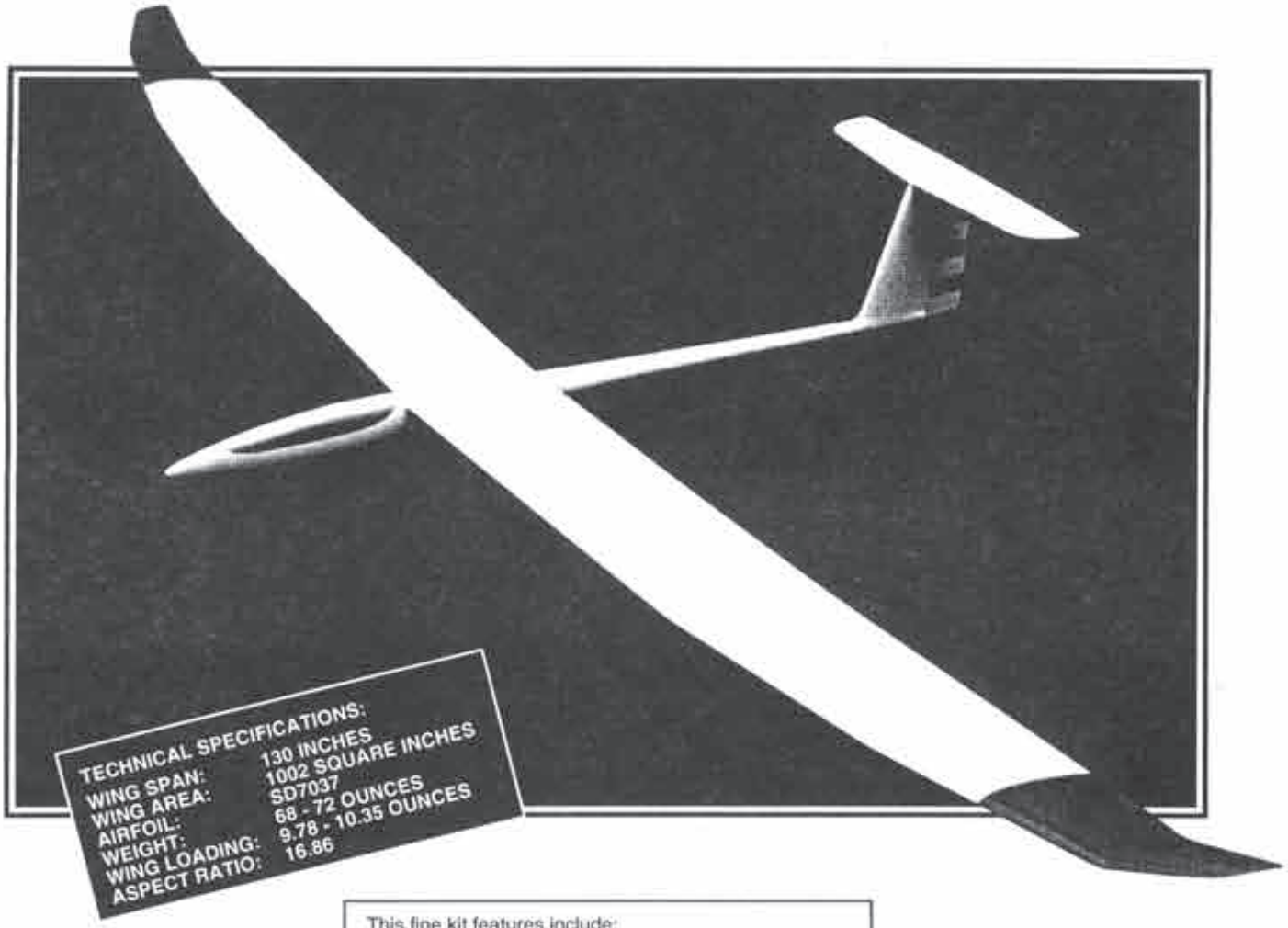
September, 1999
Vol. 16, No. 9
U.S.A. $3.50

R/C Radio controlled SOARING DIGEST

THE JOURNAL FOR R/C SOARING ENTHUSIASTS

PREDATOR XL

A WORLD CLASS ORIGINAL DESIGNED BY DAVE HILL



TECHNICAL SPECIFICATIONS:

WING SPAN:	130 INCHES
WING AREA:	1002 SQUARE INCHES
AIRFOIL:	SD7037
WEIGHT:	68 - 72 OUNCES
WING LOADING:	9.78 - 10.35 OUNCES
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R/C Radio controlled SOARING DIGEST
THE JOURNAL FOR R/C SOARING ENTHUSIASTS

1999
MONTAGUE
CROSS COUNTRY CHALLENGE
SISKIYOU COUNTY AIRPORT
MONTAGUE, CALIFORNIA

Photography by Dean Gradwell,
Jacksonville, Oregon.

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, model designs, press & news releases, etc. 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* was founded by Jim Gray, lecturer and technical consultant. He can be reached at: 210 East Chateau Circle, Payson, AZ 85541; (520) 474-5015, <jimpeg@netzone.com>.

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TABLE OF CONTENTS

OTHER GOOD STUFF

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Subscription Information
Highlights & Mailing Status of the Current Issue
RCSD Feature Columnists, Reporters, and Editors
..... E-mail/web addresses, plus general information about their areas of interest.
"Building Along" Construction Aids
..... **Modifying & Building the MB Raven (Parts 1-3)** ..... Bill & Bunny Kuhlman
..... **1/5 Scale Pilatus B-4** ..... Jerry Slates
..... **Low Tech Design & Construction - RES Model** ..... Coming Soon
..... **1/12 Scale U-2R/TR-1** ..... Coming Soon
Links to Clubs & Organizations
Hot Topics
Event Coverage (Color Photography!)
"In the News" - A compilation of news items of interest to soaring enthusiasts.
On-Line Articles - Great articles originally written for the printed version of *RCSD*.
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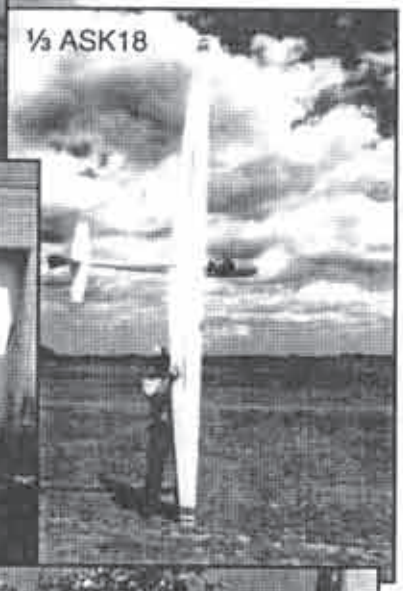

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The Soaring Site

TNT

In the news from Texas, Texas National Tournament (TNT) 1999 Dallas Fly-In Grand Champion in Open Class is Jim McCarthy flying an all molded Psyko. Tom Meeks placed 1st in hand launch flying a Carl McBurnett Bludartar. The event ran smoothly; congratulations to the Soaring League of North Texas!

"Model Aircraft Aerodynamics"

What follows is an update from Martin Simons on how to obtain one of his latest editions.

"I have been asked to give details of the new edition of my book, "Model Aircraft Aerodynamics", and how to get hold of it if you want it.

One way you can get free access to the book is to ask your local public library to buy one copy. The full details which will be needed are:

Author:	Martin Simons
Title:	Model Aircraft Aerodynamics (Fourth Edition)
ISBN:	1-85486-190-5
Publication date:	June 1999
Publisher:	Nexus Special Interests Ltd. Nexus House, Azalea Drive, PO Box 2, Swanley, Kent BR8 8HU, England
Price:	Approx 11.00 pounds Sterling in UK
Pagination:	Total 344 pages, preface, 15 chapters, 3 appendices, bibliography, index

"I note that the book is listed on the www by Amazon.co.UK. It may be bought by e-mail from them. The American division of Amazon do not seem to have the new edition listed yet but I suppose they will if someone orders it through them. I don't know how long they take or what the postage and packing costs would be. Alternatively, the publishers will sell copies by direct mail order. I have also heard from the publisher, Nexus, that my book is available from Motor Books International of Osceola. Their unique product code number is 129261. Nexus also assure me that the book is available from Barnes & Noble.

"I have often bought books from English booksellers by mail, phone or e-mail and this seems to be both easy and relatively cheap. Try The Aviation Bookshop, 656 Holloway Road, London N19 3PD, England. (International phone number +44 171 272 3630.)

"The fourth edition comes twenty one years after the first was published. It remains, as far as I know, the only book of its kind in the English language. The reason may be that no one else has been mad enough to try to cover the whole field in one text. Every kind of model aircraft is included except airships, balloons and parasails. Sailplanes perhaps get more than their fair coverage because of my own particular interests, but the others are all there too with chapters on propellers and helicopters.

"The new edition has been completely re-set and professionally redesigned with a larger page size and very much better layout and appearance, with photographic illustrations. I have redrawn all the diagrams and simplified a few of them, and some new ones have been included. With help from Dave Johnson, all the 185 aerofoil profiles in the appendix have been re-plotted by computer.

"Compared with the previous, third edition of 1994, several additions have been made, such as short sections on maneuvering near the ground in the wind, dynamic soaring, summaries of the most recent available wind tunnel test data (hysteresis, turbulators, etc.) from Michael Selig's team. There have been a great many smaller changes in detail, some paragraphs have been rewritten or re-arranged for greater clarity and emphasis, and there is a new preface.

"I have not seen any independent reviews of the new edition but Amazon UK publish several of the previous editions. Apparently it gets an average of five stars out of five there. The only adverse comment I have seen has been dealt with in the new edition.

Web Stuff

Modifying & Building the MB Raven, Part 3, by Bill & Bunny Kuhlman is now available for on-line viewing.

And in the news, Mark Nankivil reports that the World Championships 2000 will be held in early August 2000 in San Diego, California. The U.S.A. F5B team members are Jerry Bridgman, Thomas Pils, and Steve Neu. U.S.A. F5D team members are Troy Peterson, Brian Buaas, Arthur A. Adamisin, with alternate Kevin Matney. Photography is available for on-line viewing in the *News* section of the *RCSD* web pages.

For those of you interested in the unfolding of the 1999 F3B World Championships, our web masters have also added the appropriate links, so you can stay up to date easily. This event takes place September 4 - 11 in Rustenburg, South Africa.

And just in, Thomas Bartovsky, Chairman of the RC Soaring Subcommittee, says, "According to the minutes of the CIAM Plenary Meeting, the F3B World Championships 2001 is awarded to the Czech Republic." The event will probably be held in July 2001.

Happy Flying!
Judy & Jerry Slates

Dudley Dufort flew 27.3 miles on 6/12/99. Qualified for 25K pin #01.

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on the Wing

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(Below) Bill and the modified MB Raven at 60 Acres. Despite cloudy skies, the transparent covering is in evidence.

(Left) The modified MB Raven covered and ready to go!

Modifying and Building
The Model Builder Raven
Part 4 — Covering and Flying

As is usual when modifying an airplane, a couple of minor difficulties have reared their ugly heads during construction.

The first of these monsters made itself known after we thought the wing was complete. We found the ailerons twisted a bit too easily. Given their length and size, we anticipated that the covering material would not add sufficient strength. Our solution was to add a $^1/_{16}$" diagonal rib between each pair of existing ribs. This was a tricky proposition, as we did not want to build new ailerons or tear apart the existing set, but we did manage to install them successfully. These diagonal ribs have cap strips installed.

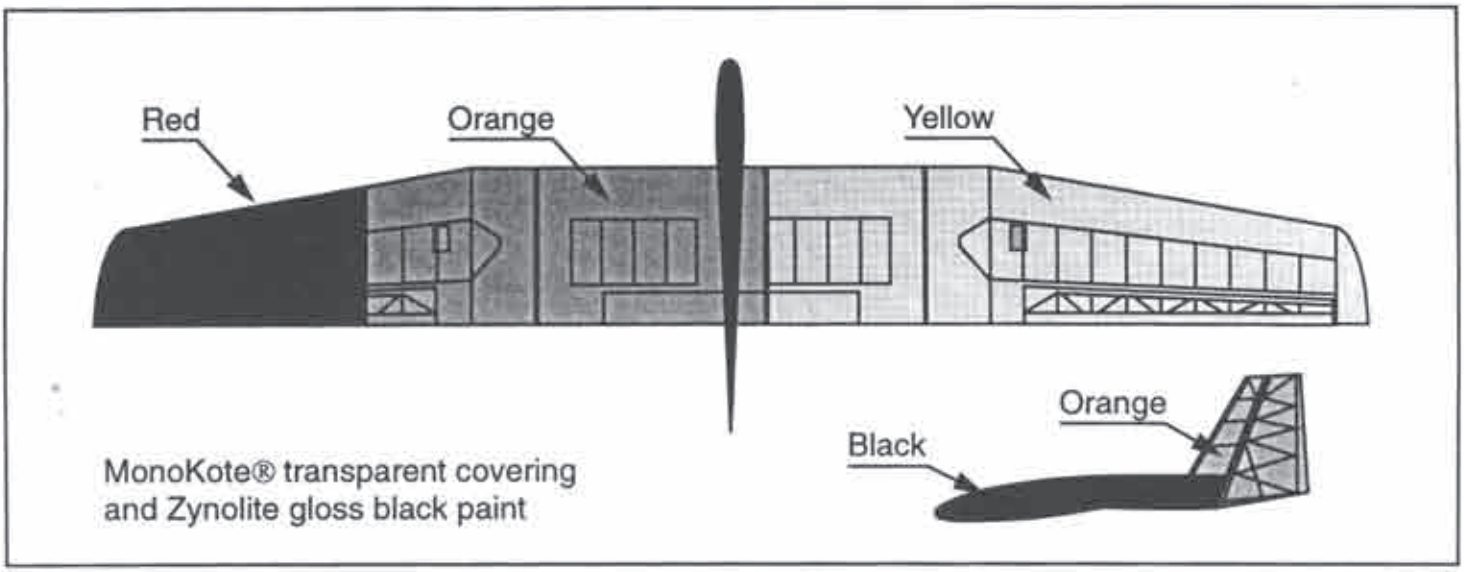
A second problem involved the elevator control horns and the upper fuselage decking. Since the wing was raised relative to the fuselage, the clearance between the elevator control horn and the $^1/_8$" upper decking is very small. We had to cut down the control horn mounting lugs and make a rectangular hole in the decking. Once we were assured that there was sufficient up elevator travel, we sealed off the hole with a piece of $^1/_{64}$" plywood. After some judicious sanding, the surface discontinuity is barely noticeable.

After much thought, we settled on covering the wing with transparent MonoKote®. Two of the four 6' rolls we purchased were defective. Replacement covering was extremely slow in coming from Great Planes, so we ordered additional MonoKote® from a local source, Hobby Town in Parkland Washington. Jon Packer, the manager of Hobby Town, had special ordered the $^1/_2$" rocket body tubes for us, so we relied on him to solve this problem as well. Jon had the covering in stock, checked it for defects before mailing it out, and we got it in the mail the next day. Thanks Jon!

From the left wingtip to a point 24" inboard is transparent red; the next 36" is covered with transparent orange; the remaining 57" is transparent yellow. Aileron and elevator hinges were formed using the MonoKote® covering. A $^3/_8$" wide black trim stripe separates each color. The vertical fin and rudder are covered with transparent orange MonoKote®. We used four Klett hinges we had in our parts box. The fuselage and canopy were first sprayed with gray primer, then gloss black.

With leading edge sheeting, ailerons, two extra servos and cabling, three ounces of nose weight, and a five cell receiver battery, the weight of our model compares favorably with the prototype MB Raven built by Dave Jones. That prototype MB Raven, built using "contest" balsa, weighed just 41 ounces and had a wing loading of 4.3 oz/ft^2. Our Raven weighs 60 ounces. With its slightly larger area, the wing loading is just over six oz/ft^2.

As mentioned in a previous installment, ballast can be added by means of inserting metal rods into the four nine inch paper rocket tubes in the center section of the wing. Half inch diameter metal rod is used as ballast. A 36" aluminum rod weighs 12 ounces and raises the wing loading approximately 1.2 oz/ft^2. Steel rod adds almost exactly two pounds to the overall weight of the glider, and raises the wing loading by 3.2 oz/ft^2. We cut both rods into three inch sections with an abrasion wheel mounted in our table saw. The three inch length makes the ballast easier to carry



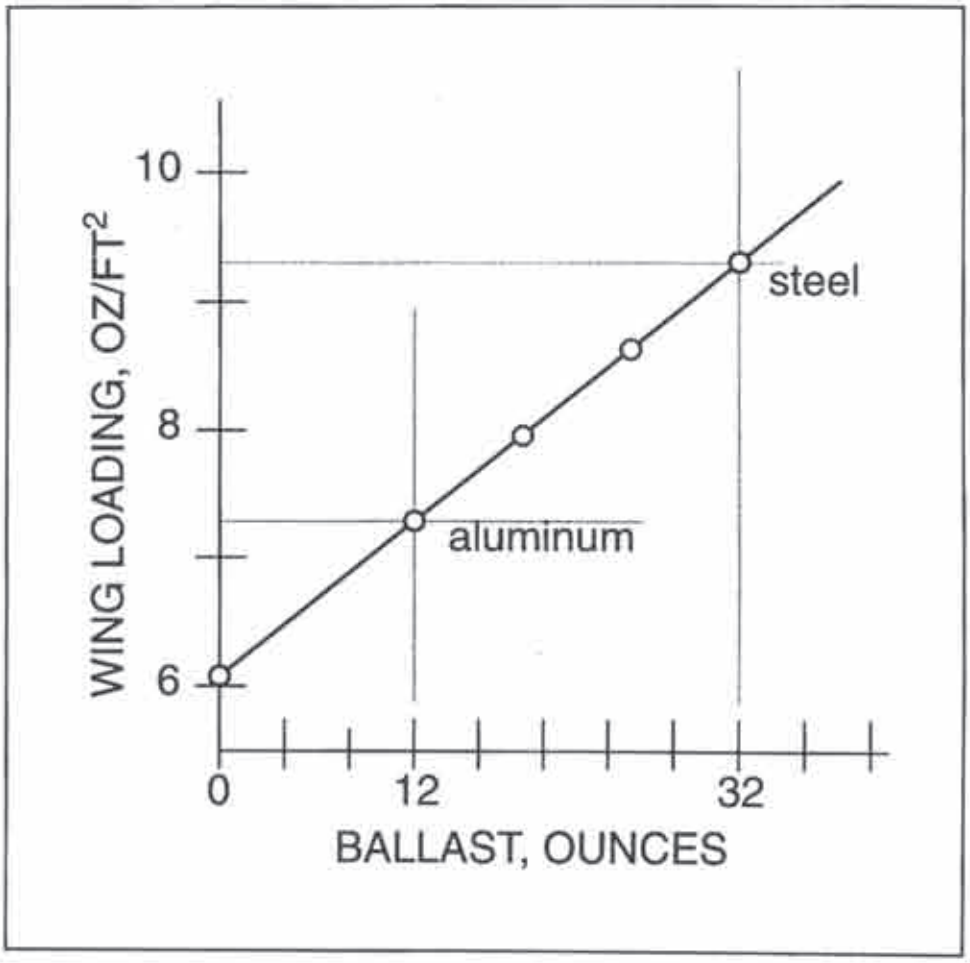
around — we have a small padded case for this purpose — and allows combinations to be used (12, 18.6, 25.3 and 32 additional ounces). See the included graph.

