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R/C
Soaring
D I G E S T

December, 1994
Vol. 11, No. 12

U.S.A. \$2.50



Classical elliptical and traditional
open bay construction

Built by Rudy Coletti of Upstate New York.

HOBBY HORN SENSOAR

Photo by Dave Garwood.
See About the Cover on page 1.

R/C SOARING DIGEST

A Publication
for the R/C Sailplane Enthusiast!



TABLE OF CONTENTS

1 Soaring Site Jerry & Judy Slates	34 Wing/Stab Bagging Lee Murray
2 Sun Glasses Lee Murray	36 How High? A Little Less for a Little More Nick Trubov
4 On The Air with Cornfed Visalla at Its Best Fred Rettig	40 Soaring East to West, Introduction Club of the Month, People in Soaring Bob Sowder
8 Hexcell: A Newly Available Core Material W.D. Williams	44 Controlled Airspace Considerations 20/20? Or, Where Did That Airplane Go? Jim Smith
9 Bubble Wrap Hint Gregory Vasgerdsian	46 Air Jam or Hand Launch Topics Scott Smith
10 Jer's Workbench Completed Fuselage & Model Jerry Slates	48 An Easy Leading Edge Finishing Technique for Bagged Wings Harley Michaelis
14 Lift Off! Getting Started in Electrics Ed Slegers	50 NASSA News Gregory Vasgerdsian
15 Trainer Cord Trainer vs Trainee Revisited Kitty Pearson	57 Winch Line Magazine Photography Gordon Jones
16 On The Wing Four Basic Concepts - Part III Bill & Bunny Kuhlman	
19 V-Tails... Why? George Siposs	
22 Understanding Sailplanes Elementary Stressing Part III Martin Simons	
28 Understanding the JR Propo X-388S Radio, Part I Richard A. Eckel	
32 RCHLG in Japan Paul P. Clark	

OTHER SECTIONS/INFORMATION

- 55 Events
- 58 New Products

ADVERTISING

- 59 Advertiser Index
- 60 Classified Ads

SPECIAL INTEREST GROUPS & CONTACTS

- 53 F3B/USA • F3F/USA
- 53 League of Silent Flight - LSF
- 53 North American Scale Soaring
Association - NASSA
- 53 National Soaring Society - NSS
- 53 T.W.I.T.T.
- 53 Vintage Sailplane Assoc. - VSA
- 54 R/C Soaring Resources

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The Soaring Site

About the Cover

We're always looking for something different for the cover of *RCSD*, and we asked Dave Garwood of Scotia, New York if he could send us a photograph for this issue. Dave does beautiful black and white photographs and most of you are aware that many of his photographs and articles frequently appear in magazines such as *Model Aviation*, *Flying Models*, *Model Airplane News*, and *Model Builder*.

If any of you are interested in sending in photographs for cover consideration, all good contrasting B&W (in some cases color) photos, in focus, will be considered. Additionally, we prefer that you turn your camera sideways as Dave has done for the cover this month. Gordon Jones, in his column, goes more in-depth about some of the things to keep in mind when taking good photos. Keep in mind that we are looking for something different and if we use your photo on the cover, we will give you a free one year first class or airmail subscription to *RCSD*.

Soaring East to West

After more than 30 years of flying RC sailplanes, another sailplane enthusiast, Bob Sowder, of Cordova, Tennessee, has "volunteered" to write a column he calls "Soaring East to West". Bob does an excellent job of setting the stage for future columns, and we leave it to him to tell you what his column is all about. Hit it, Bob!

IMS

The 18th Annual IMS Pasadena, California Model Sport and Hobby Show is scheduled for January 13 - 15. We received literature from Bill and Anita Northrop that says, "As in the past, the 1995 show will feature lots of live action, with the operating boat pond, outdoor helicopter demonstrations, the largescale

Del Oro Pacific Railway and, as in 1994, Tamiya America will be holding R/C car races on the patio outside the Conference Building all day Saturday and Sunday. An added attraction for 1995 will be a display of full size kit cars, which will be located at various spots around the show."

The list of exhibitors as of July 20, 1994 is quite lengthy, but to name a few, the list includes AMA, Ace, Aerospace Composite Products, Airtronics Inc., Cannon R/C Inc., Cermark Electronic & Model Supply, Charlie's, Composite Structures Technology, E.H. Yost & Company, Eastern Tool & Supply Co., Tekoa, Futaba, Hobby Lobby International, Hobby Shack, Horizon Hobby Distributors, Just Plane Fun Models, MM Glider Tech, Model Research Labs, Peck-Polymers, Sig Manufacturing Co. Inc., Superior Aircraft, Vintage R/C Society, Astro Flight, Intl. Miniature Aircraft Association, and Society of Antique Modelers.

