from sitting in the sun then cooling all contribute to your antenna's ill health.

Antenna cleaning should be done after every few days of use or especially after you feel it has been either wet from rain or just in dusty conditions.

I doubt any of you want dirty inefficient antennas, so get some cleaner and start cleaning! I did each of mine twice and now clean them before I head out to the field each Sunday, or especially when I return from a trip.

See you on the road!

Gordy



R/C Soaring Digest Archives & Index

by Lee Murray
lmurray@pop.athenet.net

Many of you probably know that Jim Gray started an RC soaring newsletter (*RCSD*) back when he was writing a column in Model Airplane News.

I decided to keep records of what information was in those newsletters and in other places such as "Soartech" edited by Herk Stokeley, and the MTB series out of Germany that dealt with RC soaring.

My interest in model aerodynamics coupled with my interests in personal computers was the reason my AppleWorks database records became the *RCSD* index. Even when the Apple II series was orphaned, I purchased SuperWorks, an AppleWorks program for an IBM PC.

As you might imagine, in the early 1980s memory was limited to 128K on the Apple IIe and the storage devices did not allow one to be verbose in the records created. For about a decade, I made hard copy printouts available to the editor in formats that would make it easy for Jim Gray and then Judy Slates to find references to articles. There was even a database for sources of parts, supplies and kits as well.

Several archive report formats were sent out on fan folded paper. *RCSD* was where the development in RC Soaring was chronicled. The developing technologies in composites, electronics, computers and the publication of the *RCSD* fostered a wide interest in RC soaring and the development of the sophisticated models we take for granted today.

When the Internet extended into most households in the 1990s, the format of the index changed from hard copies and databases to electronic text files that could be downloaded from web pages like B^{2}Streamlines / RCSD web page <http://www.b2streamlines.com/RCSDindex.html> and the LJM Associates / PC-Soar web page <http://www.athenet.net/~atkron95/pcsoar.htm>.

Greg Ciurpita, a Lucent/Bell Labs scientist, provided a way for readers to search the index/database on line. <http://ciurpita.tripod.com/rcsd/rcsd.html>

The format, however, was frozen in time since it was based on an AppleWorks database which embraced the use of any character on the keyboard including all the common delimiters used by mainstream databases like d-Base and MS Access.

Frustrating as it was, only AppleWorks & SuperWorks were used to maintain compatibility of the complete index in a database format.

Each record contained: Volume#, Issue #, Month & Year, Page, Contributor, Key Words and two 80 character lines of description.

When two 80 character lines weren't enough to cover the article, I entered a second record with the first 80 character description line starting with [cont.].

Another problem with the AppleWorks / SuperWorks was that it didn't have spell checking on the database. This caused lots of extra work to proof the text

files for the errors and then go back to the database to make corrections.

Starting with the release of the 2003-2004 index text file, I am going to a format with as long a description as is needed for a reference. It will resemble modern technical literature databases having abstracts. The abstracts will provide as much information as is needed in many cases and will make the index more useful.

Also, because home computers now have many megabytes of RAM, we can offer the whole database in one chunk so that the "Find" command on modern word processors can be used to find every article reference on a particular subject or by a person.

What it cannot do is create reports listing only records containing a word or phrase.

Here's a sample of the New Format:

> "Vol: 21 No: 1 Jan 04 Pg: 10 Contributor: Garwood, David
>
> "Key Words: Slope Soaring
>
> "Advice is given on how to deal with slope soaring during winter conditions. Many layers of clothing that can be shed if you get too hot. Head covering is important. Ski goggles protect eyes and resist fogging. Long underwear, sweat shirts, sweaters or flannel shirt topped off with wind jacket. For lower body parts Gortex garments are recommended or Carhartt insulated overalls or a snowmobile suit. Ski gloves or military gloves work well (Army-Navy store) Wear 2 pair of socks - cotton under wool. Consider electric socks. A positive attitude is helpful."

It will be possible to convert the earlier year's references to this style. To this end volunteers would be appreciated in modifying earlier years to this format. It is easily done by finding the [cont.] comments and joining the record with the previous record by stripping the redundant record information in the subsequent record.