Since the ballast is placed somewhat outboard of the centerline, inertia in roll and yaw is increased. This is actually helpful in gusty weather as the glider does not bounce around quite so much. Thermalling with the wing loading nearly doubled (steel ballast) is not a major problem, but the ability to work light lift is significantly reduced.

Based on previous experience with plank planforms, notably Dave Jones' Blackbird 2M, we set up the ailerons for no differential and about 20 degrees up and down. (There is a full 60 degrees of upward travel available, as we want to experiment with spoilerons at some point in the future.) During flight testing, this proved to be more than sufficient. Elevator throws were adjusted for about 50% more than shown on the plans. We don't recommend this much travel for those flying a tailless airplane for the first time, but have come to be comfortable with these deflections during more than 15 years of flying this design. Rudder throw is 20 degrees each way, as recommended in the construction article.

Winch launching the MB Raven is an interesting experience. The line must be preloaded, and the best climb out angle is achieved by throwing the model at a 45 degree angle to the ground. The Raven should immediately rotate to about an 80 degree angle and climb strongly. Noticeable flexing of the wing takes place on tow. Zooming off the line is possible, but remember this airplane is flying on spruce spars.

Those of you who are using the MB Raven as a first excursion into the world of tailless sailplanes will find a few of the flying traits to be at first unique and somewhat disconcerting, then interesting, eventually endearing. These special characteristics are positive attributes to be used to advantage.



• Due to the short fuselage length and low inertia, control in pitch is rapid and achieved with relatively small control throws. Down elevator is very powerful, hence the seemingly minimal throw shown on the plans. With the short moment arm, large elevator deflections cannot place extreme loads on the wing. Still, you should always endeavor to make elevator control both as gentle and as smooth as possible.

• Flight speed is reduced as the nose is raised, just as when flying a conventional tailed glider. If a small amount of up elevator is held, the aircraft will continue to fly at reduced speed. As soon as up elevator is released, the aircraft appears to

immediately shoot forward. There is very little loss of height.

• Due to the low inertia in pitch, recovery from a stall is rapid as well. Acceleration to flight speed and transition to level flight, even with the aircraft at a standstill in a nose vertical attitude, takes but a few feet of height. Once speed is above minimum, judicious use of up elevator can make recovery even more rapid. With practice, you can make a tight half loop using full up elevator with the aircraft coming to a complete stop just as it is inverted and at the peak of the loop. (The entry speed is critical.) Release up elevator while the aircraft is stopped. The Raven will quickly rotate to a nose down attitude, then accelerate through a large arc and transition to upright gliding flight in the same direction as at the start. The resulting maneuver traces the outline of a comma.

• If you've built the MB Raven according to the plans and without ailerons, you'll find that it turns much quicker if up elevator is applied before rudder control is input. Depending on how elevator and rudder are coordinated, flat or steeply banked turns can be made.

• Although the MB Raven may fall off onto one wing if fully stalled while in a turn, we've not been able to enter a spin.

• Thermalling is as easy as finding lift, setting the turn, and putting in some up trim. The Raven signals lift by pitching up. This motion is sometimes quite dramatic, and the airplane slows as it travels through the thermal. Centering is nearly automatic.

• The MB Raven does exceptionally well in light lift if the overall weight is kept down. At a recent contest, Bill twice set up his R/E Raven for a landing well short of the desired flight time. Both times, the Raven flew through a patch of very light lift on final approach, and was immediately turned back into the rising air. A series of flat turns in the low altitude thermal allowed the flight times to be met. Moral: Don't give up until you're on the ground.

The MB Raven offers a unique, but certainly not terrifying, flying experience. We will no doubt enjoy this newest addition to our aerie for many years to come and hope the same is true for you. We are genuinely interested in hearing from *RCSD* readers who have built a MB Raven due to this four part series. We can be reached at P.O. Box 975, Olalla WA 98359-0975, or at <bsquared@halcyon.com>.

References and sources:

Bill Northrop's Plans Service, 2019 Doral Court, Henderson NV 89014-1075; PH (702) 896-2162 M-F 10A-5P, Pacific, FAX (702) 897-7775 any time.

Hobby Town, Jon Packer Manager, 402 Garfield St, Tacoma, WA 98444; (253) 531-8111.

Model Builder Raven. Dave Jones. *Model Builder*, January 1982.

Recommendations for first tailless, Part 1. Bill & Bunny Kuhlman. *RC Soaring Digest*, February 1991, and On the 'Wing... the book. B^{2}Streamlines, 1993.

Differential and performance. Bill & Bunny Kuhlman. *RC Soaring Digest*, August 1992, and On the 'Wing... the book. B^{2}Streamlines, 1993.

Aileron differential, Part 1. Bill & Bunny Kuhlman. *RC Soaring Digest*, May 1996, and On the 'Wing... the book, Volume 2. B^{2}Streamlines, 1998.

■

Jer's Workbench

Jerry Slates
P.O. Box 2108
Wylie, TX 75098-2108
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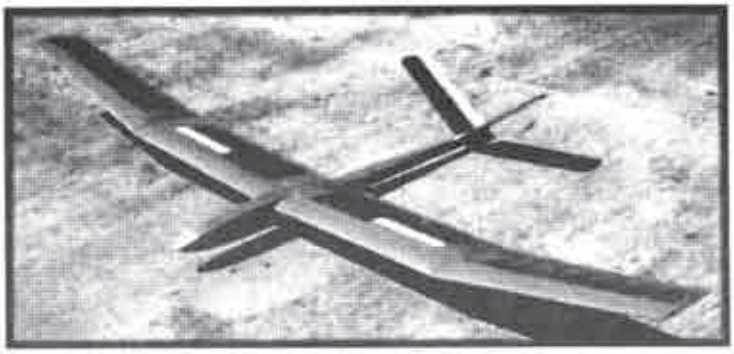
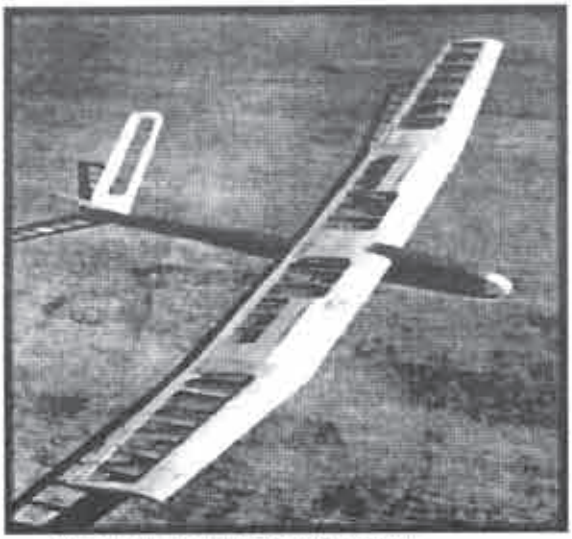
RCSDigest@aol.com

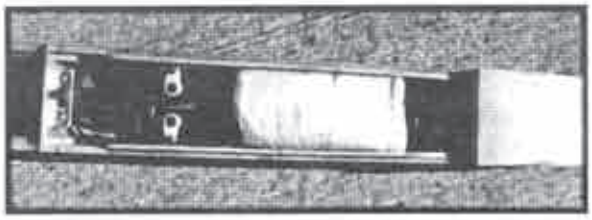
Finished model, ready to fly. Gross weight: 46 oz.





Bare bones, sanded and ready to cover.

There's plenty of room inside the fuselage for everything!



Low Tech Design & Construction
Rudder, Elevator, Spoiler Model
RES - Part VI

After many weeks of work, the Flattopper has been completed. As of today, the model has yet to be flown, but I plan to get out when the weather is just right to see how it flies, and what adjustments may be required.

For those of you that are building along, and have sent in a few questions via e-mail, I hope that you are working off a set of drawings and notes.

Last month, I was a bit concerned that the elevators might be too small. Well, several fliers that have dropped by over the last month have confirmed my suspicion; the tail feathers are, indeed, a bit too small.

Since then, I have constructed a new set of elevators, adding 12.5 square inches. The original drawing reflects 114.75 square inches, which has now been increased to 127.25. By keeping a record of all my changes as I go along, it should ensure that I don't make the same mistake twice!

The original parameters called for a 100" wing span, RES model, weighing less than 50 oz.; this was achieved. The completed model, ready to fly, comes in at a gross weight of 46 oz., with a wing loading of 7.5 oz. per sq. ft. The wings and stabilizer have been covered using Top Flight Monokote, transparent orange. The wood surfaces, elevators, spoilers, and fuselage have been painted with Behr, water-based, polyurethane, clear.

Two CS-20-BB sub-micro servos operate the spoilers; two CS-30-BB micro servos operate rudder and elevator. A 700ma battery pack and a JR 4-channel FM radio complete the package.

For V-tail mixing, I've elected to use a Vantec mixer, which I've used for 20 years, now. It still works quite well. Unfortunately, I don't know if this company is still around; I've looked for their ad with no luck. However, there are other mixers on the market, which are shown at the end of this column.

Some of you might ask, "Would you make any changes to this model, if you built it all over, again?" Well, until the model has been flown and tested, any changes contemplated at this point would be quite minor. The fuselage could be a bit more streamlined to reduce drag. I might even try a newer airfoil, for the heck of it.

I hope to give you a final report next month!

Until then, happy flying!

Resources:

EMS (mixers)
22605 E. La Palma Ave. Suite 516
Yorba Linda, CA 92887
(714) 692-1393

Precision Micro Electronics (mixers)
P.O. Box 3129
Corpus Christi, TX 78463-3129
(361) 814-6843

■

TECH TOPICS

Dave Register
Bartlesville, Oklahoma
RegDave@aol.com

Adventures in Yaw-Roll Coupling

From time to time, an experiment produces unexpected results. In hindsight, the unexpected is often pretty obvious. Like asking your 'significant other' if she wants to go to the movies. You had 'Godzilla' in mind but 'The Horse Whisperer' is also playing at the local Cineplex. Doesn't take long to figure that one out!

A few months ago we discussed elliptical wing planforms. We also talked about Reynolds number corrections leading to the development of a corrected Schuemann-Ellipse (S-E) planform. I've tried several wings made to those specifications and they've all worked quite well. But I forgot an important consideration when applying it to a polyhedral ship - the effects of wing planform and polyhedral angle on yaw-roll coupling.

Figure 1 shows the wing layout for two versions of the Tahlequah HLG - the original and a lighter version (T2/GF). Since the new wing was to fit on the old fuselage, the root chord and span needed to remain unchanged. This leads to a higher aspect ratio wing but with less area towards the wingtips. The reduced wing tip area led to the unexpected result that should have been anticipated.

For a polyhedral ship, roll response relies on yaw-roll coupling. The rudder initiates yaw and the vertical projection of the wing couples the yaw axis to the roll axis. The roll response depends on the amount of rudder area and throw as well as the polyhedral angles and areas.

Since the replacement wing has reduced area and average chord, the stability factors (RVC, TVC) using the original fuselage and tail surfaces will be greater than for the original wing. This suggests that both yaw and pitch stability should be as good as the original design. This was found to be the case. With the reduced average chord and area, the pitch (elevator) response should be at least as good as the original. Again, this was found to be the case.

Without thinking about it too much, I used the same included angles for the main panel and the polyhedral breaks (~ 6 and 12 degrees respectively). Although the yaw response was still good, the roll response was REALLY slow. Controllable but definitely not very crisp.

One way to confirm the vertical wing area effect was to saw off the wing tips and increase the polyhedral angle. When this was increased from 12 degrees to around 20 degrees, the roll response was greatly improved. However, two problems were observed:

- Turns tended to tighten up too much even after rudder was neutralized and,
- Aesthetically it looked like you were flying a radio-controlled pigeon.

The solution was to compromise. The wing angles were increased somewhat (7 degree at the root and 14 degrees at the poly break) and the rudder area was increased from ~ 30% of the vertical stabilizer area to about 45%. Finally, the included V-angle was decreased to 95 degrees. This compromise gave much improved turn response but, with a V-tail design, the pitch axis was very sensitive.

Oh yeah, I forgot to mention that this is a V-tail. The usual answer is to program in reduced 'elevator' travel in the transmitter. But I also didn't mention this was being done with the Hitec IIISS radio. Nice little unit but no differential programming of V-surfaces. You get V-tail mixing with 50-50 yaw-pitch coupling only. Since the whole design approach for the T2/GF has been to come up with something simple and inexpensive, some form of mechanical differential was required.

There are at least two ways to mechanically introduce differential movement of the control surfaces:

- Offset the angle of the control arm on the output spline of the servo and,
- Offset the clevis hole on the control horn with respect to the hinge line.

We'll use the first option which is diagrammed in Figure 2. In this case, we've offset the control arm by 45 degrees. If 'up' elevator corresponds to a ccw rotation, then the ccw movement of the control rod will be less than the cw movement. In principle this sounds good, but in practice, the snap-link (clevis) will interfere with the output arm at the extreme ccw position. A suggestion to get around this problem (for HLG only) is shown in Figure 3 using a metal clevis.

Any metal clevis I've used comes with a 'keeper' for the pin. For HLG, a metal clevis is plenty stiff enough with one arm.

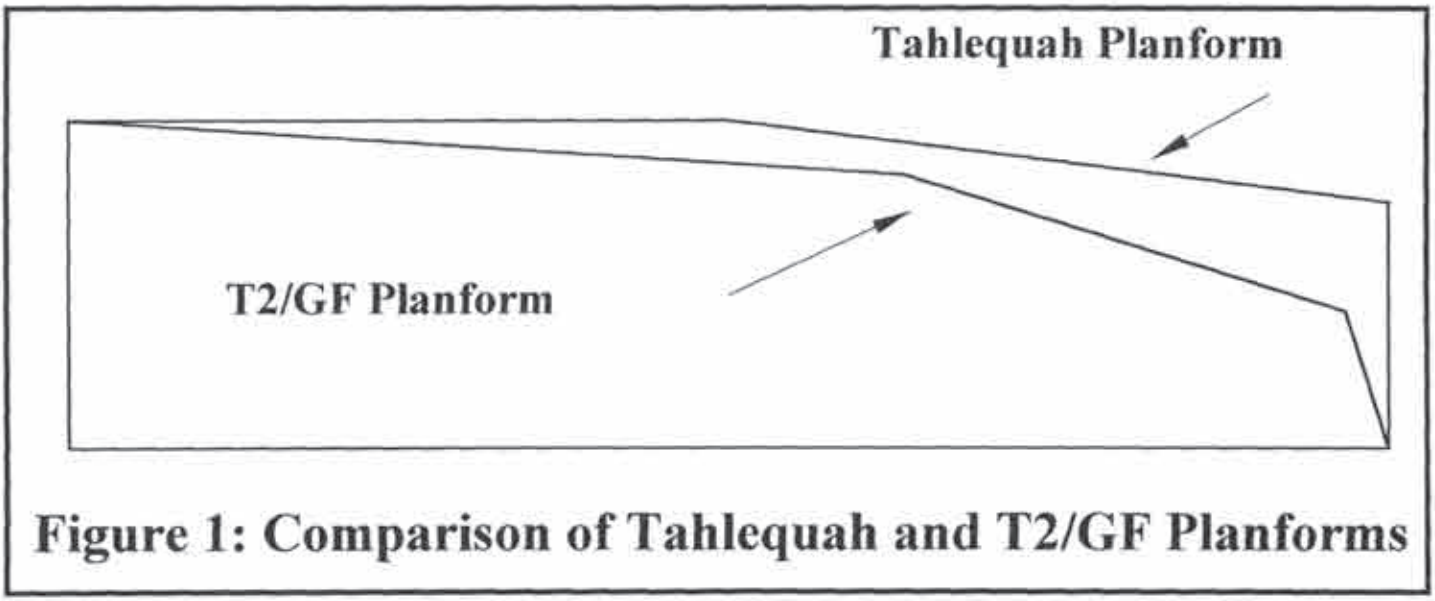


Figure 1: Comparison of Tahlequah and T2/GF Planforms

one. Duane let me fly one of his foam planes for a while.

KURT: Waihe'e was my favorite sloping spot on the island. The winds were typically 15-25 mph, and for a first-time coastal sloper, the conditions were ideal. I flew a ZAGI-LE that I had modified for travel with bolt-together wing halves. As foamies go, it was a little slow. I was fortunate to have chosen durability over "ludicrous speed" as the local balsa/FG pilots refer to it, since the landings at Waihe'e are not soft.

RANDY: My last day on Maui, Duane took me to Maluhia, their new secret slope. You would never find if you didn't know where it was.

EDITOR: Not much of a secret if he takes everybody there.

RANDY: Quiet, Nagel. Maluhia was even more beautiful than Waihe'e. It actually is almost above Waihe'e but quite a bit higher and also much greener. The landing area is a large lush cow pasture behind you. You are a fairly good way from the water, but most of it is vertical. Because of the altitude gain, it was also much cooler. My shorts and tee shirt weren't enough. Gerald loaned me extra clothing to put on so I wouldn't freeze.

The lift was fantastic, the scenery was spectacular and the company was great. I got to really practice my aerobatics skills. Something I don't get to do very often on my inland slope at home. We did some plane swapping and I flew some of their planes and Gerald flew my Vindicator. By the end of the day, I was tired but very happy. It was time to go, so I set up for my last landing of the day. I came screaming in and turned toward the landing area behind me and I found that it had been filled with cows! Fortunately, I had enough speed and height to make it around the cows and land safely. I understand Hawaiian cows are really expensive if you have buy one after you kill it with your plane.

