May, 2004
Vol. 21, No. 5

R/C SOARING DIGEST

Radio controlled

THE JOURNAL FOR R/C SOARING ENTHUSIASTS

TABLE OF CONTENTS

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.

RCSD Staff & Feature Columnists

Judy Slates: Managing Editor, Article Submissions
"The Soaring Site"

B² Kuhlman: Publisher, Internet Support, Columnist
"On the 'Wing..."

Dave Register: Video Coordination, Technical Editor, Columnist
"Tech Topics"

Lee Murray: Historian - Keeper of the Index, Columnist
"The Natural Side of Thermal Soaring"

Jerry Slates: Technical Editor, Columnist
"Jer's Workbench"

Gordy Stahl: Advertising Coordinator, Roving Correspondent
"Gordy's Travels"

Tom Nagel: Travel Saga Correspondent
"Have Sailplane Will Travel!"

Mark Nankivil: Columnist
"Electric Connection"

Greg Smith: Columnist
"The Sloper's Resource"

Dave Garwood: Photographer, Writer

The Soaring Site

RCSD on the Web

Sometimes, things seem too good to be true. And, because of the many questions we have received since March 11th, I want to assure you that *RCSD* is, indeed, now free.

By way of explanation, I'd like to share an e-mail message from Al Groke, Kansas.

"I look forward to reading *Soaring Digest* on-line. I like articles on airfoils with coordinate lists. I make and fly only foam core wings and fuselage planes, so articles on that subject are appreciated. I'm thinking of building a lost foam hollow core wing on one of my next planes so hints on that would be nice."

I'll pass your request along to the other team members. We'll see what we can do.

"I would pay a subscription to the on-line version if past issues are available and searchable."

We appreciate the offer, but have decided to provide RCSD free of charge to any that can download it. As of this writing 25 issues are available for download: April 2002-April 2004. As time permits we plan to pdf prior issues. Lee Murray has been preparing an index of articles since the beginning. It's also available for downloading off the main page of our web site.

Last month, we promised to thank those of you that have contributed to the electronic conversion since the April issue was made available. Special thanks go to:

Brian Allen, VA
Barney Bauer, MI
Charles Botzko, OH
J.D. Bourne, England
Jonathan Bryan, WA
Joe Chovan, NY
Tim Christison, CA
John Cyr, AZ
D.O. Darnell, OK
Al DeRenzis, MD
Bud Elder, FL
Paul, Emerson, AZ
Jim Gell, MI
Doug Gordon, FL
Al Groke, KS
Bert Hollifield, NC
Ray Holzheuer, IN
Brian Johnson, TX
Bruce Johnson, Canada
Brian Molloy, MO
Al Nephew, MN via Ireland
Bruce Rose, OR
Roger Segers, Belgium
Hendrik Tillema, OK
Bill Warrick, IN
Brenton Watkins, AK
Max Whitson, CA
Richard Williamson, MA
Ryan Woebkenberg, IN

"Getting Started in RC Soaring"

"Getting Started in RC Soaring," as some of you already know, is a handout available for downloading from the web site. What many of you might not be aware of is that it's undergone a complete revision this past month.

When we realized that there was a deadline to complete the revision, the *RCSD* Team jumped in to discuss potential planes and radio configuration for a beginner based on what's available today, cost being an important factor.

The latest revision may be downloaded and freely reproduced, as was recently done by Tom Kallevang, President of the LSF. The handout was made available at the LSF booth during the Toledo Show. Our thanks to Tom for the heads up!

Judy Slates
RCSDigest@aol.com
http://www.b2streamlines.com/RCSD.html

JR Aerotow 2003

Dan Troxell's scratchbuilt 40% scale model, Grunau Baby IIb, attended the JR Aerotow 2003 event held in Monticello, Illinois. Mark Nankivil covers the event this month in his column "Electric Connection."

Photography by Mark Nankivil.

ELECTRIC CONNECTION

by Mark Nankivil
nankivil@covad.net

JR Aerotow 2003

With the continued popularity of aerotow events, it was great to hear that JR Radios and Horizon Hobbies would be sponsoring just such an event here in the Midwest, and not far from where I live in St. Louis. So with my calendar marked for June 13th thru 15th, I was happy to see the day arrive as I packed up the van and headed down the road into Illinois.

JR Radios and Horizon Hobbies are both based in Champaign, Illinois and with JR's own Peter Goldsmith spearheading the event, it was a natural for Peter to set the event up in nearby Monticello, Illinois where he lives. Peter is a very accomplished flier in a number of aspects of our hobby from TOC size pattern ships to large scale sailplanes. Peter arranged for the event to be held on the home turf

Asher Carmichael brought this 6.5 meter span CNC Modellbautechnik Ka-6CR.

Dan Troxell came from California and brought a number of models including this DG500M Élan. This model was one of the casualties of Friday the 13th with a spectacular disintegration at altitude.

The mixture of full size and scale sailplanes at the hangar was eye catching.

Peter Goldsmith also flew this 6 meter span ASH- 25 from a Rosenthal kit.

Rick Richardson flew this scratchbuilt 1/4 scale EON Olympia 2B built from the Cliff Charlesworth plans.

Howard Thomas flew this nicely built 1/4 scale Ka-8B built from the Flair kit.

Peter Goldsmith's Towmaule heading back to the field.

Mibo USA brought along a number of their models and flew them throughout the weekend. Check out their website at <www.miboUSA.com>.

Tony Fiorentino's 40% scale Ventus C on tow.

Tony Elliot brought two 10.3 meter span models, one being an ETA, a scratchbuilt model that uses a much modified Rosenthal ASH-25 fuselage. AUW of 45 lb. and aspect ratio of 53:1, each wing panel is made up of 3 sections.

Big models need wide runways to land - Tony Elliot's SB-10 about to touch down.

Rusty Rood's ASW-15, a very nice 1/4 scale from Mibo USA.

Peter flew this 33% Piper Cub which easily towed the largest and heaviest sailplanes. Engine is a DA100.