Other interesting facts about *RC Soaring D*igest:

• The first issue was photocopied on one side stapled at the corner and folded over. The *RC Soaring Digest* sailplane logo was designed by Don Typond, former editor of *Model Airplane News*.

• The January 1985 issue was the first issue with a modified logo including a cloud behind the sailplane logo. This logo was designed by Robert (Bob) Rondeau and used through August 1998. Larger typeface was also used starting with this issue.

• From 1984 to 1986, *RCSD* was printed on a copy machine on different colored paper to distinguish each month.

• From February 1986 through December 1988, a different color ink was used on the cover on plain paper.

•In the January 1989 issue Jim Gray announces that publication will be taken over by Judy Slates in California.

• Under Judy's direction the magazine was published with magazine quality paper (starting May 1993)

• With the November 1997 issue, *RCSD* went to a larger format and away from offset printing to control costs and the Slates invested in their own printing equipment.

• The last hard copy printed version of RCSD was the March 2004 issue because the circulation had fallen to a point that threatened its future. An Internet version was beginning to take off, exceeding 2,250 downloads for the May issue.

• Beginning with the September 2004 issue, the publication of *RCSD* was passed onto Bill and Bunny Kuhlman

• In the November 2004 issue, the format was changed from portrait to landscape format to better fit computer screens.

The key words prove to be a useful way to classify the information in the record. Those key words now include:

2M (two meter class)

Aerial Photography

Aerobatics

Aerodynamics

Aerotowing

Ailerons

Airfoil

Autopilot

Batteries

Book Review

CA (cyanoacrylate)

CF (Carbon Fiber)

CG (Center of Gravity)

Clubs

Communications

Composites

Construction

Contests

Control

Design

DLG (Discus Launch Glider)

DS (Dynamic Soaring)

Electric

Electronics

EPP (Expanded Polypropylene)

F3B

F3E

F3I

F3J

Fiberglass

Finishing

Flaperons

Flaps

Flying

Flying Sites

Flying Wings

Foam

Foam Cores

Foam Wing

Foamies

Foamy

Forecasts

Full Scale

Fuselage

HLG (hand launch Gliders)

Humor

Internet

Kit Review

Landing

Launching

LSF

NATS

Powered Flight

Product Release

Radio

Repair

RES (Rudder-Elevator-Spoiler)

Sailplane

Scale

Show Review

Slope Racing

Slope Soaring

Software

Spoilers

Stability

Stabilizer

Std (standard class)

Thermalling

Training

Trimming

Turn-around

UNL (unlimited class)

Video

Video Review

Winch

Wing

Wingerons

Winglets

XC (X-Country)

Tech Topics

Dave Register
<RegDave@aol.com>

What's Up With Exponential?

Exponential. Some folks swear by it, others swear at it.

A recent query to *RCSD* led to varied responses from our contributors ranging from "love it" to "never use it."

More research (recent thread on RCSE) suggests that exponential is used quite often by many pilots but for different reasons on different planes and under different flight conditions.

No wonder there's such a variety of opinions about this function.

To clear the air a bit (I hope!), let's do a review of the exponential rate function. Let's also look at some conditions under which we might expect it to be useful, followed by examples from *RCSD* and RCSE on how folks actually put it to work.

In many computer radios, Exponential and Dual Rate are found in the same menu area. On the Futaba 9 C (the example I'll use most often since it's my Tx), they are found in the same menu area. For those familiar with the 9C, enter the main menu, cycle the menu selection to "Basic," roll the scroll knob down to DR/ Expo and press the scroll knob to enter this menu.

What you should see is something like the illustration of Figure 1. Other trannies have similar, but slightly different displays. Note the graph to the right side of the figure. For this example, the chart is linear since neither exponential nor dual rate have been activated.

What you're looking at is a graphic representation of the response of your servo to the motion of the control stick associated with that function. The linear graph says that as you displace the stick through a certain range of motion, the servo should rotate through its range of motion in a linear relationship to the stick displacement (1:1).