The best quote of the day came when a new flyer got too fancy and ended up in the trees to the right of the field with lots of plane crunching sounds. Duane said, "Those Guava trees, they don't give very much." At least you can have a fruit snack while you get your plane out of the tree.

KURT: When I flew it at Maluhia, which Duane calls his "fly what you like site" the low wing loading of the Carbon D-Light was a disadvantage, particularly on landing. There was low level turbulence and you had to come in fast.

EDITOR: Did either of you have any equipment problems while flying on Maui?

KURT: I made a bolt-together modification to the Zagi so that it would be easy to transport in its original box; however, it did nothing to improve its structural integrity.

The winds were steady at about 40 mph for my first and only launch at Kahakuloa. I gained about 200 feet of altitude, dropped the right wing and pitched down, putting the airplane with about a pound of lead into a dive for a high speed pass. Just as I began to pull back on the stick, the aircraft went into a mad flutter, flapping its wings like a terrified pigeon. Almost instantly it folded like a book and then was ripped apart by the relentless wind. The two halves fluttered down and came to rest in the long grass behind me, behind the wall of wind.

The moral to the story.... Well, there is no moral. The lesson is if you're going to fly the big wind on Maui, build strong.

EDITOR: Here's an idea: how about pre-building a Zagi? Do all the messy work before you leave home - stuff like cutting out the holes for the battery, receiver and servos. Lay out your pushrods, finish the elevons, put on the control horns and such, cut a slit for the antenna wire. You could even cut a spar channel in the bottom to stiffen it up. Then take out the gear, and spray the M-77 on the two wing halves, wrap them in wax paper, and stuff everything back into the box. It travels really well in the box.

When you get to your vacation paradise, all you have to do is epoxy the wing halves together, slap on the tape, stuff in the gear and tape on the elevons. Fly the thing through vacation, and then take the gear out when you head home. You can donate the airframe to the local guys - when you are on vacation you probably will spend more than the cost of a Zagi kit at the bar before dinner. Why haul a hunk of foam halfway around the world?

Any other tips for Maui travelers?

KURT: Many of the local pilots have field kits and are usually more than happy to provide tools or epoxy to keep you flying. But not everyone has a good field charger. The wind out there will outlast your batteries. I found my Hitec CG-335 indispensable.

Also, I'd suggest a trip scheduled to include MISO's fun fly contests, as I did this March. The dates are listed on MISO's website. It is a chance to meet a lot of the local pilots and test your skills. Be fore-warned—they fly a lot!

RANDY: If you go to Maui, take a foamie and something else so that you can fly in the different conditions. If you only have thermal planes, that's good too. Duane and Gerald fly thermal planes a lot, especially at Polipoli.

The upper slopes like Polipoli and Maluhia are fairly cool, so take something to keep you warm. It is an honor to fly at any of these sites, so if you go, treat the area with respect. Maluhia in particular has a sacred Hawaiian site right next to it, so act accordingly. Take only memories and pictures and leave only footprints. Now if I can just find a way to make a living there.

Here's a handy travel item that I picked up from Al French, Washington D.C., who posted it on the Radio Control Sailplane Exchange (*RCSE*).

For wind forecasts anywhere in the United States check out: http://www.intelicast.com/kitecast/

I tried this site and immediately added it to my bookmarks list. Who says nothing good ever comes out of Washington, D.C.?

Thanks, Al!

Randy Bullard has been flying RC gliders off and on for 18 years and full scale power planes and gliders for more than 30 years. He moved to Charlotte, NC area from Atlanta, GA seven years ago and flies with two different groups of pilots: a small thermaling group in Charlotte and another group which slope on the Blue Ridge Parkway, a 2.5 hour drive from where he lives.

This was Randy's second trip to Maui, but the first time he has flown there. Randy was a tech support manager for a computer industry company when he lived in Atlanta, but in Charlotte works in a SCUBA dive shop. He hopes to retire on Maui.

Kurt Dumas began flying full scale aircraft in June of 1996. His interest in model aircraft started at the same time. His first sailplane was a Wanderer but says, "My lack of proficiency as an RC pilot (I taught myself.) and anxiety about crashing prevented me from flying what took so long to build. I began building and flying with cheap radio systems. I mean cheap, not just inexpensive; when your aircraft performs better when you forget to turn the Rx switch on, you know it's time to use the good radio."

Kurt does most of his flying in light inland slope conditions, in and around the hills of Burbank and Glendale, CA. He just finished building a foamy P-40 Warhawk and is headed out to Malibu with it.

Kurt works at the Nickelodeon studios in Burbank as a storyboard director.

■

If you have a favorite sailplane saga, consider writing it down for *RCSD*. If you are planning a vacation that includes your plane and transmitter, consider making notes as you go, and working up an article later. Take photos. Collect maps. And send your story to Tom Nagel at tomnagel@iwaynet.net for gentle editing and suggestions. *Tom*

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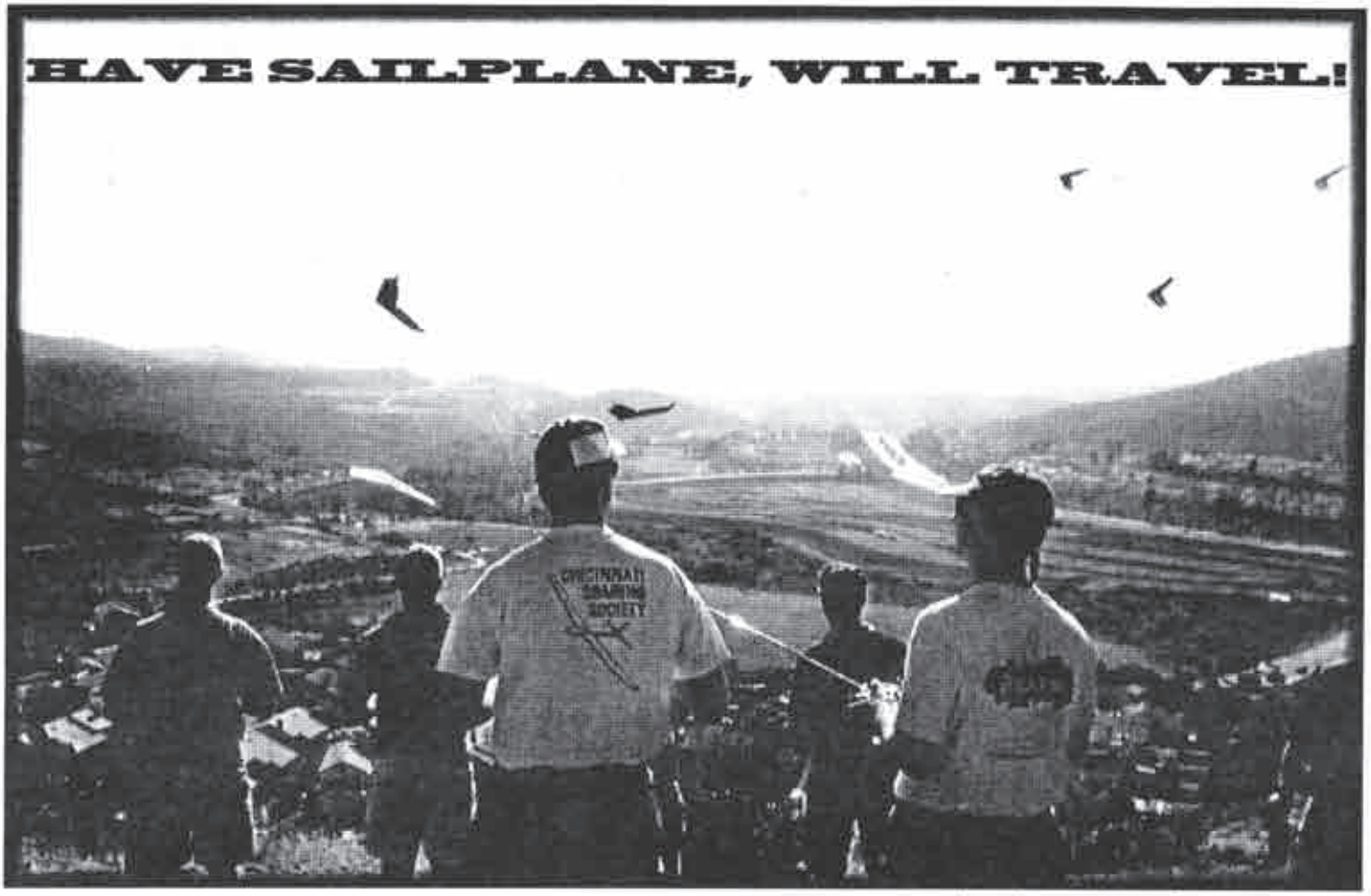
HAVE SAILPLANE, WILL TRAVEL!



Slope at Poway.

Tom H. Nagel
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(This column is dedicated to soaring vacations.)

This month's installment of HSWT is part of an article that Rudy Siegel wrote for the Cincinnati Soaring Society's Web Page (Mike Welch webmaster, <http://www.iac.net/~glide17/css>; photography by Jim Carlton.), recounting the adventures he and his brother Paul had in Southern California this spring. Thank you Rudy for a great story!

Cincinnati Yankees in King Wurts' Court (or) Rudy Siegel and the Holy Grail

By Rudy Siegel

When Paul and I left for San Diego to attend the Torrey Pines Gulls International Hand Launch Glider Festival (IHLGF), part of the plan was to spend some time sloping at Torrey Pines, and to make a ceremonial pilgrimage to Parker Mountain to seek the holy grail of sailplane pilots - dynamic soaring. I took five airplanes: two Logics, one Zagi, a Vortex, and a 3M Discus. Paul had a 2M ASW-27, a 3M ASW-27, his own Vortex, two Protage foamy wings, and four Logic HLG's.

Flying west on the 9 pm flight, we had a strong headwind allowing us to get two movies and no sleep. After we landed the real fun at Lindbergh Field was walking through the terminal with one monster travel box (6' x 2' x 1'), a smaller travel box on top, plus our bags on opposite hands. The large box is big enough to be a coffin, so we drew lots of curious stares as we made our way through the terminal. Friday morning found us eating our continental breakfast at the Poway Country Inn in the company of the British and Germans — some of the folks who put the "I" in IHLGF. After coffee and donuts it was off to the Poway flying site for some HLG practice, and then on to Torrey Pines for a taste of slope lift.

WOW! I'd forgotten how wonderful a major slope site can be. Instant altitude, zooming passes, endless acro and WIDE grins. The only thing that brought us down was the eagerness to try the next airplane.

It became hard to decide between the fast action, ripping style of the Vortex - spins, rolls, snaps, inverted passes, slope racing, etc., or the peacefulness and swooping grace of the larger scale ships. Paul found a great compromise with his new 2M ASW-27. This plane is capable of everything - scale-like grace and the ability to climb quickly, followed by fast, crisp acro flying It just depends how aggressive you are with the sticks. One

Paul Siegel with ASW in action, Torrey.

maneuver that we enjoyed was the snap roll. The '27 would snap crisply through one complete snap; then, its energy spent, it would simply fall out of a nose-high stalled attitude. Great stuff!

Other than watching out for hang gliders and parasails, it was pretty easy to get rapture of the blue. I got a bad case as I swooped endlessly through countless wingovers with the Discus. I was caught in the grasp, with the mid-afternoon sun sparkling off the indigo waters of the endless Pacific. The flying was huge vertical, the graceful sweep of the white scale wings as they wheeled over, the whistle of the ship's wings as they bowed up into another seamless arc into just the right mix of rudder and aileron at the top - at just the right moment. Then...

BAM! Paul and I were flying the 2M ASW and 3M Discus. We'd kept clear of one another, but after endless swooping wingovers, and with both of us deep in the grasp of rapture, we failed to clear our airspace. Fortunately, we got both airplanes onto the top of the cliff, but both were out of action for the rest of the weekend. We lifted our spirits with dueling Vortexes - more acro, slope racing, etc., so all was not lost.

Space constraints here will not permit me to fully recount our adventures at Torrey Pines or the details of the 1999 IHLGF, but suffice it to say that the Torrey Pines Gulls (TPG) have continuously refined the IHLGF to the point that it runs like a well oiled machine. Imagine organizing 90 pilots, 10 rounds and six flight groups. With three minute intervals between rounds, the IHLGF is a management marvel, with computerized scoring, preprinted task and scoring sheets — including the pilot's name — and great people running the whole shebang. It doesn't get much better. The tasks are varied and challenging and ordered to make sense for the time of day. Then add the world's top pilots to this mix and you've got yourself one amazingly fun and challenging contest.

We closed out the day on Sunday with some spirited combat at the Poway slope site. We had as many as nineteen planes of various foam shapes wheeling, banking and yanking into one another. I wound up even at three kills and three walks of shame. All this was to whet our appetite for Monday's trip north.

Parker Mountain - The Holy Grail

Paul and I almost skipped the three hour drive to Parker. Make that six hours of round trip driving. We wondered if it could be that much better than flying another day at the beautiful, bountiful Torrey Pines.

We launched our three van caravan a little after 7:00 am: Bruce Davidson and Randy Elkins, Switzerland's Bruno Sigrist, plus Paul and me. We flew past Lake Elsinore and a Lawrence Welk community development (only in California, thatsa nice condo boys), the north side of LA — Pasadena, Altadena, La Verne, and even Cucamonga. Then we stopped for the traditional, ceremonial lunch at the Jack-In-The-Box in Acton, California where Bruno regaled us with stories of flying 4 to 6 meter scale ships in the Alps. You can tell a Parker Mountain veteran by the Jack-In-The-Box clown head on top of their transmitter antenna. (I promise to buy mine next time out. I just didn't understand, then.)

We headed out of Acton, just miles from Muroc Dry Lake - a.k.a. Edwards Air Force Base - for the narrow mountain roads up to Parker. As we drove - carefully - along these rough roads, barely fit for a mountain goat, Bruce was hanging excitedly out of his open window pointing into the wind and over - way over - the edge. The higher we climbed, the closer we got, the more my butterflies fluttered. (Fluttered - bad word at Parker!)

This was a *MOUNTAIN*. In the *DESERT*. *There were SNAKES* - green rattlers.

There was *WIND* - lots of wind. And this is where grown men blow up strong airplanes in mid-air from over-stressing the airframe. I'd seen it on tape.

These are the skies once trod by Yeager, Carpenter and other courageous pioneer airmen in all sorts of X-planes. I could almost hear the faint, eternal echo of that first sonic boom. I could almost see an X-15 streaking toward the stratosphere. And the "Six Million Dollar Man" getting a "facial" in the salt flats. This is where pope "JW-I" works miracles with winged craft, seemingly launching them to the moon. There was angst and anticipation. Suddenly, Torrey was far, far away.

We had arrived. Standing on the drive just back from the edge, there is no wind. Not a breath. You think it's a hoax. But step to the edge and the bill of your hat lifts immediately into the swirling maelstrom. You look out on the surrounding mountains to the west and the long deep valley that channels these winds into the maw of Parker. Then east, to the edge of the earth. You see ten miles to a place called Heart Attack Hill, then nothing but the eerie white glow of the desolate, desiccant horizon beyond.

When it's time to fly, you struggle to hold your plane level in the wind, as you prepare to slay the dragon. You wonder where in this hellish landscape you'll land. Just hold your breath and heave.

Even my heavily ballasted Vortex jumped right out of my hand. It immediately became "my eager craft through footless halls of air." And I "wheeled, soared and swung" as best I could. It was wonderful, exhilarating, intoxicating. While Torrey induces a laid-back rapture, Parker is a mental quantum leap - an immediate shot of adrenaline. It's a cigar-chewing, crusty old air corps contract flight instructor yelling in your face, ordering you to have the most fun you've ever had on the sticks. But, to be VERY careful. And avoid foolish temptation. At these speeds, any wrong move is your last.

So, while Bruce and Randy flew combat out front, Paul and I grabbed our Vortexes to do with them what they were intended to do - go really fast and fly lots of acro. Then, maybe some dynamic soaring (DS). As I focused like a laser and overcame my first careful passes and opened up the envelope more and more - man, what the Vortex can do - I heard a crunch on the back side. Paul had succumbed to temptation and reached for the DS chalice too soon. It sounded like a slap in the face after trying to steal a kiss on the first date. His Vortex merely shed it's nylon-bolted V-tail - certainly fixable. But a new shot of dread coursed through my veins. I knew that I'd have to land this pocket rocket at some point.

Randy Elkins talked me around the back side to land. But I was going WAY TOO FAST. And Randy's solution was to DIVE IT LOWER. Gawd! But he was right. You have to go way down deep, then coast to the top of the ridge to a soft arrival. If you're good, you plop onto the drive. Being a novitiate, I had to traverse the local flora and fauna where I found an undamaged airplane and no rattlers - whew!

Paul was determined to DS, so out came the Protage for a long lesson in painless crash and burn. But he was getting it down. Unfortunately, my Zagi was out of action from a broken control arm suffered in the van during the bouncing ride up the mountain. So, back to the Vortex.

While I expanded the envelope even more, finding just how much vertical I could pull off, how crisp a four-point roll is at these insane speeds, and how loud a molded RG-15 is, Paul launched his repaired Vortex again and snuck to the back of the mountain. Suddenly, I heard a ripping whoosh overhead, and a crazed laugh. Paul had made a fast pass down the back of Parker and literally rocketed back to the front side. I had already been flying faster than any other modeling I'd ever done, but this...

He told me he'd flown around the high south ridge, then behind and below the lip of the mountain before blasting through the saddle. I just had to do it. And I did, time after time, after time. What a hoot! This WAS mecca. The thrill of that small white craft rocketing toward you with a quick wobble as it passed through the violent boundary layers, then the unbelievable ripping sound as it flew overhead into the front-side lift. It's not at all like the screech of a dive from a spec flight; it's literally a ripping, rocketing sound. It's a sonic delight heard only on the hallowed grounds at Parker.

Paul pulled out his Duo Discus because the Vortex was just too squirley to DS. He began to fly huge dynamic loops from front to back. I followed with my Vortex and it wasn't too bad. Then, Paul tilted his loops into the horizontal - big, high ripping passes. He was doing it. He'd DS'd the Duo. Throwing caution to the wind, I had to give it a shot in spite of the wise old instructor standing on my shoulder shouting into my subconscious.