Printing of RCSD

It was almost six years ago, but it seems like just yesterday, that we asked Joe

Borland of J. Morgan Graphics in Concord, California to print RCSD for us every month. Joe has done a wonderful job and has put up with our printing questions and requests. But Joe is going on to other things. We wish him luck and thank him for all the help and support he has given us for so many years.

It is easy to get spoiled having someone like Joe around for so long, and with this writing, we are looking for someone new to put up with our questions and help us get RCSD out the door. While we can't tell you who that will be as yet, we wanted to let you know that there are changes in the mill and are hoping that this issue of RCSD will be as good as ever, or even better. However, we also know that there is always a learning curve when doing something new, so if we do something wrong, we'll try to fix it next month, and apologize in advance!

**Season's Greetings!
Merry Christmas
& A Happy New Year!
Jerry & Judy Slates**



**Sun
Glasses**

...by Lee Murray
Appleton, Wisconsin

For those of us who have prescription glasses, we are often dissuaded by the cost of new prescription sun glasses, we might use generic uncorrected sun glasses, either clip-on or just plain sunglasses. I have discovered that sun glasses can be created from an old set of prescription glasses.

Those of us above 40 have to get new glasses more frequently, as our arms get shorter and our eyes won't read the fine print any longer. My former prescription glasses were tinted for only \$7 by Shopko, a Midwest and Northwest discount department store chain. I initially worried about perhaps getting too much UV radiation through the inexpensive tinting. To satisfy my concerns, I measured the UV and visible light transmission of the lenses with some equipment in the lab in which I work. The physical spectrum showed the tinting to filter more than 85% of blue and ultraviolet, while only filtering less than 50% of the greens and reds. The colors are brighter and I think I fly better with these glasses. ■

1995  1995 

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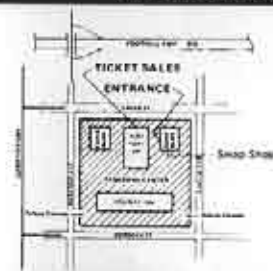
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RAFFLE: Radio control systems, kits, engines, accessories, etc. to be raffled off during show. Big prize numbers to be announced numbers for smaller prizes to be posted. New tickets sold each day. No carry over. Prizes must be claimed at show. More tickets drawn if big prizes are not claimed.

OUT OF TOWN VISITORS: The on-site Pasadena Holiday telephone (818-449-4000) offers reduced rates to IMS attendees. Be sure to mention IMS when calling for reservations.

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On The Air With Cornfed



Fred Rettig
1778 S. Beltline Highway
Mobile, Alabama 36609
(205) 471-2507 (days)

ZIKA

Visalia at Its Best

"California, Here I Come", was the song in my mind in early September of this year. I had just received my confirmation for the Visalia contest. The next hill to climb was how to pay for the airline tickets. That hill looked like a mountain. Day after day went by, but no money until, one evening after supper, I heard one of those two hogs squeal out. That's when it all came together. I'm sure y'all remember the two hogs that Fred Weaver won? Well, he never came and got 'em.

The next day, me and the baby loaded them up and away we went to the market. They sure made a mess of me and my truck, but who cares, 'cause the price of bacon looked real good to me. (If you're reading this, Fred, the law says that possession is nine-tenths of the law, and the feed bill was pretty high. Actually, you could owe me for all that tender love and care I took on your used-to-be hogs.)

Departure day to California finally came. It was both a happy and a sad day for me. You see, I was the first one in the family to leave on such a long trip. All the family,

Ben Clerx with Mako.



Curt Nehring with Mako-V.



James Smith with Sula Bird.



Top Ten (L - R):
1 - Roger Lackey
2 - Joe Wurts
3 - Jim Skinner
4 - Scott Meader
5 - B.J. Weisman
6 - Fred Sage
7 - Ben Clerx
8 - Cody Robertson
9 - Fred "Cornfed" Rettig
10 - Ron Vann
(Cody Robertson won the flyoff to win a new Genesis.)



Ron Vann with Prism.

(Below) Ben Matsumoto
with "X-CELENT"
F3B, hollow
core home brew.

including aunts and uncles, loaded into the pick-up. It was standing room, only. At the airport, there was a lot of huggin', kissin', and cryin'. But I had a job to do. I had to show them Californians that the south would rise, again. I had to defend them southern boys back home, and that I finally did.

As I entered through the plane door, I hollered back at the family, "I'll see ya'll, Tuesday."

It was a good flight. The only problem was that I got a little of tired standing and holding onto that bar the whole flight.