John Derstine of Endless Mountain Models <www.scalesoaring.net> brought along and flew one of his products, a fully molded 1/3.75 scale DG1000 (not shown) from LET Models. John Derstine's two sons, David & Michael, took turns flying their 1/3rd scale Ka-6E. A real beauty in the air and a very nice flier.

Here's the way to travel! Tony Fiorentino's models along with a Nissan S2000 arrived at the field in style in this trailer.

A truly beautiful model, Dan Troxell brought this scratchbuilt 40% scale model of the Grunau Baby IIb.

of the Illinois Glider Club (full scale) which is based at Piatt County airport, conveniently located on the south side of Monticello. The club was very kind to allow the attendees access to their hangar for storing the models and shipping containers. It was pretty neat to see full size and not quite full size sailplanes together in the hangar.

The weather in the Midwest throughout May and June was very wet and the days leading up to the event saw a substantial amount of rain throughout mid-Illinois with Monticello receiving more than its fair share. There were large ponds of water adjacent to the runways and parking area on the airport grounds but the City's public works employees did a great job on Friday of eliminating the pond in between the parking area and the runway being used for flying. Thankfully the weather turned for the better and conditions throughout the weekend were excellent with plenty of sun, good lift and warm breezes. Add to that the readily accessible food on site which was handled by the Monticello Model Makers, this turned out to be a great inaugural event! CD Peter Bergstrom kept things relaxed but well run and the guys from JR were kept busy handling the tow duties with a number of different tow planes assisted by Johnny Berlin with his Pegasus and Peter George with his Townado. There was no shortage of towing capacity all weekend long! JR Radios and Horizon Hobbies also kept a raffle going all weekend long with plenty of great prizes being handed out. Anyone at the field could also buy a raffle ticket for a chance to fly in one of the two seat gliders flown by the Illinois Glider Club. All money raised in this raffle went to the club and Nelson Itterly was the lucky man who took the ride on Saturday evening in a KR-3 Kronos sail-plane.

It was great to see a number of fliers and their models from the west coast. JR was kind enough

Rick Briggs rolling in on final approach with ASH-26.

to handle the shipping of their models from JR's west coast facilities and this enticed a number of modelers to make the trek to the Midwest. Tony Fiorentino also flew up from Florida in his Mooney and others brought his large motorcoach/trailer loaded with some truly large sailplanes.

There were a couple of crashes on Friday (Friday the 13th syndrome?!) but the weekend was pretty much accident free with only a few minor mishaps. The surrounding corn fields and the lack of any nearby background made for a surprising number of off field landings as it was hard to get good depth perception for the approach. No broken models though and a quick clean up of the mud and the models were ready to fly again.

There were plenty of fine eateries for the evening get togethers and the local community is filled with plenty of other interests too such as a very nice railroad museum on the north side of town. Monticello has a very nice atmosphere which added to the family feel of the event.

There's no doubt that this event was a tremendous success and I would highly recommend you come and make a weekend of it and enjoy next year's event.

• • •

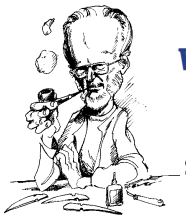
Tony Fiorentino flew this huge 1/2 scale ASW-27 on Sunday.

2ND Annual International JR Aero Tow 2004

June 10-13, 2004
Monticello/Piatt County Airport
Monticello, Illinois

http://horizon.hobbyshopnow.com/articles/1302.asp

This event is expected to draw more than 85 pilots for three days of scale soaring and aero-towing fun. Additional information, registration, and directions are available on the web page shown above.



Jer's Workbench

Jerry Slates
556 Funston Drive
Santa Rosa, CA 95407
RCSDigest@aol.com

Training Techniques

Here at Clearlake in Northern California, the Clearlake Modelers R/C Club sets aside the first Sunday of each month and call it Sailplane Sunday.

Sailplane Sunday in April turned out to be an absolutely beautiful day for flying. The winds were 0-5 mph out of the east, shifting around to the north. The sun was on our backs and the temperature was in the low 80's at ten o'clock in the morning. Not bad for the month of April!

Doug Skjerseth, President of the club, spent most of this beautiful day instructing two new club members, Dave McGhee and Stev Feuerbacher, about sailplane soaring. Doug explained how and why a sailplane flies, the controls, radio, and buddy cord set-up.

Having explained the basics, the first thing that needed to be done was to set up the high start. Doug said, "If you want to learn to fly, you also need to learn how to set up the high start." And, so they did.

Once the high start was set up, it was onto the flying. First up was Stev. Another club member, Gino Ferrario, helped by launching. Using the buddy cord system, Doug flew the plane off the launch and then turned the controls over to Stev. While Stev was flying, Dave retrieved the line (retrieve one, fly one). As the model neared the ground, Doug took over the controls, landing the model nearby. Dave flew next, with Gino launching and Stev retrieving. After round one, Doug, Dave, and Stev discussed their flights.

They repeated these steps for two more rounds. For round 4, however, Dave launched for Stev and Stev launched for Dave.

Dave McGhee is working on body language.

Stev Feuerbacher, doing the first launch for Dave McGhee.

They went on to fly 9 rounds and I believe that they had a really good time! One of the reasons was because Doug spent a great deal of time with them, carefully explaining all the basics needed in order to learn how to fly.

Doug's parting words? "Next week, the winch!"

Thanks, Doug, a day well done!

• • •

Stev Feuerbacher (L) - Student
Doug Skjerseth (R) - Instructor

Dave McGhee (R) - Student
Doug Skjerseth (L) - Instructor

The organic Alula silhouette contrasts beautifully with the overhead cloud base.

(L) Michael Richter shows off his brand new Alula (prototype #1) on the hillside behind his home. The maneuverability of the relatively small Alula makes it possible to fly around trees, shrubs and other obstacles in search of light lift.

on the Wing

P.O. Box 975
Olalla, Washington
98359-0975
bsquared@appleisp.net
http://www.b2streamlines.com

As regular readers of *RCSD* know, we wrote a kit review of Michael Richter's Weasel and miniWeasel just over a year ago. We were impressed with the quality and completeness of the kit contents, the ease of construction, and the ruggedness and performance of the completed aircraft.