I made a big arc around the south ridge, just like before. But instead of passing over the saddle, wings level, I held my bank into a huge horizontal arc, up through the boundary layer, ripping into the air that punches you back over with more of that ineffable ripping noise. Then, moving so fast that I didn't have time to think, I dove over the back and proceeded to pull back up into the slope. But it never came out.

It was a quick end. I can't even recall the crunch, but I know now what I didn't do. You have to roll away from the slope as you pull back up, and I didn't. Game over. My old, grizzled "instructor" took a long draw on his stogie and just shook his head.

I expected to find nothing but splintered carbon. But the Fuseworks Vortex is an amazingly resilient beast. Yes, the V-tail parted from its nylon bolts, and the left wing was split open along the leading edge, but the fuse was whole. Even the ballast was still in place, screwed tight to the bottom at the CG. Fortunately, Paul kept last year's trashed wing, whose left half is whole and will be spliced to the good right half that I brought back from the edge.

So, here's the plan for next time. We'll practice our DS with a larger combat foamy, something that will retain energy better than a Zagi or Protage, but will also forgive our errant excursions into terra firma. Then we'll fly bigger airplanes for the really high-energy ripping. The bigger planes are simply more stable through the turbulence and predictable at speed. Paul's considering his Spectrum F3B. Me, maybe my faithful old, home-brew 7012 Red Tail. We'll see.

That's Parker. It's temptation and consequences in fast-forward. It's beautiful and unforgiving. And the legends are true. The hype is for real. Parker is slope mecca. And now I know why Moses had to climb the mount. It is cleansing, it is real - it tests your sang froid.

So, go west young man, for forty days and forty flights.

* * *

If you have a favorite sailplane saga, consider writing it down for *RCSD*. If you are planning a vacation that includes your plane and transmitter, consider making notes as you go, and working up an article later. Take photos. Collect maps. And send your story to Tom Nagel at tomnagel@iwaynet.net for gentle editing and suggestions. *Tom* ■

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KEEP THOSE WHEELS SECURE!

By Roy Vaillancourt

When securing wheels on an axle, there are a variety of methods in use today. The most common method is to use just a wheel collar. Although this is the most widely used method, it happens to be the most insecure method. This method's obvious drawback is that the set screw comes loose from vibration and the wheel collar departs from the axle. The wheel usually isn't far behind. This situation always results in lost wheel collars and, most of the time, the wheel is lost, too. Then, the landing generally doesn't treat the aircraft very well. Most modelers would say the fix for this is a little lock-tite on the set screw. This may be fine for awhile, but trying to remove the wheel collar now becomes a chore. Stripped set screws are a real bear to get out!

The accompanying sketches show the four methods of retaining the wheel. Each method shown depicts progressive improvement over the previous method. I'm sure there are more, but these are the most common methods employed today.

As you look through these sketches you'll see that the cotter pin method is far and away the best and most secure method. Cotter pins are cheap. They are easy to install and remove. They do not rely on torque or locking compounds. They are a sure thing! Most guys avoid this method because of the difficulty in drilling a hole through the axle. The main construction steps are:

1) File a flat on the axle where the hole will be.
2) Center punch the spot where the drill will start.
3) Use a good sharp drill run at a slow speed.
4) Use oil as a cutting agent to help the drill.
5) Use steady pressure on the drill and periodically clean off the chips and re-apply some oil.

If you follow these steps you'll find the drilling process a lot easier. If you'd like to make life even easier you may want to anneal (soften) the axle at the area where the hole will be drilled prior to doing the above five steps.

To anneal the axle all you need is a standard propane or butane torch like the one you would use to solder copper water pipes. Clamp the axle in a vise with only the last 1/4 to 3/8 protruding past the vise. The vise will act as a heat sink during the annealing process. This keeps the "heat affected zone" localized so that only the area you are interested in is annealed. Heat this protruding portion to a cherry red color. When you have reached this color remove the torch. Don't over heat the material. Let everything cool naturally. DON'T blow on it or have a nearby fan blowing air around it. Be patient. Let it all cool to room temperature before removing from the vise. If you cool the material too quickly it will become harder and more brittle. As stated, the vise acts as a heat sink. If you can't get the axle mounted in a vise (or you don't have one) you can use a pair of "vise-grips". Two pairs back to back are even better.

Once everything has cooled to room temperature you should be able to "cut" the axle with a file very easily. Then proceed as previously described. You'll be surprised how nice the drill will now cut.

Go slow and be careful. Good luck.

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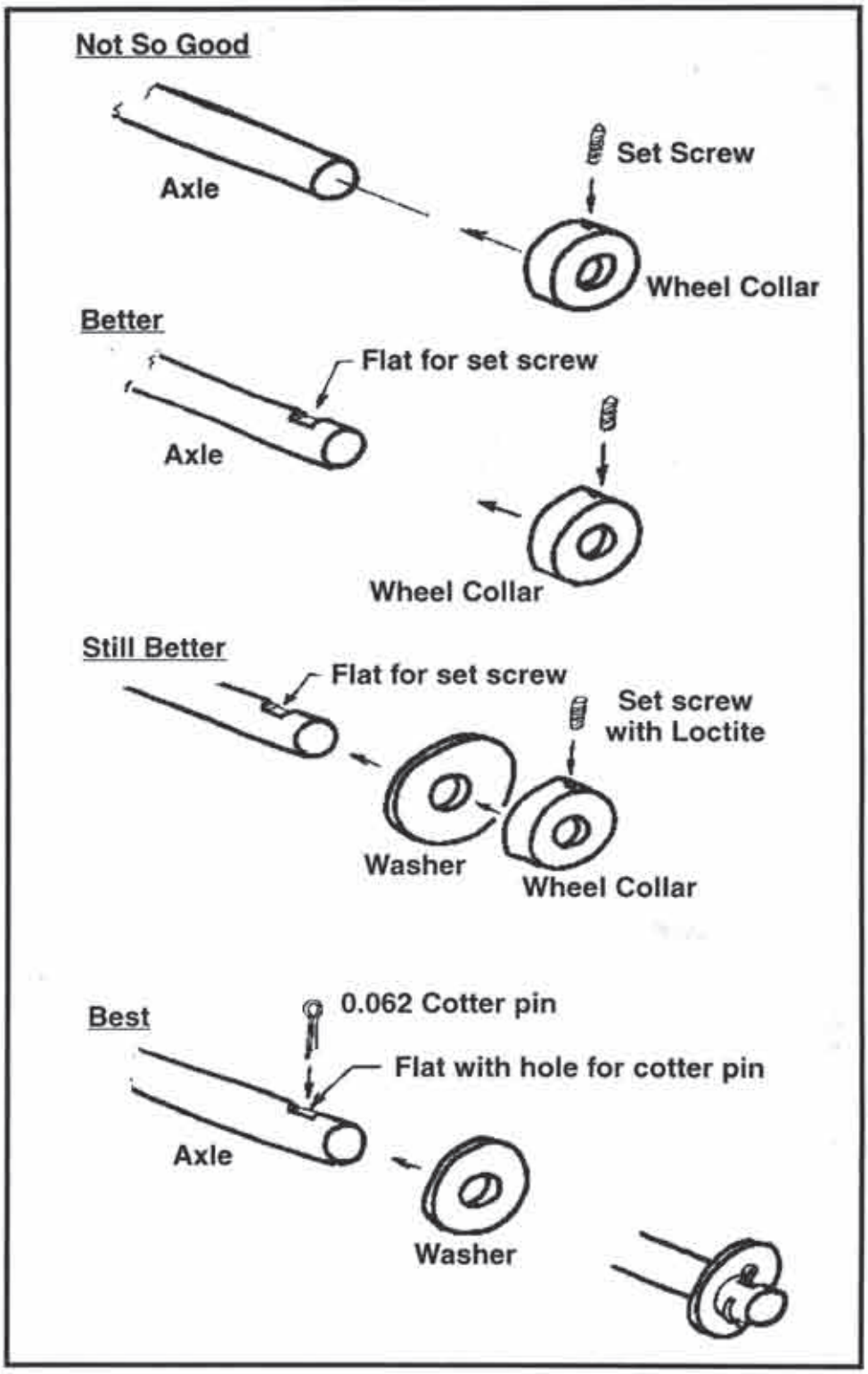
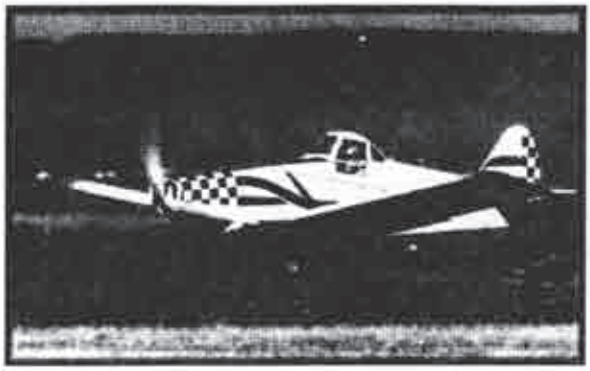
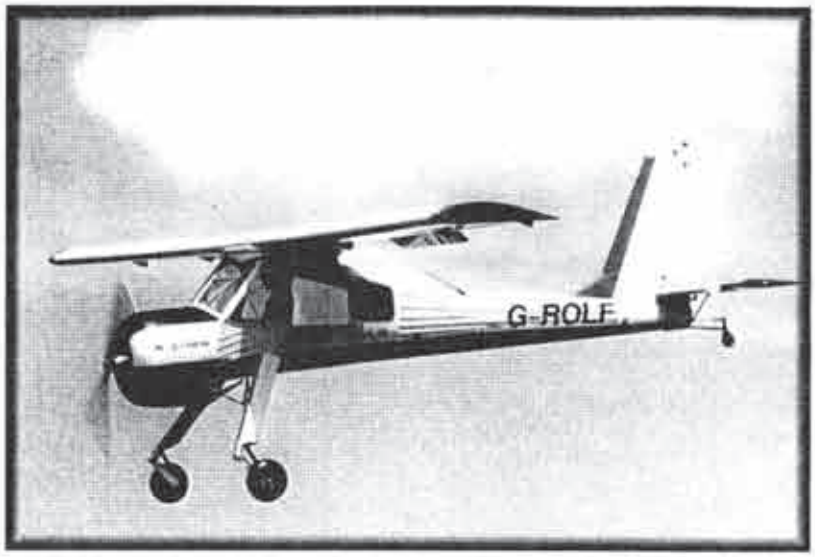




Bruckmann Pawnee 1:3.5, powered by a King 95, weighing 28 lb. Easy to fly, and perhaps the best scale tug of all, it will pull up the largest of sailplanes.

1/3 Spacewalker (held by Jim Blum) is powered by a Brison 3.2. Very easy to fly, it's an excellent towplane for up to 1/3 size sailplanes.

Eric Meyers towed with his giant Stinger at Elmira this year. The towplane, powered by a G-62, does an excellent job.



The gentle giant 1/3 Wilga stands waist high. Perhaps the easiest of towplanes to fly and land, it's powered by a King 140 twin up front, and will tow the very largest of sailplanes with ease.

"Hot Air"

Robin Lehman
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The Nationals

By the time you read this, the first ever Airtow, Sport Scale Nationals Competition will have taken place. Even more importantly, lots of new folks will have seen airtowing for the first time. I find it interesting that only a handful of sailplanes (three) ended up competing. Those three were treated to wonderful airtows by Pete George with his new Dornier 28. A few sailplanes without tow hooks in the nose, used a winch to get up. Not surprisingly, a couple of these winch flights were incomplete because of low altitude.

What are the "Nationals" anyway? And who attends this event? Are these the best pilots flying the best scale sailplanes in the USA? Or are these four competitors guys who happen to live nearby or guys who happen to want to make the long trek to Muncie? How come all other scale events regularly draw ten times (or more) as many pilots? If the AMA scale "Nationals" is ever going to get off the ground, perhaps some changes are in order.

I hear that quite a few folks would like to propose some rule changes. Two areas in particular need to be addressed:

- weight *restriction* - right now gliders over 25 lb. are not allowed to compete. Solution: the weight limit should be raised to 55 lb. (the legal AMA limit) or at the very least to 30 lb., which would allow those with 1/3 sized sailplanes to compete.
- ARF *gliders* - right now no ARF all ready-made glass slippers are allowed to compete (unless you painted yours!). No doubt you'll read more about this on the Internet and you'll form your own opinions on the subject. Solution: either split the competition into a "builders' class" and an "ARF" class, or give bonus points for the built-up models, but fly both classes together at the same time.

Although this year's Nationals was an improvement over last year's event (Was there only ONE competitor at last year's event? I can't remember.), it would seem that there's still lots of room for improvement.

There certainly are many enthusiastic scale sailplane pilots out there and they DO attend the various scale slope and airtow "fun-flys" held throughout the country, so

there's plenty of folks who must have an opinion on the subject. Anybody got any good, red tape cutters in your workshop?

Those who wish the "Nationals" to prosper would do well to give a little thought as to WHY this supposedly prestigious event continues to be so poorly attended, when fun-flys like Elmira, Fayetteville, Pensacola and Los Banos regularly draw between 30 and 70 scale enthusiasts.

More and more fun-fly airtow events are springing up all over the country. You can now travel coast to coast and find someone nearby who is airtowing! That's great! Happily I don't have to talk about how to airtow anymore! That being the case, I thought a little discussion about towplanes might be helpful.

We've Come a Long Way!

We used to think that OS 60-powered Telemaster was the perfect towplane. In those days, a 4 meter sailplane was what we were flying. Now the 95-powered 1:3.5 Pawnee is the cat's meow. It can fly slowly or fast, can tow anything – both large and small - and perhaps, best of all, it's a real pussycat; it's even easier to fly than the Telemaster.

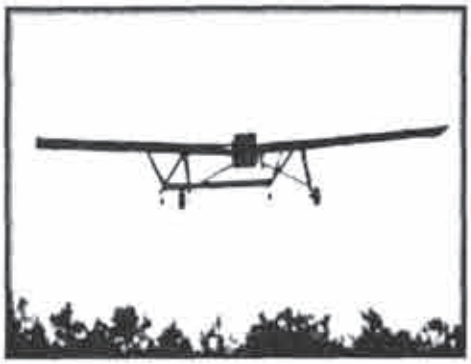
I've had quite a few inquiries about towplanes recently, and I've been told that there are many new towplane projects on the drawing board or in the process of being completed. What follows might be useful for those of you who want to airtow but don't quite know which towplane to get.

What Makes a Good Towplane?

What makes a good towplane has been discussed before, but it might be helpful to go over this again.

1) It must be easy to fly.
2) It should be large enough to see at height.
3) It should be easy to land and have a rugged landing gear, which can withstand many landings and takeoffs.
4) It should have a powerful enough motor to be able to tow the required sailplanes.
5) The towplane should be able to match the airspeed of the glider. It should neither fly way too fast nor way too slowly for the glider it's pulling.
6) It should have a wide speed envelope. An all around towplane should have all the above characteristics and be able to fly fast for the faster gliders, and slowly for the slower flying gliders.

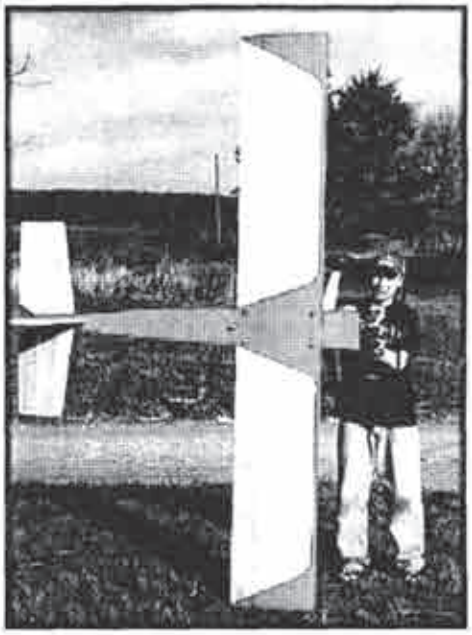
The Pegasus, by John Derstine, powered by a Brison 6.4 Twin, is super easy to fly, and one of the best non-scale tugs. Derstine photo.



The Phoenix, designed by Landon Grindstaff, is quite unique with its twin booms. Powered by a Zenoah G-62, this strange looking bird has all it takes to be an excellent towplane!

7) The towplane should be over-powered: it should be able to climb by itself on approximately half throttle. This means that approximately 50% of the throttle can be used for towing the glider. This also means that in case the motor goes sick on takeoff, there's plenty of room for error and the glider/towplane combination will never be in any danger when taking off from a short field.
8) It should probably have extra large wheels when towing off of grass or rough fields. This greatly facilitates easy takeoffs and landings.
9) Quite obviously a towplane should have a tow release installed somewhere around the rear of the wing on top of the fuselage. NEVER tow from the tail or under the fuselage!!! This means that if at any time the airtow is going wrongly, the tow pilot can dump the glider. The glider also has its own release, and if the glider pilot doesn't like what's going on he can simply get off. Remember the cardinal rule in all of this: IF IN DOUBT, GET OFF!
10) A towplane should at least pull what it weighs (meaning if it weighs 12 lb. the motor should have at least 12 lb. thrust. Better yet, the motor should pull more than the towplane weighs. Just as long as the motor fits on the fuselage and the towplane balances on

(Below) Michael Derstine with Pegasus. Size isn't a problem as the wing comes apart in 2 halves. Derstine photo.



The large Pawnee and "Schlepper" at Elmira '99. The "Schlepper" towed both very small and large sailplanes. Powered by a 3w 80, it tows the smaller sailplanes straight up.

Dave Reid Makes the 8-Ball

The 8-Ball Special has an 85" span with 1360 sq. in. of area. The length of the fuselage is 63". The plane flies at 17-17.5 lb. and the ideal engine is Brison 3.2 or similar. The kit contains premium quality wood parts, foam wing panels, fiberglass cowl and wheelpants, prebent aluminum landing gear, hardware package, and rolled plans. The 8-Ball Special sells for $199.95 plus $10.00 S&H. Plans are available separately.

Web Site: http://www.reidsmodels.com

John Derstine's Pegasus

John offers plans, one sheet with all parts drawn 36"X87" and complete instructions, set up, flying tips and a materials list keyed to plans. Plans cost $45.00 post paid rolled in mailing tube priority mail. Foam cores in four sections (1.5 oz. density virgin white foam) are also available for $65.00 plus shipping. Additional kit parts available by quote.

the CG, the more power the better.

11) We found that a slightly nose-heavy towplane does a better job than one which is tail heavy.