The exponential and dual rate functions allow you to tailor the response of the servo to the displacement of the stick. In dual rate mode, the curve remains linear but is reduced (or enhanced) in slope. That is, the amount of servo travel is less than (or greater than) the amount you would receive with this function turned off. The result is a feeling of less (or more) sensitivity in that control axis.

Exponential handles the response in a different manner. On both normal and dual rate modes, the servo travel is linear with the stick displacement. For exponential rate, the response curve is non-linear around the neutral point. The shape of the curve is approximately that of an exponential function – a function that is near and dear to the hearts of most engineers and scientists.

A key to this function is that the servo response is modified within the exponential region (the middle 50% of the stick displacement, for instance) but returns to the normal response outside this region. So you get a tailored servo rate within the exponential part of the curve but recover the full servo rotation outside this region. 50% dual rate, on the other hand, will give you only 50% of the servo travel at full stick displacement. 50% exponential will give you 100% of the servo travel at full stick displacement

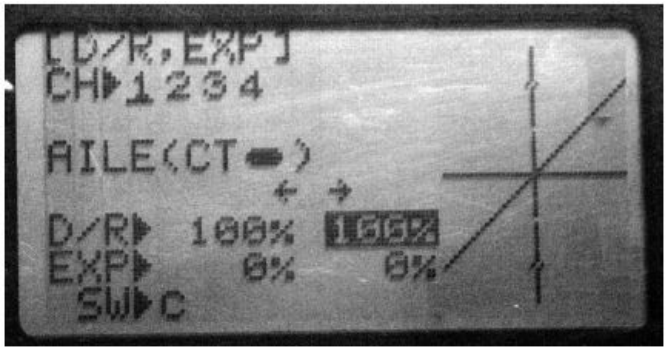


Figure 1 Futaba 9C DR/EXPO Menu: Off

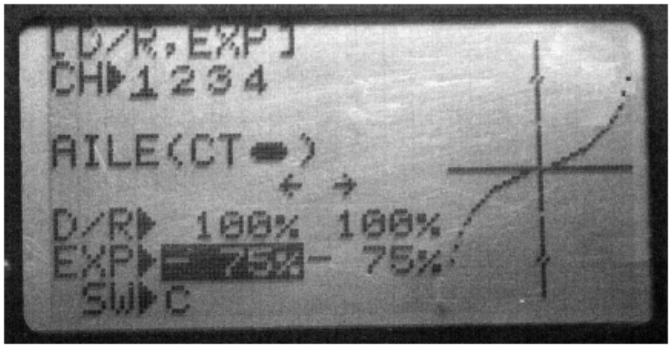


Figure 2 Futaba 9C DR/Expo Menu: 75% Negative

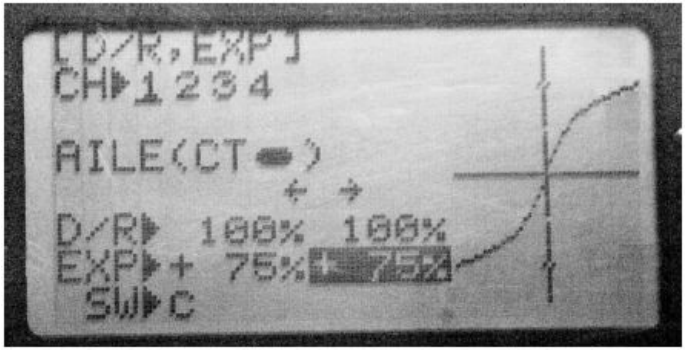


Figure 3 Futaba 9C DR/Expo Menu: 75% Positive

A handy feature of the exponential curve (at least in the 9C) is the ability to independently adjust the amount of rate change on either side of neutral. Another bonus is the ability to independently adjust the sign of the rate change on either side of neutral. Using aileron as an example (usually channel 1), right aileron can be adjusted to be more or less sensitive than linear while left aileron can be adjusted the act in a similar manner or reversed (less or more sensitive). Furthermore, the amount of sensitivity can be different for each direction of travel.