While writing the review, we were of course in contact with Michael Richter. In one piece of correspondence he included a photo of a test vehicle he had designed which sported forward swept wings and a fixed fin at the end of a long slender boom. Its rather unique planform intrigued us, and we encouraged Michael to put out a kit. (The photo appeared in the article.)

We're eagerly awaiting the appearance of that design, but in the meantime Michael has developed another sloper with forward swept wings named Alula. Steve Lange, Richter R/C enthusiast, placed some photos and a brief description of Alula on the <flyWeasel> Yahoo group, and we immediately contacted Steve in an effort to obtain more information.

Alula is a compact lightweight EPP foam machine with forward swept wings which excels at "slermal" (slope thermal) flying. The very light wing loading, maneuverability, and small size make it ideal for taking advantage of light lift conditions and tight spaces.

With that as background, we turn over this month's edition of "On the 'Wing..." to guest author Steve Lange.

Alula Prototype #2 Specifications:

Wingspan:	32in. (813mm)
Wing Area:	217in.^{2} (14dm)
All Up Weight:	3.5oz. (100g)
Wingloading:	2.3 oz./ft.^{2} (7g/dm)

Links:

Richter R/C, Michael Richter
1250 Northridge Rd.
Santa Barbara, CA 93105
http://www.dream-flight.com/

flyWeasel Yahoo! Group:
http://groups.yahoo.com/group/flyWeasel/

Short Alula flight movie (2.5MB, Quicktime .MOV format):
http://sbslopers.org/movies/alula/project_alula.mov

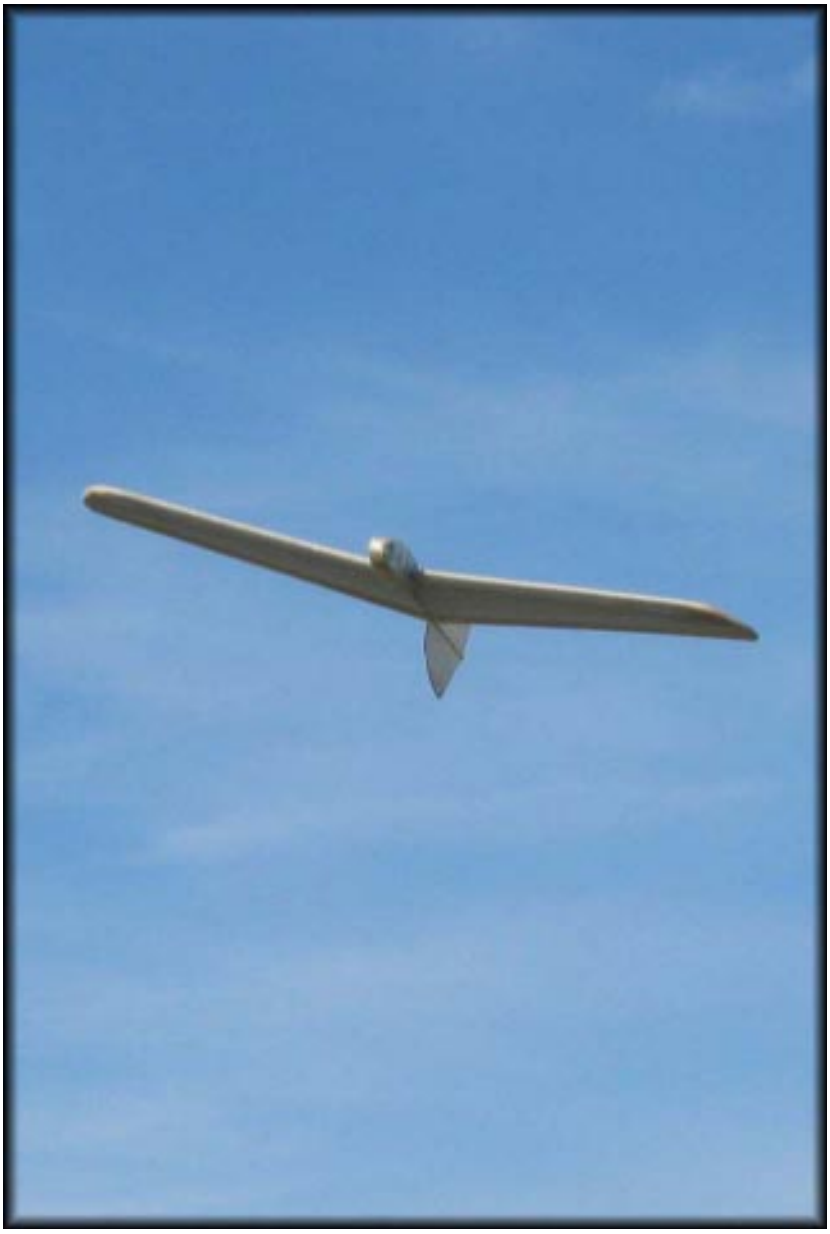
INSIDE THE RICHTER R/C SKUNKWORKS: PROJECT ALULA

by Steve Lange

One of the great things about living in the same town as Michael Richter is that you get to go over to his shop and take a peek at what he's working on. Usually he's busy filling Weasel-pro and miniWeasel orders (see *RCSD* 2/03 for details), but from time to time he gets a break in the action and a chance to do some R&D. That's when the REAL fun begins!

The latest creation to come out of the Richter R/C "skunkworks" is an ultralight tailless forward swept EPP glider named the Alula, scheduled for release in the early summer. If you consult your dictionary, you'll see that the word "alula" refers to the thumb feathers on the leading edge of a bird's wing. These feathers serve a similar function to the leading edge slats used on full size aircraft, helping to delay the onset of a stall and keep the airflow attached to the wing surface. Given the impressive low speed performance of the Richter R/C Alula, this name suits Michael's newest glider perfectly.

The Alula is a classic example of a designer "scratching an itch." Michael enjoys flying small tip-launched gliders around his home in the foothills of Santa Barbara, where his backyard frequently enjoys a soft up-canyon breeze and small



On final approach, the Alula looks very bird-like. Slow speed behavior is exceptional.