Matching the Towplane to the Glider

If you're going to tow no larger than 4 meter sailplanes, something like a 1:4 sized Piper Cub or a Senior Telemaster with an OS BGX-1 or Super Tiger 3000 or something similar will have plenty of power to do the job.

If you think that you might tow sailplanes up to 5 meters and 25 lb. you should probably go with something like the 8-Ball Special, a 1:3 Spacewalker, a 1:3 clipped-wing Cub or similar towplane powered by something like a Brison 3.2, a Zenoah G-62, or even an OS 300 Twin glow motor.

If you would want to tow even larger sailplanes up to 30 lb., you should plan on having a suitable airframe for something like a Brison 4.2 single, Brison 6.4 twin, a 3W-70 Twin, or even larger motors. John Derstine's Pegasus, a 1:4 Wilga, or something similar will do well.

For the very largest of all sailplanes, the Pegasus, the 1/3 Wilga or the 1:3.5 Pawnee with a 95cc single, or a 140 or 150 twin, will pull just about anything up to 55 lb.

Make sure, whatever towplane you select to work with, that it has all of the above mentioned characteristics and is large enough to handle whichever motor is appropriate for the gliders you plan to tow.

If you plan to tow all types of gliders, then you might be well advised to go for a larger towplane, which will handle everything. If the towplane is very powerful and you happen to be towing a smaller sailplane, tow with flaps down. If you don't have flaps, then tow at a very steep angle of climb so that the actual airspeed is as slow as possible. In Elmira this year, for instance, we airtowed with a 3W-80 powered "Schlepper" which could pull some of the smaller sailplanes almost straight up. In light wind conditions, no turn was necessary. We simply took off and headed up into the blue yonder. When the glider was high enough for the sailplane pilot, he released. Usually, a very large towplane will fly a bit too fast for the smaller sailplanes, and the excessively steep rate of climb is the best way around this because, when climbing steeply, the towplane is not flying all that fast. At first some of the (smaller) sailplane pilots were a little apprehensive, but after seeing a "rocket ship launch" they ended up enjoying the ride!

Scale Towplanes Versus Non-Scale

Whether you decide to go with a "thing with wings" or a scale towplane is more of an aesthetic and financial decision than anything else. There's really nothing like a scale towplane towing a scale glider at a scale speed! In an event like Elmira where there are many pilots waiting to fly, the trick was to launch as many sailplanes as fast as possible and get back down on the ground to tow the next one. Some of the airtows at Elmira from start to finish were under 2 minutes. In a case like this, brute force was the order of the day. For this reason, most of the towplanes used in Elmira were very powerful "things with wings", although the Bruckmann Piper Pawnee and Frisch 1/3 Wilga did do some airtowing from time to time. The scale towplanes tend to be more realistic in flight, meaning they take a little longer to get to altitude. Also, if you plan to do 50-100 tows in a day, you might be better off going with one of those "things with wings" so that you won't be risking your beloved scale towplane.

All said and done however, the 1/3.5 King 95-powered Bruckmann Pawnee has to be rated as the best scale towplane I have yet encountered. It will tow anything in sight, can fly quite fast (the Foxes, etc., are no problem) while at the same time, with flaps down, it will fly (and airtow) extremely slowly; which means it can tow both the fastest and the slowest of sailplanes.

Be Aware of Drag

As a general rule a monoplane will make a better towplane than a biplane. This is because the biplane has more drag and the motor is spending more of its energy pushing against the air to keep airborne. By contrast, a monoplane has less drag and therefore a higher percentage of the power plant can be spent towing. This does not mean, however, that biplanes are bad towplanes. It simply means that all things being equal with the same power plant and the same flight characteristics, a biplane is going to fly a little less well than a monoplane. I might add that putting a biplane together is more work than putting a monoplane together. For all of these reasons, most of the time, the preferred towplanes have one wing and not two.

If you're a biplane lover, there are a number of scale biplanes which I have seen towing which do an excellent job. The 1/4 Fleet Biplane powered by a Zenoah G-62, and the 1/3 Flybaby Biplane with the same power plant do an excellent job with sailplanes up to 30 lb.

It also follows that a large-winged bird will airtow less well than a shorter winged airplane. The perfect example of this is the Piper Cub. The 1/3 clipped wing Cub (with a Brison 4.2) is an excellent towplane, while the longer winged Cub needs a larger motor to do the same job because the longer wings are more "draggy". Go for the clipped wing Cub!

Financial Considerations

Quite a few guys are now getting together and chipping in to buy a towplane. In one case that I know of, three guys got together and shared the finances and also shared the building of a towplane. In this way the towplane was put together very fast, and rather inexpensively for each person. These same 3 guys also fly gliders and share the airtowing.

If a group of you plan to get together and airtow, sharing expenses and having a communal or club towplane is an excellent way to go.

Gas Versus Glow

There are lots of glow motors available for smaller towplanes (pulling up to 20 lb. of thrust) and in this same category there are plenty of gas motors also. I used to only fly glow motors, but now I fly gas exclusively. My reasons are:

- Gas is much cheaper than glow fuel.
- Once you set up a gas motor correctly, it will give you years of reliable service without any carburetor adjustment. It's extremely rare that you have to touch your carburetor on a gas motor, whereas on a glow motor you are constantly fiddling and tweaking the carburetor to get the thing to run properly.
- All things being equal, glow motors are a little bit lighter than gas motors, which might in some cases be an advantage.
- Perhaps the most compelling reason to go with a gas motor is your clean-up mess at the end of the day. Glow motors leave a heavy residue of oil, which is really yucky stuff to clean. Worse yet, if you fly when it begins to get colder, this yucky stuff gets thicker and thicker and is all but impossible to clean in very cold weather.
- Glow motors tend to be a little less expensive than gas motors of the equivalent size.
- When you begin to get into the really powerful motors (3W80, Brison 3.2, King 70, Zenoah G-62 on up) gas is definitely the way to go. Almost no very large glow motors are available.
- You won't EVER want to start a glow motor with your fingers, because they often run backwards and kick. Once a propeller whacks you, you will not ever want to have that experience again! Gas motors tend to be easier to start and

very rarely will eat you.

Propellers

Choose the propeller which gives you the highest thrust. One way to find out what thrust you are getting is to tie a line around the tail and see what the airplane pulls at full throttle. Do this test on a road or a hard surface, not the grass, because grass can cause a lot of drag and will cause you to get a false (low) reading of thrust. Generally, the best propeller for airtowing is one size larger than that recommended for a given motor.

Safety

Safety comes first and with ALL motors a couple of safety tips might help.

1. When starting a motor, always wear a glove or use a "chicken stick" or an electric starter. NEVER start your motor with your bare fingers because sooner or later you will regret it.
2. ALWAYS start your motor at low throttle.
3. ALWAYS stand behind the arc of the propeller when you rev your motor up to high throttle to check it out.
4. ALWAYS tie your model down or have somebody hold it. This is especially important with the larger motors.
5. NEVER EVER START YOUR MOTOR WITHOUT HAVING THE MODEL IMMOBILIZED!
6. ALWAYS check your propellers for nicks and dings. A propeller, which comes apart at full throttle in the air, will take but a second or two to shake the airframe apart and you'll very probably crash.
7. ALWAYS balance your propellers. At low throttle if your propeller is unbalanced you will experience excessive vibration which will add unnecessary wear and tear to your towplane.

Single Cylinder Versus Multi-Cylinder

A single cylinder will vibrate more than a multi-cylinder engine. This is especially true the larger motor you run. Smaller single cylinder motors up to 4.2 can be run hard mounted, but 5.2 sized motors on up really do need some sort of vibration mount. Because most of the glow motors are smaller, vibration is not a factor. Gas motors can be real "shakers" and you'd be well advised to ask around to those who have flown the motor you wish to use to see whether or not vibration might be a problem. If so, an adequate "soft" mount will make all the difference in the world!

Most vibration occurs at medium to low throttle and, at the higher rpm's, tends to disappear. However, a lot of the time your airplane is at low throttle when descending to land or at idle waiting to hook up, so vibration is a very important factor which needs to be addressed.

For what it's worth, I've found that all glass models tend to vibrate worse than models built of foam and/or wood.

High Wing Versus Low Wing

There are a couple of Myths concerning high wing and low wing airplanes. The first is that a low wing airplane is harder to fly. Neither one nor the other is more difficult to fly. What determines whether an airplane is easy or difficult to fly is the airplane itself; namely: the wings, the wing section, the stab, the tail section, the tail moment, the nose moment, and perhaps the most important of all, the wing loading. When you put all these things together a given airplane has certain flight characteristics. There are low wing airplanes which are particularly easy to fly such as the Piper Pawnee and there are high wing airplanes which are more difficult to fly, such as the Citabria for example.

Size

You've heard this many times before, but it bears repeating: the larger the model airplane you fly the easier it is to fly, period. This same thing holds true for the towplanes. Aside from being easier to fly, a large towplane has one huge advantage: it's easier to see at height than a smaller one.

Cost

Generally speaking a scale model will probably cost more that a "thing with wings".

Scratch Building

At first glance, it would appear that the initial cost of scratch building from plans is going to be less than buying an ARF kit. Once you begin to keep track of what it costs you to buy the wood, glue, covering materials and all the other things required to complete the model, you would be surprised just how expensive scratch building really is!

Most people who scratch build do it because they enjoy it and they rarely keep track of what the model actually cost them. Of course when you factor in the hours of labor it takes to complete a scratch built model, the real cost is enormous.

Pre-Built Models

Sometimes you can find completely finished models with motor, servos, etc., all ready to fly. Very often these are being sold at a discount price, and are cheaper than the price of the kit (or scratch building) plus all materials. If you have a computer and can get on the Web, visit Sailplanes Unlimited:

http://www.sailplanes.com/classifieds/

The IMAA also have a classified section in their website where you can often find excellent powered aircraft:

http://www.fly-imaa.org/imaa/classifieds.html

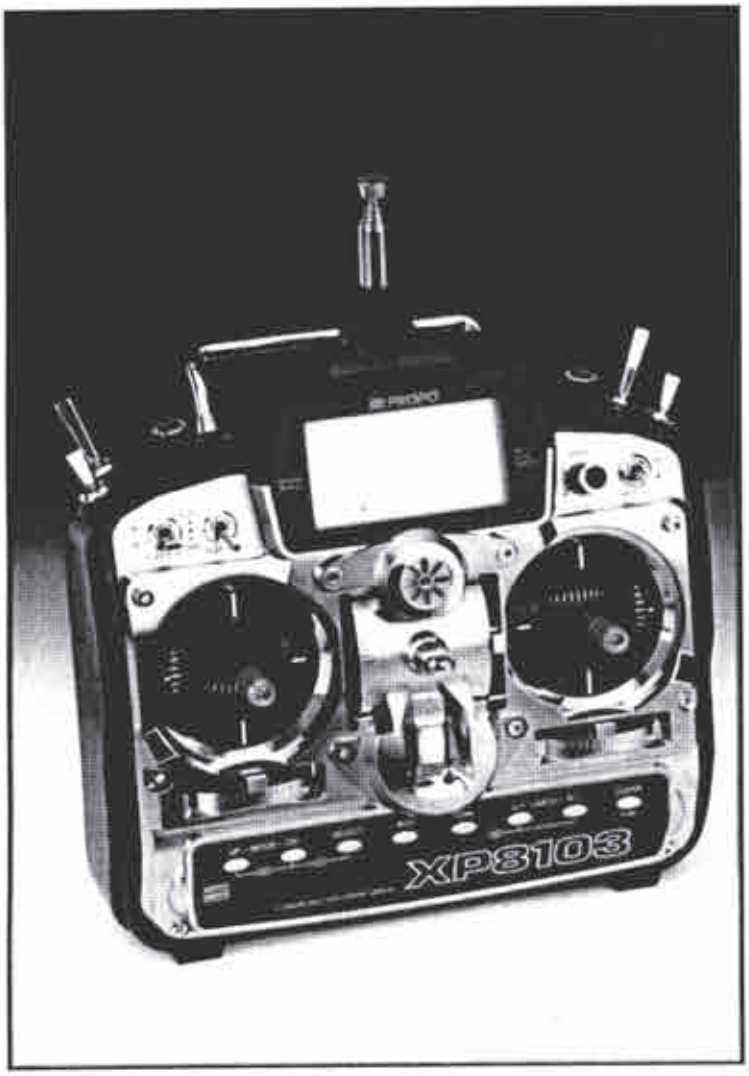
If you choose well and are lucky enough to get a good deal, you can find an excellent used towplane all ready to go for a relatively modest investment. Other places where you can find towplanes for sale is at the various fun-fly gatherings throughout the country. People will often show up with airplanes for sale and occasionally you can find a great bargain.

What Kind of Towplane Do You Need?

The first thing you need to decide is what sorts of sailplanes you want to airtow, and your choice of towplane follows from that. The larger the gliders you wish to tow, the larger and more powerful the towplane you need to tow them up. If you'll be towing a variety of gliders both small and large, pick a towplane which has a wide speed envelope so that it will fly both slowly and fast. In this way you'll be able to tow everything in sight.

Good luck, good airtowing, good flying and happy landings! ■

THE JR XP - 8103 COMPUTER RADIO WITH DIGITAL TRIMS



By Sherman L Knight
Bellevue, Washington

Several years ago, JR introduced its new XP-8103 computer radio. I wrote a lengthy, two part article, on how to program their radio which appeared in the April and May 1997 issues of this magazine. This article is not going to re-visit the radio programming discussed in the 1997 article. If you need the 1997 article please call Judy for reprints or e-mail me at DUWorm@aol.com and I will send you a copy.

The XP-8103 is available in a sailplane version that includes the R549 receiver, 600mah receiver battery and two (2) 341 servos. The usual assortment of goodies (radio flag, miniature switch, servo arms, screws, bushings and an Allan wrench for adjusting the stick length) are included. The manual is long. One hundred and forty five pages long. However, two thirds of the manual is for helicopter and airplane templates. The manual is unchanged from the earlier radio. Four pages of new instructions are included. I recommend that your cut out the four pages and paste them into the manual in the appropriate locations.

Digital Trims

The new 8103 with digital trims makes some refinements to the earlier programming and adds the digital trim levers. The old style trim levers are no more. The trims for rudder, elevator, and aileron have been replaced with a trim lever that moves one click each way, beeps, and then the spring loaded lever automatically returns to center. The large display of the 8103 now contains a sliding bar graph for each trim lever.

To change the trims, you simply bump the trim lever. Each time you bump the trim lever there is a corresponding change in the position of the control surface on the aircraft. A black dot moves along the graphic bar on the display screen and the radio makes a beep each time you bump the lever. If you bump the lever and hold it down, the trim will make rapid advancement in the direction the lever is held down. As the trim is changed to the top or to the right, the beeps become higher in pitch. As the trim is changed to the left or bottom, the beeps become lower in pitch. As the trim passes through the center position, a louder and easily recognizable beep occurs.

On the surface, digital trims do not sound like much of an improvement. Boy, was I surprised. The resolution of the digital trims is adjustable. In its default mode, one click of the digital trim is approximately 20% less trim than the old style radio. The default can be changed so that 5 or 6 clicks of the digital trim is required to equal one click in the old style radio. With the digital trims' finer resolution, the elevator "sweet spot" was much easier to find. Even if you change the defaults to the finer resolution, the total amount of servo trim adjustment remains unchanged. Whether the resolution is fine or course, the total amount of trim adjustment remains the same (approximately 15 degrees each way from center).

Over the last six or seven years, there has been a significant amount of discussion concerning elevator "dead band". "Dead band" may appear in several forms or any combination of forms. The most common is lack of pitch change with small stick changes near center. Another is a plane that cannot hunt. In other words, upon moving to level flight, the aircraft feels like it's mushing along (nose high). The next time the aircraft moves to level flight, it feels like it will not slow down (nose down). It seems to occur most often on aircraft with full flying stabs.

There are many items that can contribute to "dead band". The ones most often discussed are sloppy linkages, airfoil cross section, and worn out servo pots. Add a new "dead band" contributor to the discussion: lack of trim resolution in the radio.

In August, the Seattle Area Soaring Society sponsors one of the larger competitions in the Pacific Northwest. Saturday arrived with a 2500 foot cloud cover, no wind, 65 degree temperatures and short launch lines. I do not believe anyone found a thermal all day. The grass never really dried out. The trim on your aircraft was critical. If you couldn't float for seven minutes, you weren't competitive.

I was flying the Molded Psycho 3 in the competition. Not an airplane known for its dead air float time. However, I was able to find a trim setting with the digital trims that I could never find with my old style radio. A trim setting that allowed the Psycho 3 to float with larger and lighter aircraft. I made all my times and ultimately won the contest. I don't think I could have won the contest without the digital trims.

During a contest, how many times have you used your finger or thumb to move a trim lever one click and accidentally bump it three, four, or was it five clicks? Now you have to take your thumb off the stick and frantically try to re-center the trim. Never again with the new digital trims. Bump the

digital trim; it only moves one click at a time. Not only that, but you don't look down as much because you're not as worried about accidentally bumping the trim lever.

At large contests, transmitter impounds are a necessary evil. Many have launched their aircraft only to discover that the trim levers have been accidentally bumped. No one is to blame except for the pilot. He is the one who failed to properly check his radio. The blessing of digital trims eliminates this problem. As long as the radio is turned off, bumping the trim levers have no effect on the memorized trim settings.

Digital trims are worth the price of admission.

Other Modifications

JR made other, more subtle, modifications to the programming. Unfortunately, this means you can no longer use the DSC cord to transfer programming from an old style 8103 to the new 8103 with digital trims.

JR did remove one of the programming features. You no longer have to save your trim settings before you switch to a different model in the radio. As you switch from model to model, the radio remembers the last location of each model's trim settings. If you fly two classes in your local competitions, you no longer swear at yourself for forgetting to save your last trim locations. No more sub par launches when you forget to reset the trim lever to neutral before launching a different model.

Flap settings on JR radios are not difficult to program. You just have to know where in the manual to look. JR increased the resolution of the flaps sub trims from 125 to 250. As the flaps are lowered, the higher resolution allows a smoother transition from a straight trailing edge to 90 degrees. Page 134 of the manual discusses the presetting of the flap sub trims to 90. That was the value for the old 8103. The flap sub trims on the new 8103 should be set between 175 and 200.

Both versions of the 8103 contain an undocumented mix function. The programmable mixes contain either a master or slave called "FPRN". The availability of this function allows an easy method to program reverse differential into your ailerons.