California was a lot different than what I was used to. Gettin' there a few days early, I was able to find my way around Visalia. Now, Visalia is in a valley, and is known for being one of the greatest agricultural productive areas in all California. You name it; they grow it there. They sure grow some nice folks there, too.



Out to the field early Friday morning; folks started showing up to set up tents and mobile trailers. Seems that someone had a brand new 100 foot motor home. It was longer than my house! Tent City started to appear. Looked like a high dollar refugee camp to me. After the tent and camper row was set up, I guess it ended up about 400 feet long, and two and three tents deep, with one row of campers and motor homes. It was bigger than the fair back home!



Enrique Mertins, Robin & Pete Olsen
Peregrine & legend



Jousting on tow.



Raffle tent. Forget it, I've got
the winning ticket.



Larry and Gary Fogel with
Multiplex DG-600.

Field workers started setting up for the world's biggest two day R/C glider contest; and what a contest it was! There was a sense of excitement in the air. People were pointing fingers saying, "There is so-and-so." And, "Did you see what's his face?" There I was in the hot bed of this sport; I was among some of the very best. Some of the fliers I remember seeing were Skip Miller, Fred Weaver, Randy Spencer, The Renaud Brothers, Joe Wurts, Rich Spicer, Daryl Perkins, Mark Levoe, Tom Peadon, Don and Betty Vickers, David Layne, Henry Bostick, Ben Clerx, and Ron Vann. (My, I am

dropping names like peanut shells at the circus.) Now, I know that not all the hot shots from around the country were able to show up but, for the folks that did, their goal was to finish on the first page of a five page list that contained the names of 220 fliers!

Friday was a day of just testing the air and trying to get a little momentum on your side in anticipation of what the next two days would bring. Some guys were checking their C.G., while others did nothing but practice their landings or fine tune their plane for the best launch. For myself, I was ready. If I didn't have it before I got to California, then I sure wouldn't find it now. So, I just kinda milled around, meeting new folks and

checking out the wares on display by the kit manufacturers. Let me tell y'all, this had to be one of the best trade shows on site of any of the contests I have ever attended. Just to list some of the vendors, there was Airtronics, Layne/Urwyler, RnR Products, Spectrum Enterprises, Levoe Design, The Bag Lady, Kennedy Composites, Clerx Aeronautics, M&M, and Tekoa. To top it all off, the above all donated prizes for the great raffle!

The raffle tent was jam packed with any and everything needed to supply a R/C modeler with. It seems that just about everyone in the model glider industry donated something such as Slegers International, Wood Logic, Henry Bostick, C.R. Aircraft, Team Taco, Global Quality, and RCSD. The list could go on and on. There was even stuff there that wasn't related to airplanes such as a blow torch set, bike, drill presses, tools, etc. You name it. Everything but the kitchen sink was donated, and it might even have been there someplace, too.

One thing I knew for sure was that I had to stay focused. The raffle, the folks, and the partying was not what I had gone to California for. I was here to win. I told some of the locals that I would sure like to do real good at this contest. I don't know why, but they just laughed and said, "Boy, this contest is for fun and partying." But I knew better and that when the smoke cleared, only a hand full would be left standing and holding trophies in their hands. It was to be an up hill climb of fighting and scratching to get to the top of the hill, where only a few would be able to stand on top of the mountain and claim a victory.

I tossed and turned all night long Friday night, wishing that the night would quickly pass, and I would be able to get to the flight line and get that first flight over with. However, 6:00 A.M. came too quickly, and I found myself wanting more

sleep as I made my way out to the field. Once my plane was assembled, I turned over my transmitter to the folks at the well oiled impound tent. I tell you, they guard those transmitters like they was gold. They even ran a magic wand that made a funny noise over those things. I can't begin to tell ya how well the Visalia group ran that contest. I mean, they ran 220 plus fliers per round in about one hour and twenty minutes! The surprising thing was that I never felt rushed. Things just went along quite smoothly.

All right! To the competition. The pilots meeting went quick and smooth. The sky was blue and perfect on both days, with a little downwind push in the morning on launches and landings. First round was three minutes, then a five, a seven, and a four. The first round on Saturday was quite easy, but those landing points were about as hard to get as finding hens teeth. (I'm telling you, they hid the 25% which was the highest score you could get. They musta hid it in between two 15% and a 10% on each end.) The landing zone was a long rectangular box with a small center box for the highest score. It was by far the hardest landing zone I have ever seen.