Steve Lange's plane, prototype #2, with some super-extra-custom Sharpie penwork providing the Alula "logo."

thermals. On the downside, there are tall trees and scrub brush everywhere, making retrieval of downed planes a non-trivial affair. Having a durable and highly maneuverable glider is of key importance when your landing pattern frequently involves a downwind approach beneath a tree branch, over a creosote bush and touchdown in an outstretched palm!

Happily, the same features that make the Alula an outstanding performer in Michael's backyard also make it great for ultralight slope lift and slermal (slope thermal) conditions at "normal" flying sites. The forward swept planform is incredibly agile, allowing the pilot to slow forward flight to nearly a walking pace without any fear of stalling. Steeply banked 180° turns can literally be done around a wingtip. It also makes for some of the prettiest thermal turns you're ever likely to see from an R/C glider; high in a thermal, the Alula looks much more like a small soaring bird than an airplane.

Like the rest of Richter R/C's offerings, the Alula is made from EPP, with one major difference: except for the competition grade balsa elevons, it is not taped or covered in any way. Leaving the airframe uncovered results in two immediate benefits: the plane's all up weight is significantly reduced, and building time is cut by half or more. At the low Reynolds Numbers at which the 32" wingspan Alula operates, it is questionable whether or not the rough surface of the raw EPP actually inhibits performance; it may actually improve it. Since the plane is so light (3.5oz./100g AUW) durability remains good. My prototype has been flying regularly since the end of 2003 and it is still going strong.

The Alula uses similar construction techniques to the Weasel-pro and miniWeasel. The wing halves are joined using Weldwood contact cement or 3M77, the carbon spars are installed using thin CA, and the servos are held in place with a dab of hot glue. The fin, a unique symmetrical design that extends both above and below the wing like the NCFM Bluto, is made from Depron and features its own carbon spar. As mentioned above, the elevons on my prototype are competition grade balsa and covered in packing tape (the production version may feature Depron elevons; the design is still being finalized).

Michael and I have been flying our prototypes using the same submicro gear that the miniWeasel employs. My prototype uses two Cirrus CS-5.4 servos, a Cirrus MRX-4 Mk.1 single conversion receiver, and one of Michael's 150mAh NiMH battery packs. With that setup the Alula can be flown continuously for a little over an hour. As mentioned, the AUW with this gear comes out to about 100g, which results in a wingloading of approximately 2.3oz./ft.^{2} (7g/dm).

As most of our flying sites here in Santa Barbara feature hills of one sort or another, I have yet to test the Alula in truly flat field conditions. Tip launches are not exceptionally high, probably averaging about 40 feet. Obviously the Alula is not meant to compete with 1.5m handlaunch gliders; its forte lies in the ability to be flown in cramped locations where maneuverability and durability are key, as well as slermal and ultralight slope conditions. Low cost will be another attractive feature; Michael has indicated the kit will most likely retail for less than US$50.00. That will make it less expensive than any other EPP SAL glider on the market with the exception of the miniWeasel.

Overall, I've been very impressed by the Alula's performance, and especially its durability. I expected the uncovered plane to be much more fragile, but so far it has held up to my abuse extremely well. The forward swept planform looks cool, and more importantly it works. I have yet to see anything that is as maneuverable and controllable at low speeds and in tight spaces as the Alula. It outclasses both the Weasel-pro and miniWeasel in this regard, and has definitely become one of my favorite airplanes. Hopefully, the Alula will meet the desires of the many Weasel-pro and miniWeasel owners who have been clamoring for a more thermal-oriented airplane. I know I'm satisfied!

This photo demonstrates some of the difficulties inherent to flying around Michael's house, especially if you have reflexes which are a bit slow. This Alula, one of Michael's prototypes, is still flying, and very well!

• • •

TECH TOPICS

Dave Register and Bob Peck
Tulsa, Oklahoma

Gorilla Glue Anyone?

Just when you think you've seen all the adhesives you can handle, something new comes along. First it was acetate, then Elmers, carpenters, epoxy, cyanoacrylate (CA), various types of contact cement and hot melt. Now we're into Gorilla Glue.

You may have seen this stuff on the shelf at your local hardware store - a dark brown plastic bottle with a picture of a hairy ape on the label. What in the world do we do with it?

Turns out, there may be quite a few uses for this adhesive. As more modelers become aware of this product, we'll probably learn more. For now, let's do a brief run through of what we've learned so far.

Gorilla Glue is a type of polyurethane (Polymeric MDI). You can learn all the technical details and many application hints from their website:

http://www.gorillaglue.com

You can also download an MSDS sheet (Material Safety Data Sheet), which is a good idea for understanding any potential hazards. After looking over this sheet, the precautions are similar to many of the adhesives we commonly use – avoid skin and eye contact, good ventilation, etc. Unless you have a specific allergic reaction to this material, it appears to be appropriate for general modeling use.

What's so special about it? Well, it claims it grabs everything. It won't dissolve in water once it's cured. It seems to be resistant to alcohol and mineral spirits, also post-cure. It foams to fill gaps if there's a bit of humidity or moisture while the polymerization process cures.

Bob Peck, our TulSoar president, first started using this adhesive for EPP slope ships. If you've worked with EPP, the adhesive choices are limited. Epoxy works (sort of) but can be brittle. Silicone won't grab EPP very well at all. Contact cement (3M77 in particular) is good but the carrier can eat the foam. Goop is probably best since it grabs the foam pretty well and is not brittle when it cures. Goop will mildly attack EPP if you put it on too thick.

Gorilla Glue seems to address all of those problems. It's got a very tenacious grab when first applied. Unless it foams too much, it retains some ductility when it cures. When it foams into a gap, it fills the area very nicely. The excess foam can be trimmed and/or sanded easily.

Bob's suggested experiment is shown in the first set of pictures. We took three pudding cups (great for mixing resin for wing bagging, by the way) and added the same amount of gorilla glue in each. The first cup just had the glue, the second was lightly wiped with a wet brush and the third had liquid water mixed with the glue and then the excess left in the cup.

The humidity in the air will cause some foaming (cup #1), but a slight amount of moisture will help 'kick' the foaming reaction (#2). A lot of water results more foam and a somewhat brittle material (#3).