General Comments About Programming

Flexibility is a wonderful thing. However, programming the JR is complicated by the fact that the radio's flexibility may provide more than one way in which to accomplish the same result. Although more than one means may be available, it **is important to select and use only one method to accomplish your objective.** Otherwise, programming functions may be in conflict and actually cancel themselves out.

Some of you may be confused by the lack of an "OFF" setting for much of the programming. Most all computer radios do not contain a setting called "OFF". Why? Because every function is "ON" all the time. As long as the mix value is set to -0-, nothing will happen. In other words, "OFF" and "-0-" are the same thing.

Disable or inhibit all functions that your don't use. Disable all the pots and, if you don't use dual rates while flying, make both switch positions the same.

Make sure that the servo arm angle, control horn location, and linkages (i.e., the mechanical stuff) for all opposite but matching control surfaces (flaps and aileron) are identical.

Set up all your controls as close to neutral as possible with a subtrim setting of 0.

Use dual rates to make gross reductions or increases in control throw.

Only use end point adjustment to make fine adjustments.

If you use the previous article on programming the radio, always start with a fresh and empty model slot. If you start in the middle of the article, you will probably wind up with a conflict in the programming and fail to achieve the results you're looking for.

Conclusion

I am extremely pleased with the results I have gained by using the digital trims in their finest resolution setting. Hats off to JR for another fine product.

I would like the thank the members of the Seattle Area Soaring Society for their wisdom and their "Boys with Toys" attitude. They help make this sport one of the most fun adventures I've ever had. If you have any questions during the day please call (425) 454-5052 or e-mail <DUWorm@aol.com>. ■

THE NATURAL SIDE OF THERMAL SOARING

By Lee Murray
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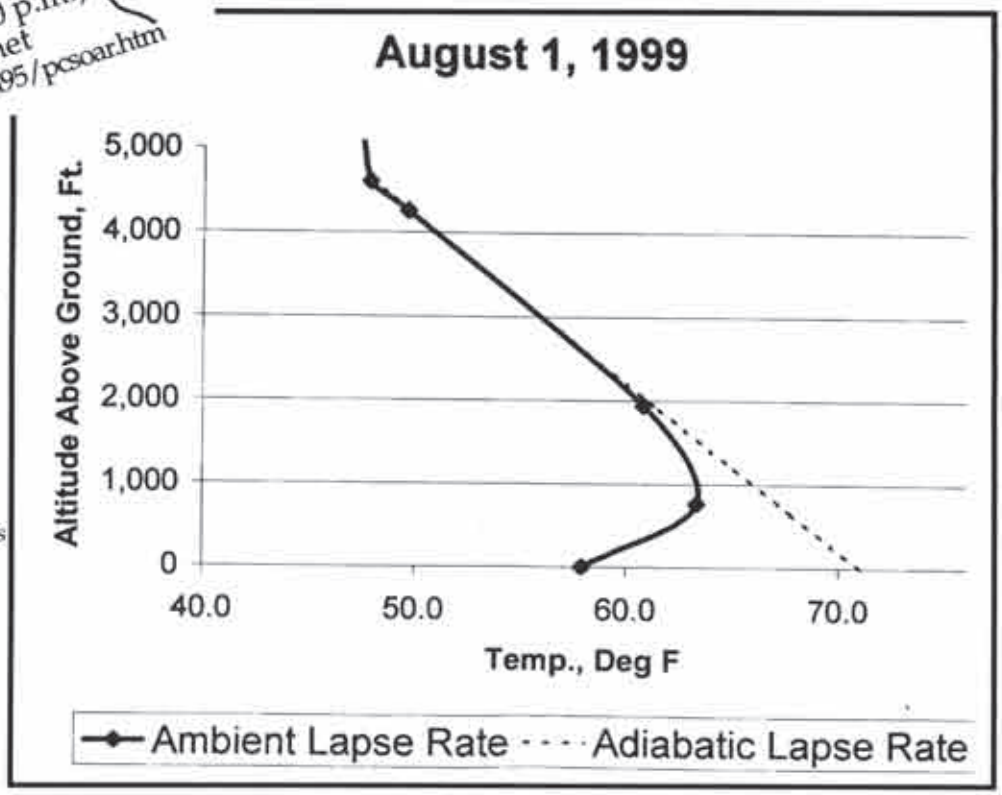
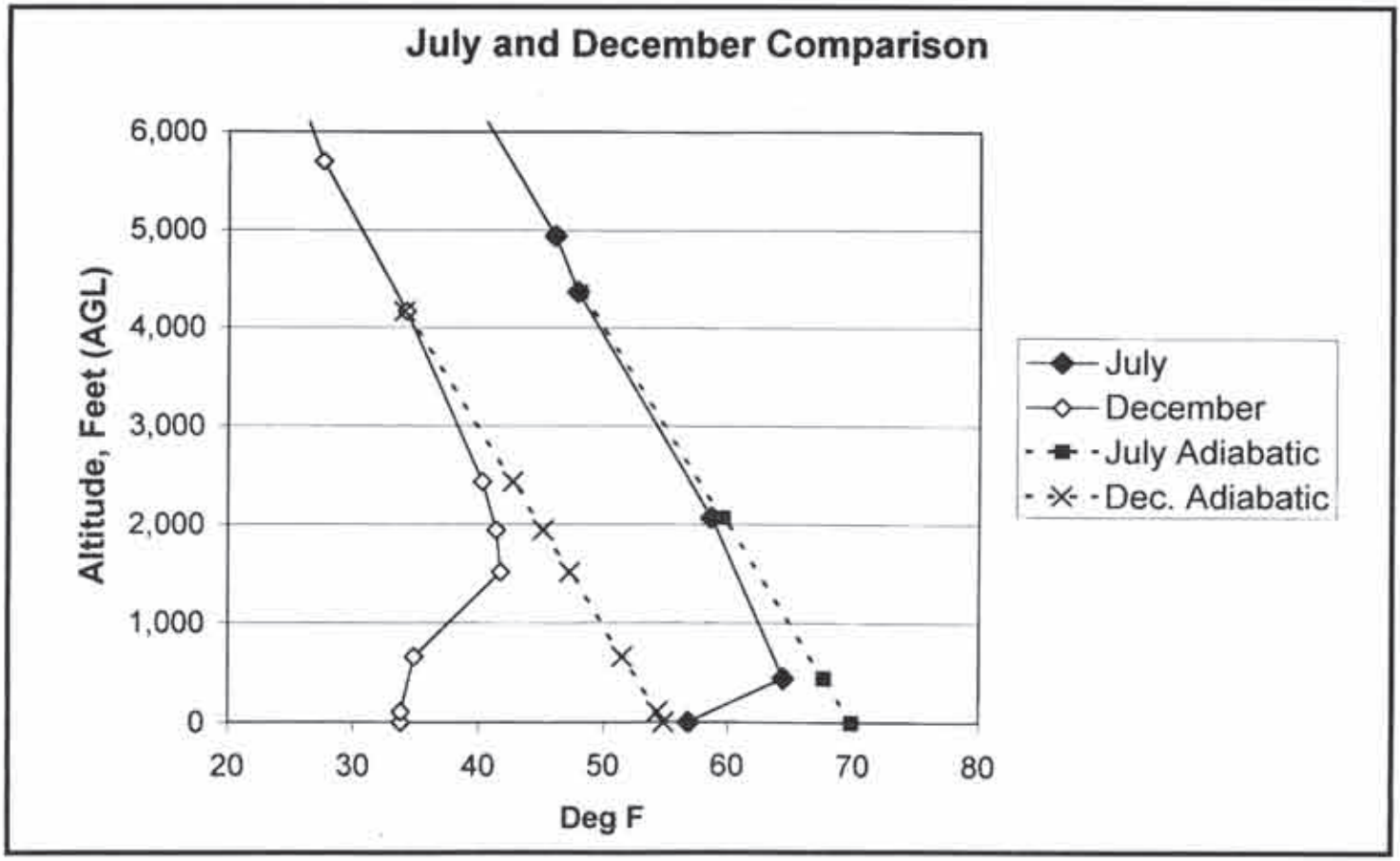
Part 4 – Examples of good and weak soaring conditions

Our last article in the weather related series dealt with High & Low Pressure Areas, Mixed Boundary Layer, Nocturnal Inversions, Noon Balloons, and Plumes and their natural variability. This article will deal with some examples of great and not so great soaring conditions as defined by experience and the weather conditions which support the experience.

My most recent experience occurred on August 1st. The flying started at 11 AM with moderate success. I had a couple 8 minute flights but also several 3 to 4 minute ones. The altitude achieved never got above launch height. About 2:30, the





Searching the city database file for: GRB ...
Date:1200Z 1 AUG 99
Station: GRB
WMO ident: 72645
Latitude: 44.48
Longitude: -88.13

LEV	PRES mb	HGHT m	TEMP C	DEWP C	RH %	DD C	WETB C	DIR deg	SPD knt	THETA K	THE-V K	THE-W K	THE-E K	W g/kg
0	1000	140						320	7					
SFC	992	208	14.4	11.7	84	2.7	12.8	320	7	288.2	289.7	286.3	312.7	8.73
2	965	444	17.4	10.4	63	7.0	13.2	348	7	293.5	295.0	287.8	317.1	8.23
3	925	806	16.0	8.0	59	8.0	11.3	30	8	295.7	297.0	287.7	316.8	7.29
4	850	1517	9.8	5.7	76	4.1	7.5	345	10	296.4	297.6	287.5	316.2	6.77
5	839	1625	8.8	5.3	79	3.5	6.9	322	13	296.5	297.7	287.4	315.9	6.67
6	805	1967	8.6	1.6	61	7.0	5.0	305	19	299.8	300.8	287.3	315.7	5.34
7	796	2060	9.0	-8.0	29	17.0	1.7	305	20	301.2	301.7	285.1	309.3	2.63
8	744	2619	9.0	-12.0	21	21.0	0.5	318	24	307.1	307.4	286.6	313.6	2.05
9	700	3121	6.6	-14.4	21	21.0	-1.5	320	25	309.8	310.1	287.3	315.6	1.79
10	680	3359	6.2	-19.8	13	26.0	-2.7	313	29	311.9	312.1	287.3	315.8	1.17
11	647	3767	6.0	-12.0	26	18.0	-1.6	305	35	316.2	316.6	289.9	323.9	2.35
12	618	4142	3.6	-18.4	18	22.0	-4.3	305	36	317.6	317.9	289.5	322.5	1.45
13	586	4571	0.4	-7.6	55	8.0	-3.3	300	37	318.7	319.4	291.9	330.7	3.68
14	565	4864	-0.7	-18.7	24	18.0	-7.0	291	33	320.8	321.1	290.6	326.1	1.55
15	563	4892	-0.7	-12.7	40	12.0	-5.6	290	32	321.1	321.6	291.6	329.6	2.56
16	554	5021	-1.7	-10.7	50	9.0	-5.5	287	32	321.4	322.0	292.2	331.5	3.05

University of Wyoming, Department of Atmospheric Science
http://www-das.uwyo.edu

Reading	MB	Altitude (Meters)	**Altitude (Feet)**	Altitude AGL	Temp, C	**Temp, F**	Dew Point Deg C	%RH	**Computed Temp**
1	992	208	676	0	14.4	57.9	11.7	84	71.0
2	965	444	1,443	767	17.4	63.3	10.4	63	67.2
3	925	806	2,620	1,944	16.0	60.8	8.0	59	61.3
4	850	1517	4,930	4,254	9.8	49.6	5.7	76	49.7
5	839	1625	5,281	4,605	8.8	47.8	5.3	79	48.0
6	805	1967	6,393	5,717	8.6	47.5	1.6	61	42.4
7	796	2060	6,695	6,019	9.0	48.2	-8.0	29	
8	744	2619	8,512	7,836	9.0	48.2	-12.0	21	Cell Formula
9	700	3121	10,143	9,467	6.6	43.9	-14.4	21	Trig. Temp -.005 * Altitude
10	680	3359	10,917	10,241	6.2	43.2	-19.8	13	
11	647	3767	12,243	11,567	6.0	42.8	-12.0	26	
12	618	4142	13,462	12,786	3.6	38.5	-18.4	18	
13	586	4571	14,856	14,180	0.4	32.7	-7.6	55	
14	565	4864	15,808	15,132	-0.7	30.7	-18.7	24	
15	563	4892	15,899	15,223	-0.7	30.7	-12.7	40	
16	554	5021	16,318	15,642	-1.7	28.9	-10.7	50	

Trig. Temp: 71.0

Note: Column Headings in Bold are Computed Values

thermals became stronger and carried me into the sky at the limits of my ability to comfortably see and control the 2M Mariah (~2,000 ft.) in a couple of minutes. The weather factors were as follows:

- A high-pressure cold front came to town a day earlier allowing clear skies in the morning and falling humidity.
- There was efficient solar heating with clear skies but the ground of the sod farm was damp due to lots of rain in July.
- There were contrasting areas of the sod farm with dark exposed dirt and other areas with green grass with greater evaporative cooling.
- A favorable lapse rate[1] existed in the atmosphere with a ground (trigger) temperature of about 71°. The trigger temperature is the temperature at which the air is predicted to rise to some significant altitude you hope to reach. In this case, the Pearson theory[2] predicted one could reach 2,000 feet.
- A maximum temperature of 77 deg F. was reached about 3 p.m.

Lapse Rate Plots (actual air temperature vs. altitude)

Information is obtained from weather balloon soundings made at weather stations around the world and is available on the Internet. I had found NOAA – RAOB sources[3] earlier that were not real user friendly. My scientist-weatherman friend, Frank Gouveia from Lawrence Livermore National Labs, told me that a great place to get lapse rate data is from the web page for the University of Wyoming. Here you can get plotted information as well as the data in text format. I'm including a section of that data that I saved as a text file then imported into an Excel spreadsheet for plotting. Use the space delimit option on the import to Excel.

How to get data for your area:

The URL for this Aviation Weather web site is: http://www-das.uwyo.edu/upperair/

From this page select: "Upper Air Observations including Soundings"; then "Atmospheric Soundings", "Text" output, and enter the date of interest and select the time (0Z or 1200Z) from a pull down menu. That time is Zulu time, formerly referred to as Greenwich Mean Time[4]. When the Zulu time is 12:00 Noon in Green Bay, the local daylight-savings time is 7 AM.

The default date entry is the current date. Enter the date of interest if you want data from a previous date. You will need the three or four letter code for the weather station nearest you that have soundings[5]. There is a map with the codes on them for your use. You can click on that map for your selection. There is a well-labeled table that has the information about altitude above sea level in meters vs. the air temperature in centigrade, RH and other information. You can get explanations of terms for the column titles on this page.

The adiabatic lapse rate

Briefly, the air can be counted on to cool as it rises and expands. I'm going to spare you the thermodynamics and point you back to my article in the January 1999 issue. In the case of dry air, the number is adiabatic lapse rate is –5 deg F/1000 feet.

According to Pearson's method, the temperature required to get to a certain altitude can be computed by plotting the altitude vs. temperature from the sounding data. The extrapolation from the point on the lapse rate plot at the altitude of interest along the adiabatic slope (-0.005 deg F/ft) to ground level indicates the trigger temperature. I believe most sailplane pilots use charts with parallel lines for the adiabatic lapse rate pre-plotted and they simply plot the data on this pre-made chart. I favor making new plots using spreadsheet plotting functions.

The August 1st example of a good day is depicted with the 71 deg F trigger temperature shown on the plot. Remember that I said the temperature reached 77 by 3 PM. When the temperature passed the trigger temperatures, the achievable altitude made a major jump from about 800 feet to 4,000 feet. (See plot of August 1 lapse rate.)

Conditions on a "not so great" day of soaring.

On May 15, 1999 the sky was completely cloudy with 15 mph winds from the southeast. From all that I had learned, this would not be a good day for soaring. I found light lift and was able to have consecutive flights of 7, 8, 9 and 13 minutes with my Cumic+. Friends flying with me had a Magic and a Victory C. They were not quite as fortunate with the times but they made more of a search pattern than I did. I suspect that even on such days with poor solar heating, there is still heating going on and some convective cooling over the harvested areas of the sod farm and over the road. The plumes of rising air might not be termed thermal activity but it is certainly useful to R/C sailplaners using, in this case, floaters with low sink rates, being flown slowly. I don't believe altitudes exceeded the launch height. 12:00 Noon Zulu lapse rate data wasn't collected in Green Bay on, for that date, so I can't provide the theoretical comparison between the two dates. I can only point to the lack of optimum conditions for good thermal development.

Comparison of Summer and Winter Lapse Rate Conditions

I compared the soaring for a day in July to a warm day in December. The plot showed how warm the ground level air would have to be to reach 4,000 feet of altitude on each day. In the case of July, only a few degrees of heating were required. This was on an exceptional soaring day. On the day in December, it would have been possible to reach 4,000 ft only with a large amount of solar heating. This is unlikely to happen in December when the sun is low in the sky and there is usually poor conversion of solar energy into ground heat here in Wisconsin. It would be more probable in the desert southwest, but still not as probable as in July. (See July to December comparison chart.)

I hope this has been helpful in your understanding of thermal soaring conditions. Things get more complicated if you are near large bodies of water as we discussed earlier. I recently had some experience with windy weather cloud streets during a contest where 15 modelers were attempting to use the available lift. Hopefully, this will be the topic of the next article. Your feedback would be much appreciated.