As round two ended, it seemed that about thirty fliers would rock back and forth, fighting for the top ten honors. On Sunday, the day started just the same, but a pattern for the top ten fliers was set. I wasn't in the top ten, but I was close. Them boys hung tough. Every time I tried to open the door, they just slammed it tight. There were three rounds on Sunday. During the second round, I looked over to the left of the flight line and noticed that there were about ten to fifteen planes in one thermal, and all were goin' up. As I watched, two of them got all tangled up: a Spectrum and a Thermal Eagle. They were locked together like two hawks fighting; they were spinning out of control. It looked to

be just a matter of time until they hit the ground. But the pilot of the Thermal Eagle got his plane under control, and broke away with only a few scares; the Spectrum never stood a chance and spun to the earth out of control.

The contest came down to Joe Wurts and Roger Lackey challenging each other for the first place spot, only to have Roger come out on top. Looking at the team standings from a manufacturer version, Team Mako took first and seventh, Team Super-V (had the most planes in the top ten) took fifth, eighth, and ninth; Team RnR took fourth, and Team Airtronics took second and third.

In closing, the raffle was second to none, and the folks at Visalia want to thank all of the donors who helped close out this great contest. There is one thing I would like to say to the rest of the country that cannot compete or go to California; the only thing they have better than the rest

of the country is more competition on a regular basis, and the only way to beat them at their own game is to practice every chance you get. That way, when they come eastward, we can put an old-fashioned home boy whippin' on them and send them home cryin' like a baby.

Signing Off, Cornfed

P.S. Say your prayers and don't forget to rake the leaves.

ATTENTION: Joe Rodriguez of California. Don't forget to bring extra glue to the field and wiggle the stick. ■



**MERRY CHRISTMAS
HAPPY NEW YEAR**

Hexcell: A Newly Available Core Material

...by W.D. Williams
Gravel Switch, Kentucky

Structurally, the ideal core material for sandwich type construction is a honeycomb rather than a foam. Full size aircraft have made use of an aluminum honeycomb core for decades, but nothing comparable which would be suitable for models has been generally available. Recently, however, Aerospace Composite Products added to its line a 1/8" thick honeycomb core made of an impregnated Nomex fabric. (Actually, ACP offers two honeycombs. The regular honeycomb is intended for flat and slightly curved parts. A second version, which has cells that are 3 times as long as they are across, is used for tighter curves.) Because I'm curious about anything that

might allow me to build a better model, I purchased a small sample.

For several months, the sample sat on my bench. I was puzzled. How was I supposed to tell how much resin to apply to a skin to make a good bond to the honeycomb? Eventually, I decided dithering wasn't going to give me an answer and that the only way for me to find out was to give it a try and see what happened. I wet out 3 oz./sq. yd. glass fabric on mylar sheets using enough resin so that the weave was covered and the surface looked very slightly wet. Ordinarily, at this point in a layup, I would use toilet paper to blot up the small excess resin that changes the look of the layup from a dry look, in which the weave stands out, to one in which the weave is filled and the surface has a slightly wet shine. Then, the sandwich of fiberglass - honeycomb - fiberglass was pressed between two 3/8" glass plates with four or five pounds of

handy stuff piled on top. This was done in a very casual way using some excess resin and scrap fabric after I finished laying up and bagging a wing. There are no doubt more sophisticated procedures which I would very much like to hear about, but I was on my own.

The result was a sandwich which was approximately or even a bit lighter than a comparable balsa or Rohacell and glass sandwich, and roughly comparable, or perhaps somewhat stiffer. But, the impact resistance and peel strength of the bond between the fiberglass and the honeycomb was very much better. And, the honeycomb itself, which is very floppy before lamination, turns out to have outstanding strength in compression and torsion. Altogether, the properties of the sandwich should make for a lighter, more ding resistant and easily repairable structure. When it does fail, it tends to do so locally rather than de-laminating over an extensive area.

I won't try to describe how it looks, but when using fiberglass in the sandwich, it is possible to visually inspect the bond between the fiberglass skin and the honeycomb. It's easy to tell if you've got a good bond. And, the bonding process doesn't appear to be critical. When the honeycomb is bonded under light pressure to a wet fiber layup, the edges of the honeycomb cells seem to press slightly into the fabric, and the resin wicks up onto the cells. Light pressure, a pound or so per square inch, seems adequate; a low cost vacuum bag pump provides more than enough force for a good bond. Once you're confident about getting a good bond, there shouldn't be any problem using the same technique and switching to Kevlar, or carbon fiber, for a skin.

After the initial sample worked out so well, I did some more trails to see what I could do with the stuff. Unless you slit it, you can't use it to mold complex shapes, and the 1/8 inch thick material is not

suitable for a very small radius corner, which you can do with thin balsa or Rohacell sheets. But for moderate 1" or greater radius curves, the Nomex honeycomb is tough and easier to work with for many applications than either balsa or Rohacell.