I've tried three applications so far that work nicely – wood spars in an EPP Gentle Foamy, gap filling in the wing saddle of an EPP Foam One-2 and Nyrod installation, also in EPP. Although the applications are quite different they all seem to be suitable.

For the spars, a moist acid brush was used to leave a bit of a water coating in the EPP spar groove. Gorilla Glue was applied to the spar and then pressed into the slot. The excess material that splooged out was mopped up with rubbing alcohol. The spar was covered with Saran, a metal straight edge was placed over the saran and then a few bricks on the straight edge. Three hours later I had a very well glued and gap filled spar installation.

For the Foam-One, I wet down the pine mounting board in the fuse, squirted on an excess amount of glue, and screwed the wing in place. The bolts had been waxed. Saran was taped to the bottom of the wing. The next morning I had a pretty nice wing saddle!

For the Nyrod application, two rods were glued into a scrap of EPP. Both channels were routed with a 0.125" Dremel router bit, wet down with the acid brush and Gorilla Glue squeezed into the slot. The Nyrods were pressed into the slots and rotated a bit to spread the glue.

In this experiment, one rod was wiped with alcohol while one was sanded to roughen the surface. After achieving a full cure, both rods were ripped out of the foam. The smooth rod had reasonably good adhesion but the roughened rod was REALLY stuck in the channel and pulled out quite a bit of foam.

A few things to note:

This glue seems to grab best when it is first applied. After it begins to foam it doesn't seem to stick very well.

The foam that squeezes out and freely expands is easy to carve and doesn't stick to monokote, saran or just about any smooth, low porosity surface.

It takes 30 minutes or so for the foam reaction to really 'kick' so you have a decent working time with this adhesive.

If you maintain tight gaps, the foam will only expand into the little nooks and crannies. This stuff isn't like household foam that will lift the Queen Mary. It just seems to fluff into the extra spaces and then pretty much stop.

I'm sure there are some great applications for this material in other types of construction. For now it looks pretty good on EPP. If it can grab EPP it can grab just about anything.

Gorilla Glue is available in Lowe's, Home Depot, etc. It looks like it's a nice complement to the other adhesives we use. Bob and I like what it does with EPP. And it cleans up reasonably well with isopropyl alcohol.

And just imagine – you could be the first at your hill or field to be flying an 800 gram Gorilla!

• • •

GORDY'S TRAVELS

Gordy Stahl
Louisville, Kentucky
GordySoar@aol.com

Going Up? Understanding Sailplane Surfaces

I travel a lot and I get to talk to a lot of sailplane pilots. The one thing I have noticed is that while there are some great thumbs out there, not many guys really understand what does what on their sailplanes.

If you have been following my travels this season, you've probably noticed that I have been writing about what does what well. And this month, we'll start with a quiz question!

What single sailplane control surface causes a clean directional change?

Aileron?
Rudder?
Flap?
Elevator?

Aileron is not correct. It causes the sailplane to roll on the axis of its fuselage, no directional change, clean or otherwise.

It is not Rudder, either! While Rudder does cause a directional change, calling it clean is a stretch, because in fact it also causes roll and yaw, as in spiraling toward gravity's source.

If you chose Flap, you're getting close! Flap does cause a pretty close to clean directional change but, in fact, while it does cause some 'up' nose pitch, it mostly causes the entire model to change its place in space. Sort of like changing the model from one shelf to another.

If you chose Elevator, then you got it! Whether we are talking model or full size, flying wing, biplane, conventional tail or V-tail, it's Elevator that makes the sailplane's nose go cleanly up or down. That's a directional change! Now to make the sailplane go right or left, the model's attitude has to first be changed using aileron or rudder; then the 'turn' is executed with elevator, and ended by using aileron or rudder to bring the model's attitude back to level to end the 'turn.'

So having said all that, why was I able to control my Pike Superior with little problem when my elevator servo unplugged immediately upon release from my hand? Even though I had little problem while working lift off the winch, little problem bringing it in for a smooth controlled landing?

Sure I am a superior RC sailplane pilot, but without elevator, as in the elevator was stuck in neutral, I was not in complete control of my sailplane.

Here's what happened. I flew the first round with no problem, but the night before I had been futzing with installing ballast into the fuse and must have loosened the elevator servo plug into the RX. The second launch, I pumped up tension on the winch line, then let the Pike spring out of my hand. That force was enough to shift the Rx backwards and dislodge the elevator's plug. The elevator stayed at neutral and the model went up the line. It didn't take long to note that the elevator was not responding, and that I couldn't dip into the bucket to build speed for the zoom release, so I simply let off the winch and the Pike floated level off the line.

It was clear that rudder, aileron, and flaps were working just fine, just no pitch from elevator. Considering my appreciation for what I feel is maybe one of the top two molded TD ships on earth today and the love I have developed for it, you can imagine my shock and awe at the prospect of losing that plane.

It was clearly time to engage brain, and quickly. Did I mention the wind was blowing 15mph steady with gusts up to 25mph? That kind of complicates things, even WITH elevator function!

As I mentioned earlier, I had tested rudder and aileron and, while they were doing what they do best, the Pike was starting to follow its nose down, so I had to try something else. I remembered that with landing flap, down elevator compensation keeps the nose from pitching up, and the model in general from rising. So I tried pulling some flap, and the Pike pitched up sharply to a stall!

Okay so I also had pitch control! However it was very touchy; a slight amount of flap stick caused pretty radical up pitching action, so it took some reprogramming of my left thumb to get my Pike under smooth control. Course all that wind didn't make it easy, but the important thing was it worked!

I flew it around getting the feel, and found that there was a lot of lift coming through, so getting it down was work. After landing it, I realized that I landed at about a minute thirty seconds, instead of the 5 minute task the round called for, which put me well out of the winner circle. If I would have understood what did what, with all the lift that was present, I'd have had no trouble making my time, even if it would have been unlikely that I'd have aced the landing without elevator compensation.

Next time out at the field, when

your plane is about four dumb thumbs high, leave your elevator alone and fly around just using your flap stick for pitch control. Get comfortable with it and practice, without using elevator. Use rudder and flap, use aileron and flap. I guarantee that you will have a lot better understanding of what does what, when it comes to your control surfaces.