– Lee Murray
(lmurray@athenet.net)
920-731-4848

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1 Simons, Martin, & Murray, Lee J., The Natural Side of Thermal Soaring, *RC Soaring Digest*, Vol. 16, No. 1, p. 10

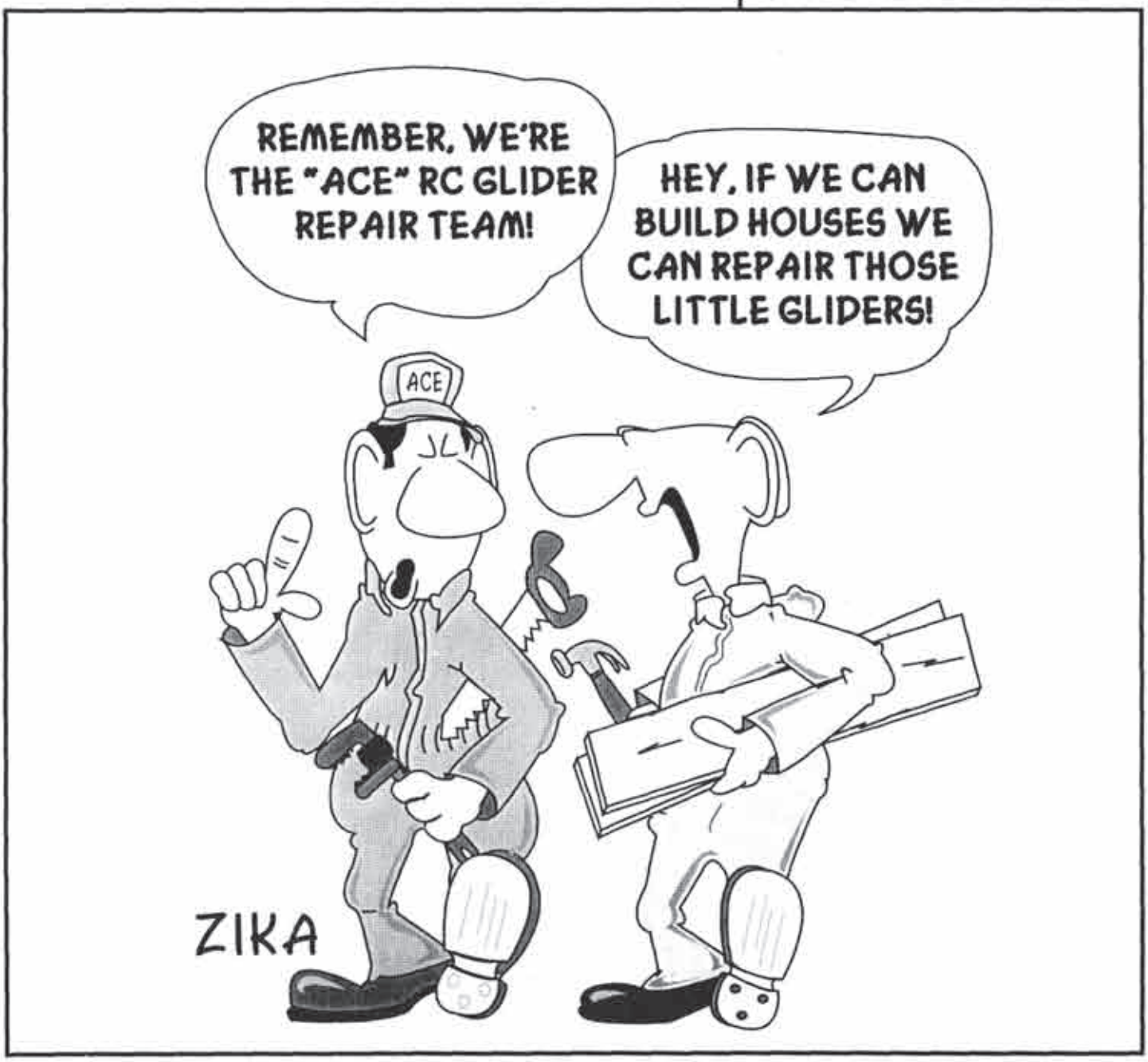
2 Pearson, Russell O., *Technical Soaring*, Vol. XV, No. 4, pp. 110-118

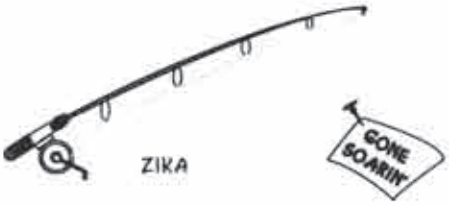
3 National Oceanographic and Atmospheric Administration Radiosond Archive

4 The current time standard is known as Coordinated Universal Time (UTC) which is based on atomic clocks. A good discussion of this standard issue can be found at <http://www.wharton.co.uk/tech006.htm>. This comes with the help of my flying buddy Dave Beck and from Larry Oolman, Department of Atmospheric Science at the University of Wyoming, who runs their Weather Web Page.

5 Soundings are weather balloon data showing temperature, relative humidity and wind information by altitude.

■


REMEMBER, WE'RE THE "ACE" RC GLIDER REPAIR TEAM!
HEY, IF WE CAN BUILD HOUSES WE CAN REPAIR THOSE LITTLE GLIDERS!
ACE
ZIKA



Event Announcement

October 16 - Apple Valley, California

International Scale Soaring Association 2nd Annual High-Desert Scale Fun Fly

Aerotow and winching available for large scale sailplanes on large, obstruction-free field. Motorgliders welcome too! AMA or SFA required. Warmup flying on Friday, Oct. 15. Contact Stan Sadorf at (760) 245-6630 or <soareyes@aol.com>.

MARKET PLACE LISTINGS

VACUUM FORMED PRODUCTS, CANOPIES
Viking Models, U.S.A.
2 Broadmoor Way
Wylie, TX 75098
(972) 442-3910 • fax (972) 442-5258
RCSDigest@aol.com

SCHEDULE OF SPECIAL EVENTS

October 9

NASF Unlimited — Huntsville, AL
Lars Ericsson, lars_ericsson@atk.com
((256) 859-0255

October 16-17

Tulsa Tow #3 — Broken Arrow, OK
D.O. Darnell, (918) 481-5855

October 16

High Desert Scale Fun-Fly — Apple Valley, CA
Stan Sadorf, (760) 245-6630
soareyes@aol.com

June 9-11, 2000

Montague Cross Country Challenge — Montague, CA
3rd Annual, Practice June 9th
DG Airparts, Inc., dgair@cdsnet.net
(541) 899-8215

June 23-25, 2000

MSSC 2000 — Louisville, KY
Ed Wilson, (502) 239-3150
ewilson1@bellsouth.net

For detailed information on events outside of the U.S.A., please view www.sailplanes.com event schedule.

ZIKA

Please send in your scheduled events as they become available!

Hobby Shops that Carry RCSD

Gunnings Hobbies
538 San Anselmo Ave.
San Anselmo, CA 94960
(415) 454-3087

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23052 Lake Forrest Dr.
Unit C2
Laguna Hills, CA
(714) 583-1775

Gyro Hobbies 2
17431 Brookhurst Unit H
Fountain Valley, CA 92708
(714) 378-8924

Hobbies"N Stuff
9577-L Osuna Rd. NE
Albuquerque, NM 87111
(505) 293-1217

Hobby Town U.S.A.
8060 S. 84th St.
La Vista, NE 68128
(402) 597-1888

Hobby Warehouse
4105 South Street
Lakewood, CA 90712
(562) 531-8383

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Five Forks Village
King, NC 27021

Tim's Bike & Hobby
2507 Broadway
Everett, WA 98201
(206) 259-0912

Closet Scale Stuff At Sailplanes Unlimited. Ltd.

1/3 Pribek ASW 27 - 5 meter span (196"), wing profile HQ 2.5/12, ca. 20 lbs.

1/4.2 FiberClassics Nimbus 4 - 6.28 meter span (246"), wing profile E 68-66, ca. 18 lbs.

1/3.6 Roedelmodell DG 800 - 4.15 meter span (163"), wing profile E 207, ca. 11 lbs.

1/3.75 Roedelmodell Fox MDM-1 - 3.8 meter span (149"), wing profile RG 12, ca. 15 lbs.

1/2.77 PriBek ASW 19 - 5.4 meter span (212"), wing profile Ritz 3 mod., ca. 20 lbs.

Please call for additional info: (212) 879-1634.

Classified Advertising Policy

Classified ads are free of charge to subscribers provided the ad is personal in nature and does not refer to a business enterprise. Classified ads that refer to a business enterprise are charged $5.00 per month and are limited to a maximum of 40 words. The deadline for receiving advertising material is the 15th day of the month. (Example: If you wish to place an ad in the March issue, it must be received by February 15.) *RCSD* has neither the facilities or the staff to investigate advertising claims. However, please notify *RCSD* if any misrepresentation occurs. Market Place Listings are $5 a month. Personal ads are run for one month and are then deleted automatically. However, if you have items that might be hard to sell, you may run the ad for two months consecutively.

For Sale - Business

PC-Soar Version 3.7 Sailplane Performance Evaluation Program with Airfoil and Sailplane Library expanded to 60 models including Chrysalis, Anthem, Genesis, Peregrine, Probe, Thermal Eagle, and Spectrum. Airfoil library includes 322 polars with 56 UIUC polars. PC-Soar with Libraries of Sailplanes and Airfoil Polars plus a new Excel utility for working with multi taper wing areas and aerodynamic centers. Reduced Cost: $50 + $3 P&H. PC-Soar library and software Upgrade to Ver. 3.7: $10 + $3 P&H. LJM Associates, 1300 Bay Ridge Rd., Appleton, WI 54915; ph: (920) 731-4848 after 5:30 p.m. weekdays or on weekends. E-mail: lmurray@athenet.net. PC-Soar Web Page: <http://www.athenet.net/~atkron95/pcsoar.htm>.

PRECISION AMAP WING CUTTER, replacement parts, and service. AMAP Model Products, 2943 Broadway, Oakland, CA 94611. Butch Hollidge, (510) 451-6129, or fax (510) 834-0349.

A.M.P. Aerial Model Products, sport, slope, race prototypes - all airfoils. 60" Del Valle Snake, 94" H&K Cobra, AMAP Flair, Kevin Cutler's full house Davenport Monitor. All race tested. Butch Hollidge, (510) 680-0589, eve, California.

PARACHUTES: $10. Dale King, 1111 Highridge Drive, Wylie, TX 75098; (972) 475-8093.

DesignAire: EASY TO USE AIRCRAFT DESIGN SOFTWARE (PC). 3-D sketch, performance, Wt/Bal, inertias, color graphs, panel analysis, static stability, airfoils, envelope, FAR 23A loads and envelope. Runs "airfoil ii". $119. JammAero POBox 236, Horntown VA 23395. www.jammaero.com.

For Sale - Personal

1/4 Roedel Super Cub (towplane), 2.687 meter span, wing profile Clark Y mod. (suitable motors are 160 T, 300 T, OS BGX-1, Brison 3.2 or similar), NIB... $385.00. Contact Robin Lehman, 63 E. 82nd St., New York, NY 10028; (212) 879-1634.

ASK 18, 5.3m, very nice, w/servos... $1695.00; Krause 1/3 scale Salto, excellent condition, w/servos... $1495.00; EMS Minimoa, white/beige beauty, w/servos... $1995.00. Dan Troxell, (949) 831-8013, So. California.

ACE DIGIPACE II (Advanced Ni-CD Battery Management System), battery charger and cycler, simultaneously handles both Rx and Tx batteries, three different charge currents, two discharge currents (If you're not cycling your Ni-CD's, you should be!), $75 OBO. Keith Love, <KeithCLove@yahoo.com>, 282 Ontario Road, Milpitas, CA 95035, 408-945-0531.

Glasflugel Mosquito 1/4 scale, RTF w/all servos (8) & battery, aero-tow or slope... $950.00. Dale King, (972) 475-8093, Texas.

Multiplex Discus 4m... $550.00; Multiplex Alpina CS 4m... $500.00; Multiplex condor 4.2m... $1350.00; ASW-20 5m... $1550.00. Above are RTF. Just add Rx & battery. Airtronics radio gear in all. Greg, (760) 568-2224, California.

60" all moulded HLG, hollow core wing & tail, new... $200.00; all moulded F3B, hollow core wing & tail, new... $550.00. Peter Zak, (305) 687-7706, Florida.

R/C Soaring Resources

These contacts have volunteered to answer questions on soaring sites or contests in their area.

Contacts & Soaring Groups - U.S.A.

Alabama - North Alabama Silent Flyers (NASF), Ron Swinehart, (256) 722-4311, <ron.swinehart @lmco.com>, or Rob Glover at AMA3655@aol.com, http://sh1.ro.com/~samfara/

Alabama - Central Alabama Soaring Society, Ron Richardson (Tres.), 141 Broadmoor Ln., Alabaster, AL 35007, <ron_mail@bellsouth.net>.

Alabama - Southern Alabama & NW Florida Aerotow, Asher Carmichael, (334) 626-9141, or Rusty Rood, (904) 432-3743.

Arizona - Aerotowing, slope sites in AZ (rugged), Arizona Flying Eagles R/C Demo. Show Team, Dave Wenzlick, (602) 345-9232, <azdw@uswest.net, or visit CASL at <http://www.public.asu.edu/~vansanfo/casl>.

Arizona - Central Arizona Soaring League, Iain Glithero, (602) 839-1733.

Arizona - Southern Arizona Glider Enthusiasts, Bill Melcher (contact), 14260 N. Silwind Way, Tucson, AZ 85737; (520) 825-2729. SAGE welcomes all level of flyers!

Arkansas - Northwest Arkansas Soaring Society, Tom Tapp (President), RT 2 Box 306, Huntsville, AR 72740; (501) 665-2201, eve.

California - DUST, Buzz Waltz, 68-320 Concepcion, Cathedral City, CA 92234, (760) 327-1775.

California - High Desert Dust Devils, Stan Sadorf, 14483 Camrose Ct., Victorville, CA 92392; (760) 245-6630, <Soareyes@aol.com>.

California - Inland Soaring Society, Robert Cavazos, 12901 Forman Ave., Moreno Valley, CA 92553, RCAV@aol.com.

California - Northern California Soaring League, Mike Clancy, 2018 El Dorado Ct, Novato, CA 94947; (415) 897-2917.

California - Sacramento Valley Soaring Society, Dudley Dufort, 225 30th St., Suite 301, Sacramento, CA 95816, (916) 448-1266, <www.svss.org>.

California - Soaring Union of Los Angeles, John Bruce, 908 W 245th St., Harbor City, CA 90710, (310) 534-0948, <rcflyinman@aol.com>.

California - South Bay Soaring Society, Mike Gervais, P.O. Box 2012, Sunnyvale, CA 94087; (408) 683-4140 (H), (650) 354-5469 (W).

California - Southern Calif. Electric Flyers, John Raley (President), 1375 Logan Ave., Costa Mesa, CA 92626; (714) 641-1776 (D), (714) 962-4961 (E), e-mail: E-Flyer@ix.netcom.com.

California - Torrey Pines Gulls, Ron Scharck, 7319 Olivetas Ave., La Jolla, CA 92037; (619) 454-4900.

Colorado - Rocky Mountain Soaring Assn., Phil Weigle, 1290 Salem St., Aurora, CO 80011; (303) 341-9256 eve.

Eastern Soaring League (VA, MD, DE, PA, NJ, NY, CT, RI, MA), Tom Keisling (Pres./Editor), (814) 255-7418, kiesling@ctc.com; Ben Lawless (Sec./Tres.), LawlessB@ang.af.mil; Anker Berg-Sonne (Scorekeeper), (508) 897-1750, anker@ultranet.com; Josh Glaab (Contest Coordinator), (757) 850-3971, jglaab@pinn.net; <http://www.eclipse.net/~mikel/esl/esl.htm>.

Florida - Florida Soaring Society, Mark Atzel (President), 1810 SW Terrace, Ft. Lauderdale, FL 33312, (954) 792-4918.

Florida (Central) - Orlando Buzzards Soaring Society (www.specs-usa.com/~ingo/OrlandoBuzzards), Jerre K. Ferguson (Pres.), 4511 Pageant Way, Orlando, FL 32808, (407) 295-0956, <jerre@bellsouth.net>.

Georgia - North Atlanta Soaring Association, Tim Foster, (770) 446-5938 or Tom Long, (770) 449-1968 (anytime).

Hawaii - Maui Island Slope Soaring Operation (MISO), Duane A.K. Asami, 262 Kamila St., Kula, HI 96790, pgr. (888) 932-6247, <dasami@mauigateway.com>.

Illinois (Chicago Area) - Silent Order of Aeromodeling by Radio, Jim McIntyre, 23546 W. Fern St., Plainfield, IL 60544-2324; (815) 436-2744. Bill Christian, 1604 N. Chestnut Ave., Arlington Heights, IL 60004; (847) 259-4617.

Illinois (Northwest) - Valley Hawks R/C Soaring Club, Jeff Kennedy (President), 414 Webster St., Algonquin, IL 60102, (708) 658-0755, eve. or msg.

Indiana (NE Indiana and NW Ohio) - League Of Flight by Thermal (LOFT), Ft. Wayne, Marc Gellart, (419) 229-3384, <isoar2@wcoil.com>, <www.rc-aero.com/LOFT>.

Indiana - Bob Steele, 10173 ST Joe Rd., Fort Wayne, IN 46835; (219) 485-1145.

Iowa - Eastern Iowa Soaring Society (IA, IL, IN, KS, NE, WI), Ed Harris (editor), 2000 NW 84th Ave., Ankeny, IA 50021; (515) 965-5942, <harris.edwin@mcleodusa.net>, <http://eiss.cnde.iastate.edu>.

Kansas - Kansas Soaring Society, Pat McCleave (Contact), 11621 Nantucket, Wichita, KS 67212; (316) 721-5647.

Kansas - Aerotowing, Jim Frickey, (913) 585-3714.

Kentucky - Bluegrass Soaring Society, Frank Foster (President), 4939 Hartland Pkwy., Lexington, KY 40515; (606) 273-1817.

Kentucky - Louisville Area Soaring Society, Ed Wilson (Contact), 5308 Sprucewood Dr., Louisville, KY 40291; (502) 239-3150 (eve), e-mail <ewilson1@bellsouth.net>.

Louisiana - Capitol of Louisiana Soaring Society (CLASS), Leonard Guthrie (contact), 12464 Fair Hope Way, Baton Rouge, LA 70816, (225) 275-2122, flynguts@aol.com.

Maine - DownEast Soaring Club (New England area), <Jamesiii@blazenetme.net>.

Maryland - Baltimore Area Soaring Society, Erich Schlitzkus (President), 52 North Main St., Stewartstown, PA 17363; (717) 993-3950.

Maryland & Northern Virginia - Capital Area Soaring Association (MD, DC, & Northern VA), Chris Bovais, 12504 Circle Drive, Rockville, MD 20850; (703) 643-5513.

Massachusetts - Charles River Radio Controllers, Dick Williamson (past president), 21 Pendleton Road, Sudbury, MA 01776; (781) 981-7857 (W), <williamson@ll.mit.edu>, <http://www.charlesriverrc.org>.

Michigan - Greater Detroit Soaring & Hiking Society, Greg Nilsen (Sec.), 260 Rosario Ln., White Lake, MI 48386-3464; (248) 698-9714, GNilsen624@aol.com.