Whew! Why would you want to do all that?

Well, normally you don't.Perhaps it's handy for some radical 3-D maneuvers (there are more power pilots than soaring pilots, after all). But for most of us, decreasing or increasing the control sensitivity around neutral is usually the same for either right or left stick (for the example chosen).

In Figure 2 we've programmed exponential (- 75%) into the 9C. That means that for about 75% of the stick travel, the amount of servo travel is reduced compared to the linear case. Note that as we approach the 75% travel limit, the correction approaches the linear case so there is a smooth transition between the modified and linear rate regions.

In Figure 3 we've programmed +75% exponential into the 9C. In this case, the servo travel will be greater than linear over 75% of the stick motion. As in Figure 2, at the ends of the 75% region, the curve smoothly transitions into the linear limits.

As a point of nomenclature, I've used the signs "-" and "+" simply to represent the sign of the exponential correction in the Futaba 9C. In a number of notes on this topic, 'negative' exponential has historically meant an increase in sensitivity over the exponential region. This terminology derives from early use of the exponential function which typically reduced sensitivity around neutral.So "negative" exponential would increase sensitivity.

Now that we know what it is, why would you want to use it? That depends on

- the sensitivity you like in your control surfaces,

- the type of flying you normally enjoy (sport, slope, TD contest, etc.).

-the type of plane you're flying, and

- the kind of weather that you normally experience

Keep in mind that this is a tool provided for your flying enjoyment. If it doesn't help, don't use it. If it does, go for it. There is no right or wrong answer when it comes to using this function.

It's a choice.

That said, I haven't heard any responses from folks that use dual rates.So we'll not discuss that approach.

There have been many responses on exponential – some of them spirited.So I'll use my own experience as an example. I fly Thermal Duration (Open and 2 Meter), DLG and a bit of slope. I fly contests and am sometimes competitive but the real reason for flying these days is that for over 35 years it's just been a whole lot of fun. The challenge of hooking a decent thermal far outweighs the convenience of hanging a power plant on the front of a ship. Getting my Level IV thermal flight with a 2M a little while ago has kept me pumped up for weeks. I used exponential off and on during that flight and found it to be very helpful.

In my neck of the woods, we almost always have a 5 to 15 m.p.h. wind blowing. For the first few years after moving here from SoCal, it was rather discouraging. But in Oklahoma, you either learn to fly in the wind or you don't fly at all.

Part of the wind thing is a lot of turbulence - especially if it's a tight field with trees around the edge. With a somewhat rearward CG, that turbulence can create some interesting gyrations in your ship. Hence the need for fairly strong control surface responses.

However, there are times when too much control is not a real good thing (at least in my hands).

Those times are generally when the ship is flying much faster than normal or when it's right on the edge of a stall. There's also the rare day when the wind quits and you've got beautifully calm weather in which you don't need to bank and yank nearly as quickly.

High speed generally occurs at launch. The worst problem (for me) is a roll axis excursion from a tip stall, a poor throw or maybe a gust of wind. At launch speeds the aileron response is already pretty exciting so it's easy to over correct a roll event. In this case, I use exponential to decrease aileron sensitivity during launch.

The low speed issue occurs with very light lift on relatively calm days. In many cases our

thermals are light and tight so it's easy to miss the core or fall out once you're set up in the thermal. In this case, to keep from over controlling in both roll and pitch, I'll use exponential to reduce the control sensitivity in both the elevator and aileron controls.

Since rudder is typically slaved to aileron, adverse yaw correction (rudder) remains in effect.

A typical flight will have me flipping exponential on and off as conditions require. On the 9C, I assign exponential to a 3-wa y switch with "Up" being off "Center" as the launch position and 'Down' as the thermalling position. I'll typically use ~30% exponential so that only a small region around center is affected.

That's my story and I'm stickin' to it.

Give it a try sometime. If you've got a "touchy" 'ship, this might help it more manageable (newbies take note!)

If it works for you, that's great; but if it doesn't add to your flying experience then turn it off and move on to the next fun thing.