Next trip? Traveling the contest trail with the Pike Superior.

• • •

FAI News 04/04
Fédération Aéronautique Internationale
The World Air Sports Federation

What follows is information about FAI, and excerpts from their newsletter, thanks to a forward by B2.

Nice to know

The FAI Recommended Museum Program recognizes museum collections of an aeronautical nature which contribute to furthering the education of the public in the history and practice of air sport, aeronautics and astronautics.

<http://www.fai.org/education/museums/ Information / Conditions
<http://www.fai.org/press_releases/2004/documents/fai_rec_museums.pdf

Links

FAI Homepage <http://www.fai.org>
Sporting Calendar <http://events.fai.org>
World Records <http://www.fai.org/records>

About FAI

The Fédération Aéronautique Internationale (FAI), the world air sports federation, was founded in 1905. It is a non-governmental and non-profit making international organisation with the basic aim of furthering aeronautical and astronautical activities worldwide. Ever growing, FAI is now an organisation of some 100 member countries. FAI activities include the establishment of rules for the control and certification of world aeronautical and astronautical records. FAI establishes regulations for air sporting events which are organised by member countries throughout the world. In achieving these goals, FAI brings together people who take part in air sports from all over the world.

Maynard L. HILL honoured

On 15 August and 27 October 2003, the FAI-News reported on the World Record set by Maynard L. HILL and his crew as their Model Plane crossed the Atlantic Ocean; this outstanding performance has been honoured by *Aviation Week & Space Technology.*

At the beginning of February, the Aviation <http://www.aviationnow.com/ Week & Space Technology Magazine presented its 47th annual Aeropspace "Laurels" selections. Each year, the magazine's editors nominate individuals and teams who made significant contributions to the international field of aerospace during the previous year.

In the category "Aeronautics / Propulsion", Maynard L. HILL has been honoured for "designing and being the first to fly an 11-lb model aircraft across the Atlantic Ocean, re-creating the flight of Alcock & Brown. Hill displayed remarkable tenacity in achieving this goal, making such a small craft have both the range and reliability required while on a shoestring budget, and overcoming poor weather and other hazards. Hill's lifelong efforts in support of model aviation have inspired generations of people attracted to aerospace".

The Voodoo Theory of Battery Maintenance (The Basics of Rechargeable Battery Care.)

by Rick Eckel
raeckel@usa.net

Although a million articles have been written about batteries (and I've read most of them) they usually contain a lot of theory and not enough "how to." This is a simplified (I hope) explanation of the best way to feed and care for your transmitter and receiver packs.

You need to think of charging your packs in three separate ways. When you get a new pack, whether in your new radio gear or a replacement pack, you need to perform a FORMING charge. Once you have successfully formed the battery a BEST charge is what you should use most of the time. An EMERGENCY charge can be used occasionally if you get caught with a low pack at a time when you really want to fly. Lets talk about each of these charge types so that I can clearly define what they are and how they are different.

New packs come from the manufacturer uncharged and often will not take the first charge very well. A number of pilots have lost airplanes to new packs dying quickly because they didn't take that first charge well. So a FORMING charge is required for all new packs. It is a slow deep charge best performed by charging at approximately 10% of the pack's rated capacity for 14 to 16 hours. (For a typical 600mah pack this would be 60 ma. Your charge rate doesn't have to be this exact figure but should be within plus or minus 50%.) This can be done with the wall wart or a specialized charger – your choice. Feel the pack occasionally and see if it is getting warm. It should get warm toward the end of the time limit. If it doesn't get warm stop the charge anyway, discharge the pack, and do another forming charge. You should do at least one forming charge and probably a maximum of three. It is dangerous to fly a pack after only one forming charge. Trying to fast charge a new pack before properly forming it can make it difficult to fast peak charge reliably in the future and seriously shorten its useful life.

It is also good to do a forming charge occasionally throughout the life of a pack. Nicads have a tendency to charge and discharge unequally when fast charged and they can slowly form a 'weak' cell (one that is not fully charged even though the pack 'peaks' in the other cells). The forming charge will level up the charge in all cells and keep the pack capacity up. I suspect that it is this uneven cell level that is often misidentified or referred to as 'memory effect'. In any case a forming charge every 6 months or so will keep the pack in sync.

Both the BEST charge and the EMERGENCY charge are considered fast charges. They should only be performed using a good peak-detecting charger that will shut off automatically. When the charger shuts off the pack should be noticeably warm. If it is hot but you can close your hand around the battery it is still ok but not ideal. If it is still cool you might want to be suspicious as to whether it accepted a normal charge or not.

The BEST charge uses a peak detecting charger set at about 25% to 35% of the pack's rated capacity. (For a typical 600mah pack this would be 150ma to 210ma.) For a full charge the peak charge should take about four hours and then trickle charge for a total time of 5 to 6 hours. Most good peak chargers automatically switch to a trickle charge after the pack peaks. This brings the pack up to full capacity in a reasonably short amount of time and provides good longevity for the cells.

The EMERGENCY charge is for when you really need to get an almost depleted pack into action as soon as possible. This charge uses a peak detection charger set at 200% (nicads) or 100% (nimh) of the pack's rated capacity. (For a typical 600mah pack this would be 1200ma or 1.2 amps for the nicads or 600ma-0.6 amps for the nimh pack.) This is not dangerous and doesn't hurt the cells if you have a good peak detecting charger and your packs are in good shape. It really doesn't provide a full charge since the cells don't have time to absorb and diffuse the charge throughout the cells. But it provides what looks like a full charge and plenty of flying time. For nicads the emergency charge should take about 30 minutes from empty to cutoff. Nimh packs will take 60 minutes. Normally, it will be quicker than this since you won't start with totally depleted cells.

Don't run your nicads or nimhs down for storage. Just put them away in a cool dry place and do a forming or best charge every one to two months. If you forget and they go depleted no harm will be done, just be sure to best charge and cycle them once the next time you go to use them. The absolute worst thing you can do to batteries is to leave them on any so called "trickle" charger for long (weeks) periods of time. It kills them. (I don't care what the advertising says. Trust me on this.)