Michigan - Great Lakes 1.5m R/C Soaring League & "Wings" Flight Achievement Program & Instruction. Ray Hayes, 58030 Cyrenus Lane, Washington, MI 48094; (810) 781-7018.

Minnesota - Minnesota R/C Soaring Society, Tom Rent (Contact), 17540 Kodiak Ave., Lakeville, MN 55044; (612) 435-2792.

Missouri - Independence Soaring Club (Kansas City area, Western Missouri), Edwin Ley (Contact), 12904 E 36 Terrace, Independence, MO 64055, (816) 833-1553, eve.

Missouri - Mississippi Valley Soaring Assoc. (St. Louis area), Peter George, 2127 Arsenal St., St. Louis, MO 63118; (314) 664-6613. Mark Nankivil, nankmc@quixnet.net, (314) 781-9175.

Nebraska - B.F.P.L. Slopers, Steve Loudon (contact), RR2 Box 149 E1, Lexington, NE 68850, (308) 324-3451/5139.

Nebraska - Lincoln Area Soaring Society (Wilson Slope Races), Jim Baker, 920 Eldon Dr., Lincoln, NE 68510, (402) 483-7596, jcbaker@inebraska.com, <http://www.geocities.com/CapeCanaveral/Hangar/1671/lass-2.html>.

Nebraska - SWIFT, Christopher Knowles (Contact), 12821 Jackson St., Omaha, NE 68154-2934, (402) 330-5335.

Nebraska - Ken Bergstrom, R.R. #1, Box 69 B, Merna, NE 68856; (308) 643-2524, <abergst@neb-sandhills.net>.

Nevada - Las Vegas Soaring Club, Jim Allen (Pres), 7117 Caprock Cir., Las Vegas, NV 89129; ph (702) 658-2363.

Nevada - Sierra Silent Soarers (Reno/Sparks/Carson City/Minden area), Chris Adams, (775) 345-1660, chris@scrollsander.com, <http://www.scrollsander.com/SierraSilentSoarers.htm>.

New Jersey - Vintage Sailplane R/C Association, Richard G. Tanis (President/Founder), 391 Central Ave., Hawthorne, NJ 07506; (201) 427-4773.

New Mexico - Albuquerque Soaring Association (all soaring & electrics), Jim Simpson (contact), 604 San Juan de Rio, Rio Rancho, NM 87124; (505) 891-1336, <jimbonee@aol.com>, <http://www.abqsoaring.com>.

New York, aerotowing Rochester area, Jim Blum and Robin Lehman, (716) 335-6515.

New York - Elmira - Harris Hill L/D R/C, aerotowing & slope, John Derstine, (717) 596-2392, e-mail johnders@postoffice.ptd.net.

New York, aerotowing Long Island Area, Robin Lehman, (212) 744-0405.

New York - (Buffalo/Niagara Falls area) - Clarence Sailplane Society, Lyn Perry (President), (716)655-0775; e-mail perryl@sstaff.sunyerie.edu; Jim Roller (Competition Coordinator), (716) 937-6427.

New York - Long Island Silent Flyers, Stillwell Nature Preserve, Syosset, NY, Ze'ev Alabaster (President), (718) 224-0585, or Peter DeStefano (VP), (516) 586-1731.

New York - Syracuse area, Central NY Sailplane Group, Dave Zinteck, Minoa, NY, (315) 656-7103, e-mail Zinteck@aol.com.

North Carolina - Aerotowing, Wayne Parrish, (919) 362-7150.

Northwest Soaring Society (Oregon, Washington, Idaho, Montana, Alaska, British Columbia, Alberta), Sandie Pugh (Editor - NWSS Eagle), 1119 SW 333rd St., Federal Way, WA 98023, e-mail: parrot2luv@aol.com, (253) 874-2429 (H), (206) 655-1167 (W).

Ohio - Cincinnati Soaring Society, Ed Franz, 7362 Ironwood Way, Burlington, KY 41005; (606) 586-0177, <ejfranz@fuse.net>.

Ohio - Dayton Area Thermal Soarers (D.A.R.T.S.), Walt Schmoll, 3513 Pobst Dr., Kettering, OH 45420, (513) 299-1758.

Ohio - Mid Ohio Soaring Society (MOSS), Hugh Rogers, 888 Kennet Ct., Columbus, OH 43220; (614) 451-5189, e-mail <tomnagel@iwaynet.net>.

Ohio, Kentucky & Indiana - Ohio Valley Soaring Series, Marc Gellart, (419) 229-3384, <isoar2@wcoil.com>, <www.dma.org/DARTS/ovss/ovss.html>.

Oklahoma - Central Oklahoma Soaring, George Voss, (405) 692-1122.

Oklahoma - Tulsa R/C Soaring Club (TULSOAR), http://www.mccserv.com/tulsoar

Oregon - Bay Area R/C Fliers, Mike Shaw, <grizzy2@gte.net, (541) 269-2423.

Oregon - Portland Area Soaring Society (PASS), Pat Chewning (Secretary), 16766 NW Yorktown Dr., Beaverton, OR 97006, (503) 645-0323, e-mail: patch@sequent.com, www.europa.com/~patch/

Oregon - Salem Soaring Society, Al Szymanski, CD, (503) 585-0461, http://home.att.net/~aszy/sss/>.

Oregon - Southern Oregon Soaring Society, Jerry Miller, 3431 S. Pacific Hwy. TRLR 64, Medford, OR 97501, e-mail Milljer@aol.com, ph/fax (541) 535-4410.

Tennessee - Memphis Area Soaring Society, Bob Sowder, 1610 Saddle Glen Cove, Cordova, TN 38018, (901) 751-7252, FAX (901) 758-1842.

Tennessee - Tullahoma (Southern Middle Area), Coffee Airfoilers, Herb Rindfleisch, 106 Inglewood Circle, Tullahoma, TN 37388, (931) 455-1836, <herb@cafes.net>.

Tennessee - Soaring Union of Nashville, Terry Silberman, PO Box 17946, Nashville, TN 37217-0946, (615) 399-0846.

Texas - aerotowing, Dallas area, Andrew Jamieson, 9426 Hillview, Dallas, TX 75231, (214) 349-9346, e-mail ajsleep@aol.com. Larry Sengbush, (972) 291-4840.

Utah - Intermountain Silent Flyers, Tom Hoopes, (801) 571-3702 (eve). "Come Fly With Us!"

Vermont - Steve Savoie, 926 Gage St., Bennington, VT 05201, (802) 442-6959.

Virginia - Blue Ridge Area Soaring Society (Central Virginia - Waynesboro), Tom Broeski, (540) 943-3356, <tjb@rica.net>.

Virginia - Tidewater Model Soaring Society, Herk Stokely, (757) 428-8064, herkstok@aol.com.

Virginia - Appalachian Soaring Association, Virginia's Southwest (Bristol area), Greg Finney, 106 Oakcrest Circle #5, Bristol, VA 24201; (540) 645-5772, e-mail <gfinney@naxs.com>.

West Virginia & Pennsylvania - Tri-State Soaring, Chip Vignolini, 2784 Mill St., Aliquippa, PA 15001; (724) 857-0186, Voice mail (412) 560-8922, <ydne30a@prodigy.com>.

Washington - Seattle Area Soaring Society, Waid Reynolds (Editor), 12448 83rd Avenue South, Seattle, WA 98178; (206) 772-0291.

Wisconsin - Valley Aero Modelers, Lee Murray, 1300 Bay Ridge Rd., Appleton, WI 54915; (920) 731-4848, <lmurray@athenet.net>.

Outside U.S.A.

Australia - Southern Soaring League, Inc., Mike O'Reilly, Model Flight, 42 Maple Ave., Keswick SA 5035, Australia. Phones: ISD+(08) 8 293-3674, ISD+(08) 8 297-7349, ISD+(018) 8 082-156 (Mobile). FAX: ISD+(08) 8 371-0659.

Canada - Calgary R/C Soaring Society (Alberta), thermal duration & slope soaring, Chris Gregg (Pres.), (403) 226-1019, cgregg@cadvision.com; Eric Weder (Sec.), (403) 289-8844, eaweder@telusplanet.net.

Canada - Montreal Area - C2VM Glider Club, Jacques Blain (President), days (514) 443-5335, eve. (514) 652-6167.

Canada - Greater Niagara Area Thermal Soarers (GNATS), Flat Field Soaring & Aerotowing, Gerry Knight, (905) 934-7451 or Don Smith, (905)934-3815.

Canada - MAAC Men Gliding Club, Jim Holland, 168 Verona Dr., Winnipeg, Manitoba, Canada R2P 2R8, (204) 697-1297.

Canada - Southern Ontario Glider Group, "Wings" Programme, dedicated instructors, Fred Freeman, (905) 627-9090, or Bill Woodward, (516) 653-4251.

England (CIAM Flyer), Jack Sile (Editor), 21 Bures Close, Stowmarket, Suffolk, IP14 2PL, England; Tele. # 0449-675190.

England (southwest) - Sean Walbank, Woolcombe Hays, Melbury Bubb, Dorchester, Dorset, DT2 0NJ, phone 01935-83316.

Hong Kong - Robert Yan, 90 Robinson Road, 4th Floor, Hong Kong, (852) 25228083, fax (852) 28450497, yanr@asiaonline.net.

Japan - Dr. Paul "Sky Pilot" Clark, 2 - 35 Suikoen Cho, Hirakata Shi 573, Osaka Fu, Japan; IAC+(81) 720-41-2934, <pclark@osk3.3web.ne.jp>
http://www3.osk.3web.ne.jp/~pclark/skypilot/

Scotland - Ron Russell, 25 Napier Place, South Parks, Glenrothes, Fife, Scotland KY6 1DX, ph. 01592 753689.

RCSD Index/Database

Available from: <http://www.athenet.net/~atkron95/pcsoar.htm>. Or, send 3.5" high density disks & SASE with stamps for 2 oz. Lee Murray, 1300 Bay Ridge Rd., Appleton, WI 54915; (920) 731-4848 after 5:30 pm weekdays or on weekends, <lmurray@athenet.net>.

Reference Material

Summary of Low-Speed Airfoil Data - Volume 3 is really two volumes in one book. Michael Selig and his students couldn't complete the book on series 3 before series 4 was well along, so decided to combine the two series in a single volume of 444 pages. This issue contains much that is new and interesting. The wind tunnel has been improved significantly and pitching moment measurement was added to its capability. 37 airfoils were tested. Many had multiple tests with flaps or turbulation of various configurations. All now have the tested pitching moment data included. Vol 3 is available for $35. Shipping in the USA add $6 for the postage and packaging costs. The international postal surcharge is $8 for surface mail to anywhere, air mail to Europe $20, Asia/Africa $25, and the Pacific Rim $27. Volumes 1 (1995) and 2 (1996) are also available, as are computer disks containing the tabulated data from each test series. For more information contact: SoarTech, Herk Stokely, 1504 N. Horseshoe Circle, Virginia Beach, VA 23451 U.S.A., phone (757) 428-8064, e-mail <herkstok@aol.com>.

"Aerotow '97 Elmira!" video taken at the Annual Northeast Aerotowing Fly-in, New York. 56 minutes of great flying, interviews, pristine scale models, demos, full-scale as well as models, and rare vintage film from Harris Hill in the 1930's. Check or money order, $24.95 plus $3.00 S&H (U.S.), payable to John Derstine, RD 3# Box 336, Gillett, PA 16925; (717) 596-2392, <johnders@postoffice.ptd.net>.
S&H foreign: $6 Canada/Mexico, $7 Europe, $8 Asia/Africa, $8.50 Pacific Rim. VHS format, NTSC standard. PAL format $40 + applicable shipping.

Books by Martin Simons: "World's Vintage Sailplanes, 1908-45", "Slingsby Sailplanes", "German Air Attaché", "Sailplanes by Schweizer". Send inquiries to: Raul Blacksten, P.O. Box 307, Maywood, CA 90270, <raulb@earthlink.net>. To view summary of book info.: http://home.earthlink.net/~raulb

Seminars & Workshops

Free instruction for beginners on construction & flight techniques, week-ends (excl. contest days), "AJ" Angelo, South Bay Soaring Society (San Jose area), (415) 321-8583.

BBS/Internet

Internet soaring mailing listserve linking hundreds of soaring pilots worldwide. Send msg. containing the word "subscribe" to soaring-request@airage.com. The "digestified" version that combines all msgs. each day into one msg. is recommended for dial-up users on the Internet, AOL, CIS, etc. Subscribe using soaring-digest-request@airage.com. Post msgs. to soaring@airage.com. For more info., contact Michael Lachowski at mikel@airage.com.

Sailplane Homebuilders Association (SHA)

A Division of the Soaring Society of America

The purpose of the Sailplane Homebuilders Association is to stimulate interest in full-size sailplane design and construction by homebuilders. To establish classes, standards, categories, where applicable. To desiminate information relating to construction techniques, materials, theory and related topics. To give recognition for noteworthy designs and accomplishments.

SHA publishes the bi-monthly ***Sailplane Builder*** newsletter. Membership cost: $15 U.S. Student (3rd Class Mail), $21 U.S. Regular Membership (3rd Class Mail), $30 U.S. Regular Membership (1st Class Mail), $29 for All Other Countries (Surface Mail).

Sailplane Homebuilders Association
Dan Armstrong, Sec./Treas.
21100 Angel Street
Tehachapi, CA 93561 U.S.A.

The League of Silent Flight (LSF) is an international fraternity of RC Soaring pilots who have earned the right to become members by achieving specific goals in soaring flight. There are no dues. Once you qualify for membership you are in for life.

The LSF program consists of five "Achievement Levels". These levels contain specific soaring tasks to be completed prior to advancement to the next level.

Send for your aspirant form, today:

League of Silent Flight
c/o AMA
P.O. Box 3028
Muncie, IN 47302-1028 U.S.A.

The Vintage Sailplane Association

Soaring from the past into the future! The VSA is dedicated to the preservation and flying of vintage and classic sailplanes. Members include modelers, historians, collectors, soaring veterans, and enthusiasts from around the world. Vintage sailplane meets are held each year. The VSA publishes the quarterly BUNGEE CORD newsletter. Sample issues are $2.00. Membership is $15 per year. For more information, write to the:

Vintage Sailplane Association
13312 Scotsmore Way
Herndon, VA 22071 USA

The Eastern Soaring League (ESL) is a confederation of Soaring Clubs, spread across the Mid-Atlantic and New England areas, committed to high-quality R/C Soaring competition.

AMA Sanctioned soaring competitions provide the basis for ESL contests. Further guidelines are continuously developed and applied in a drive to achieve the highest quality competitions possible.

Typical ESL competition weekends feature 7, or more, rounds per day with separate contests on Saturday and Sunday. Year-end champions are crowned in a two-class pilot skill structure providing competition opportunities for a large spectrum of pilots. Additionally, the ESL offers a Rookie Of The Year program for introduction of new flyers to the joys of R/C Soaring competition.

Continuing with the 20+ year tradition of extremely enjoyable flying, the 1999 season will include 14 weekend competitions in HLG, 2-M, F3J, F3B, and Unlimited soaring events. Come on out and try the ESL, make some new friends and enjoy camaraderie that can only be found amongst R/C Soaring enthusiasts!

ESL Web Site: http://www.eclipse.net/~mikel/esl/esl.htm

ESL President (99-00): Tom Kiesling (814) 255-7418 or kiesling@ctc.com

ZIKA

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The Condor is designed by Mark Allen, who is considered one of the best model sailplane designers in the United States, if not the world. Mark has taken all of his previous experience in competition thermal duration flying, plus all the knowledge he has gained from his earlier contest and sport designs, to design the Condor. Mark Allen's previous planes, to name only a few, are: Falcon 880 and 800, Falcon 600, Swift, Thermal Eagle, Vulcan, Night Hawk, Sky Hawk, Electric Hawk, Falcon 550E, Rocket, Pocket Rocket and, of course, the molded, world championship F3B Eagle. By taking the best of these designs and the new construction techniques available today, Mark has come up with, what we feel, is the absolute best open-class sailplane available.

The wings are made in America by Ron Vann, owner of Spectrum Enterprises. Ron is also an avid competition flier, and is considered to be one of the best wing manufacturers in the industry. Taking his years of experience in manufacturing wings, Ron has produced wings and stabs for the Condor that we feel are world class. Starting with the spar that Mark Allen designed, Ron uses only the best and most accurately cut foam cores available. He then uses hand-picked obechi from Kennedy Composites, which is applied with West Systems epoxy.

CONDOR

Tomorrow's Sailplane, Technology Today

This is after he has first reinforced the wing with carbon fiber and fiberglass. The servo wells are routed out, as are the flaps and ailerons. What this means for the sailplane enthusiast is a minimum amount of work before getting the sailplane into the air. The wing is light but strong enough to take "pedal to the metal" launches. Also available as an option is Ron's unique internal capped hingeline. This means even less work for the modeler.

The fuselage is made by Steve Hug, owner of the Fuse Works. Steve is another master at what he does. Fuse Works makes what we consider to be the best fuselage in the business. Steve uses only the best fiberglass and Kevlar™ available. All fuselages are manufactured using the West Systems epoxy. Steve's fuselages have the least amount of pinholes, if any, that we have seen. In fact, the fuselage is so pretty that many people do not paint it. The fuselage is extremely light, and yet strong enough for very aggressive flying and landing. For those with very little building time, and those who don't like to paint, there is an optional pre-painted, in the mold, fuselage which includes a unique carbon fiber canopy.

All kitting is done at Slegers International's new and larger manufacturing facilities. We have spared no time or expense with supplying the modeler with the best materials available. The kit contains pre-sheeted wings and stabs by Ron Vann, fiberglass and Kevlar™ reinforced fuselage by Steve Hug, 3/8" diameter titanium wing rod from Kennedy Composites, optional 3/8" diameter steel wing rod by Squires Model Products, control horns and tow hook by Ziegelmeyer Enterprises, pushrods by Sullivan, or optional one piece steel rods. All wood is custom cut. Specially cut basswood of 60" is supplied to eliminate splices in leading edge, flaps and aileron capping. All balsa is hand picked, light to medium, to ensure light weight wing tips, stab tips, and rudder. Aircraft ply is used for the pre-fit servo tray and towhook block. A comprehensive instruction manual is included.

The Condor, designed by Mark Allen, wings by Ron Vann, fuselage by Steve Hug, and kitted by Slegers International, we feel, is the best open-class, thermal duration sailplane available, at an affordable price of $395.00 plus S&H.

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