A trick you should keep in mind, even if you never use anything but a wall wart to charge your batteries, is that when a pack on charge gets warm it is done. Packs do not warm while they are being charged. They don't warm until they are full. When they are full the charge current

begins getting converted to heat and thus the pack warms up.

Remember:

- Forming Charge = 10% of rated capacity (trickle charge) for 14 to 16 hours (i.e., a 600mah pack would be charged at 60 milliamps – 0.060 amps
- Best Charge = 25% of rated capacity peak detected plus 10% charge for 3 to 4 hours (i.e., a 600 mah pack would be charged at 600 milliamps – 0.600 amps.)
- Emergency Charge = 100% (nimh), 200% (nicad) of rated capacity using a good peak detecting charger (i.e., a 600 mah nimh would be charged at 0.6 amps. A 600 mah nicad would be charged at 1.2 amps.)
- Never trickle charge for long periods.

Whether or not you agree with my exact charge rates I think you will agree that viewing charging in this way will add to the life of your cells and avoid a lot of battery problems during your flights.

• • •

THE WINCH SCENE

E-MAIL

Our Contest Winches

from Dave Register
RegDave@aol.com

One thing for US winches, the drum design is actually a little tricky. If it's too narrow the line will pile up and start loading down the motor at the top of the launch. If it's too deep, you don't get enough pull at the start. Both the Rahm and the McCann winch drums do a good job of compromising on this. Don't know about others but it's something to consider for U.S. TD contests.

Our contest winches have 3 large 12 V batteries in parallel for the winch and two 6V in parallel for the retriever. Large copper knife switches for cutouts. We also replaced the bushings with the Real Balls bearings and they made a big difference. You also need to replace the brushes to get the most out of them as well.

All of this adds to weight so we've gone with trailers which can be towed to the field and then pushed out to the setup area. A bit of work to build them but they give years of service this way.

Industrial strength winch picture attached for reference. The tool box on the trailer is very handy for landing lanes, spare parts, tapes, line, tools, etc. A staked down hoop about 10 ft. out from the retriever is essential to keep it working properly.

THE WINCH SCENE

E-MAIL

Australian Winches

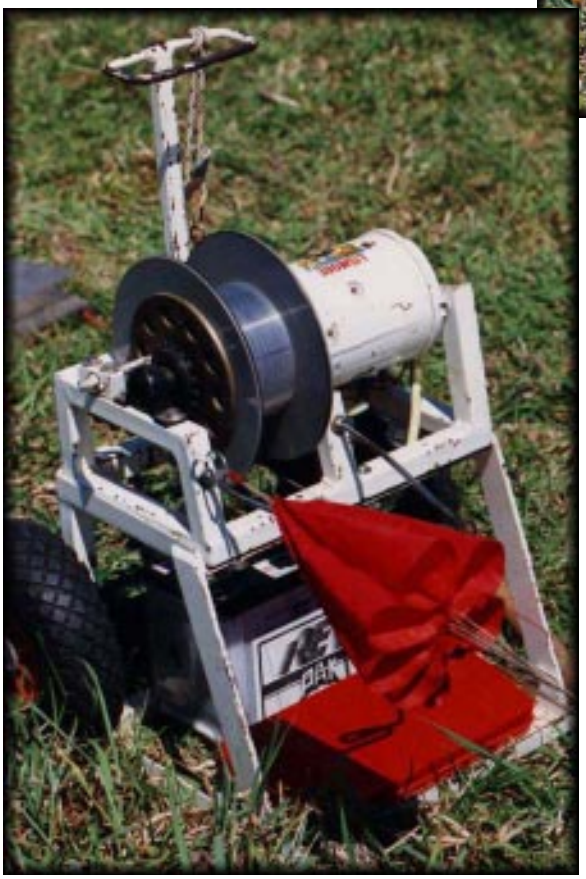
from B2
bsquared@appleisp.net

We were impressed by the Australian winches because each was individually made - no two were the same. Some were low slung, others lifted the line off the ground, some had removable wheels, some had large diameter drums... All were portable. There are a lot of ideas to be garnered from them, as can be seen by the three examples we've included with this message. (The images are relatively low resolution, 150 dpi, and 50% JPG compression.)

Spool diameter is a dimension which can be whatever the designer wants. You can use braided line on any of the winches we saw. There's no reason separate retrievers cannot be used. The chain or sprocket brake is a viable option for winches not attached to retrievers.

Seattle Area Soaring Society

SASS (Seattle Area Soaring Society) has their club winches stored in a shipping container on the field. The winches are mounted on trailers which can be towed with a hitch, but there have been times when it's been dragged across the field by hand. Winch, retriever and extra batteries are all on the trailer, along with useful tools, leather gloves, etc.



WINCH SAFETY TIP

by Dave Garwood

One of the great horror shows of winch launching is a "runaway winch," a condition where the winch motor remains energized after the pilot removes his foot from the footswitch. This can happen more often than you might think, because a common failure mode of the automotive current-switching solenoids is "contacts welded together" and the high-amperage current continues to flow to the motor, even though the low-amperage control circuit is now open with the pilot NOT tapping the foot switch.

A runaway winch can pull a sailplane into the ground at high speed in a short time. When this happens, it takes a quick-thinking and agile pilot to pull up and disengage the tow ring, and even so, it's a high-adrenaline moment, the sailplane is launched prematurely, possibly at an unusual attitude, while the winch still furiously pulls in line, creating the rat's nest of the season on the reel. On a lightly built sailplane, a runaway winch can quickly fold the wing. People who have witnessed this event do not forget it easily.

I've seen three strategies used to reduce the hazard:

1. Install a cut-off switch in the high-current circuit. Suitable switches are available from boating and recreation vehicle suppliers.

2. Install TWO solenoids in the high-current circuit. They are wired in series, so that if one welds itself closed, the other may continue to function and open the high-current circuit and stop the motor when the footswitch is released.

3. Replace the solenoids each flying season. New solenoids are less likely to fail than old solenoids (less accumulated damage from internal arcing, return spring stronger).

For maximum safety, it makes sense to incorporate all three strategies, and to have each pilot using the winch, practice using the cut-off switch. Does this "extra" equipment seem costly? Consider the value of the sailplane you are launching.

"Safety is No Accident"

• • •

Safety Tip

from B^2
bsquared@appleisp.net

One more switch that can weld shut is the foot switch. We had this happen at a Wednesday night fun fly last summer. Folded the outer wing panel of non-ARF Bird of Time. Everyone thought it was the solenoids, but the winch shut down as soon as the foot switch was unplugged.

Andrew Mileski has a dual light system described in one of his links which shows when the solenoids are operating correctly and when they're not. Uses LEDs. Otherwise one solenoid can already be welded shut and go undetected until the second does the same thing.

Andrew Mileski:
http://isoar.ca/~andrewm/rc/winch

An Old Winch

by Jerry Slates
RCSDigest@aol.com

This winch was manufactured by Ted Davey at Davey Systems Corp. in PA some 40 years ago. It was state of the art in its time. It has an angel iron welded frame, drum mounted on a live axle, and is belt driven by a car starting motor.

I still use the winch today if I don't have to carry it too far. The winch frame and motor weighs 38 lb.; the battery weighs 51 lb.

E-MAIL

Single Winch Design

from Gordy Stahl
GordySoar@aol.com

There is a reason that we have settled on a single winch design (90%). Actually a bunch of reasons, uniformity being the most important. When I show up at a contest, I know what the winch will do, how the line reacts, how the brake works, how much my wings will be loaded using the same pulse rhythm as I do at home, in Dallas, in Lancaster or in Visalia.

Safety is the next big factor. I know what to do with every winch that I come across if the solenoids get stuck, or the line gets crazy.

Everyone who gets enough experience and interest in the hobby to be ready to have their own winch, dreams of the 'ultimate winch': electronic braking, electronic variable speed and torque control, load sensing, etc. Then, of course, the line is next thing to be 'improved.' We quest for some spectra fibre, or kevlar line, which weighs nothing, creates no drag, doesn't tangle and never breaks.

But in the end, we realize that nothing else is 'needed' because all we need is lift, the same lift at every place we fly.

For awhile we had belt drives, special motors and different drum center shapes and diameters. The NATS used a super powered version of our 'standard' winches and that resulted in hundreds of sailplanes being destroyed over the years. They were works of engineering masterpieces, a little too good.

Competition soaring guys, that is F3B and F3J pilots, all have a standardized FAI spec'd winch, made by one guy in NZ. No retrievers, because FAI doesn't allow them. I flew in Sydney and Melbourne, and I saw 23 winches and every one was identical to the others, whether the guy was flying a Spirit RES or a Pike Superior. Clubs are careful to direct new members to get or build a 'standard' winch.

Last year, we received a simple e-mail request:

"I'm trying to find a place to buy a sailplane winch without much luck, could you please help?"

That request which was answered behind the scenes and Mike Garton's recent column in the May 2004 issue of *Model Aviation*, triggered a series of e-mail messages among the authors and columnists of *RCSD*.

The outcome was the creation of a new column called "The Winch Scene." It will pick up where Mike's column left off, providing more detail where it's available.

To kick it off this month, we're sharing several of our e-mail messages and an article written by Dave Garwood. We encourage anyone who has a hint, tip, photo or suggestion on the subject of winches to send it to <RCSDigest@aol.com>.

Judy Slates
RCSDigest@aol.com

E-MAIL

Thoughts on Australian Winches

from Gordy Stahl
GordySoar@aol.com

Australian winches are F3B winches, completely different than anything used in the USA except for F3B task flying. They use them for winch powered F3J contest launching over there, too.

So it is important to point out the differences:

No belt braking which can allow line to be released back into the air for 'kiting' launches. Instead they use a chain brake, or pin lock system which does not allow any release of line, unless the brake is undone for bringing the parachute back for relaunch.

No chance of using a retriever as is the norm in the USA (except for Man On Man TD comps).

Monofilament line instead of our braided line. Theirs stretches a lot which gives a more slingshot release.

Smaller diameter drum than the USA winches and the motor is restricted with resistors to limit the winch power to a very specific and uniform speed and torque.

joiner rod: $R = (a F b / 2 \pi \Sigma)^{0.333}$

joiner blade: $w = 0.75 a F b / h^2 \Sigma$

R = rod radius (inches)
w = blade width (inches)
h = blade height (inches)
a = load factor (see below)
F = winch load (lbs)
b = span (inches)
$\pi = 3.14159$

Σ = maximum allowable material stress

= 5000 psi spruce
= 40000 psi 6061 aluminum
= 55000 psi 2024 aluminum
= 70000 psi 7075 aluminum
= 80000 psi mild steel (varies widely)
= 100000 psi pultruded carbon fiber with nick safety margin
= 150000 psi pultruded carbon fiber
= 180000 psi piano wire
= 250000 psi hardened steel

The Σ values are typical at yield or failure.

The load factor "a" accounts for the spanwise location of the joiner, and also for the type of spanwise load distribution expected. Almost all glider wings will be somewhere between the two values in the 2nd and 3rd columns, depending on the amount of taper and washout under load.

τ = fractional spanwise location of the joint
a_{uni} = "a" factor for uniform loading
a_{ell} = "a" factor for elliptical loading

t	a_{uni}	a_{ell}	
0.00	1.0000	0.8488	root
0.05	0.9025	0.7520	
0.10	0.8100	0.6615	
0.15	0.7225	0.5774	
0.20	0.6400	0.4996	
0.25	0.5625	0.4280	
0.30	0.4900	0.3626	
0.35	0.4225	0.3032	
0.40	0.3600	0.2498	
0.45	0.3025	0.2022	
0.50	0.2500	0.1603	
0.55	0.2025	0.1240	
0.60	0.1600	0.0929	
0.65	0.1225	0.0669	
0.70	0.0900	0.0458	
0.75	0.0625	0.0292	
0.80	0.0400	0.0168	
0.85	0.0225	0.0082	
0.90	0.0100	0.0030	
0.95	0.0025	0.0005	
1.00	0.0000	0.0000	tip