For tail cones, I found that it was possible to first laminate fiberglass, to one side of the honeycomb, on a flat surface. Then, after the initial layup cured, a second layer of fiberglass could be wet out on a positive mold. With the exposed honeycomb to the inside, the one-sided cured part could be wrapped around the mandrel and either vacuum bagged, or strapped in place with rubber strips. I also molded a sandwich wing skin by pressing a wet layup on mylar carriers between two foam blocks into which an airfoil contour had been hot wired. Except for what would have been the extreme leading edge (about a half an inch), the sandwich skin followed the contour precisely. ■

Bubble Wrap Hint

...by Gregory Vasgerdsian
Martinez, California

Upon moving to our new home, I bought some bubble wrap and found it to be the perfect thing to make wing and fuselage bags out of to help protect my models. I purchased two rolls of 2' x 150', one inch bubble wrap from a local packaging distributor for \$50.00. That was their minimum order, more than I wanted, but you could go in on it with your flying friends. The bubble wrap is pre-perfed every twelve inches, and I used two inch wide packaging tape to make the wing and fuselage bags. Not nearly as nice as the quality bags from the Bag Lady, but much cheaper for those on a tight budget. ■



Jer's Workbench

Jerry Slates
P.O. Box 2108
Wylie, TX 75098-2108
(214) 442-3910

that I will be using is blue in color and metal filled, and it is called BCC-6060. Again, read the instructions. The two part epoxy surface coat is mixed 100 parts of resin to nine parts of hardener by weight.

Remove the newspaper from the plug and parting tray and brush the surface

Completed Fuselage & Model

Last month, I installed the plug into the parting tray and caulked the edges. That completes the preparation, so let's complete the mold this month and wind up with a completed fuselage and model.

OK, let's start to work. First, if you have an air compressor, start by blowing off any dust on the plug and parting tray. If you don't have an air compressor, use a soft, clean rag and wipe the plug and parting tray clean. Next apply the mold release. I use a product called "Frekote 1711 Mold Release" that comes in an aerosol spray can. Read the instructions carefully and then apply two coats. Care should be taken that there are no runs or puddling. If there are runs, they should be wiped off with a soft, clean rag, and another coat of mold release should be applied.

Next, cover the plug and parting tray with newspaper to keep it dust free while mixing the surface coat. The surface coat



Photo 1 - Doesn't look like much, but it's the parting tray and plug with surface coat applied.



Photo 2 - First layer of fiberglass cloth laid on at a 45° angle.



Photo 3 - Second layer of fiberglass cloth laid on at a 45° angle the other way.

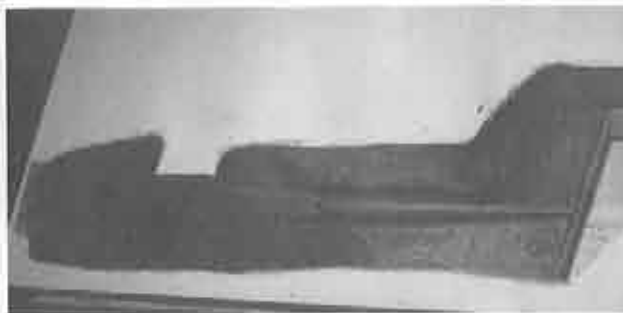


Photo 4 - Completed first half of the mold.



Photo 5 - Using a thin putty knife to release the mold from the parting tray.



Photo 6 - Cutting in the keys.

coat onto the plug and parting tray. (Photo 1.) This step should be done quickly because epoxy surface coat only has about 30 minutes of pot life. The coat will cure in about 4 hours at room temperature. While the surface coat is curing, take 5 yards of 7.5 oz. fiberglass cloth and cut it into strips 5 to 6 inches wide. Stack neatly; set aside.

The photographs of the completed mold and fuselage are in black and white, but the final color is amber. I am using Safe T Poxy II, Epolite resin-2410 with hardener - 2184. This epoxy resin wets out very well and dries to a hard finish.

After the surface coat has cured, it is now time to start laying up the mold. First, brush on a coat of epoxy over all of the surface coat. Then, mix a thick puddy of epoxy and colloidal silica; fill any corners, places where the fiberglass cloth won't lay into easily.

The first layer of fiberglass cloth is laid in at a 45° angle. (Photo 2.) The second

layer of fiberglass cloth is rotated 90° or 45° the other way. (Photo 3.) Repeat these last two steps until there are 8 layers. After completed, clean up the mess and let the first half of the mold cure, which will be about 72 hours at room temperature. (Photo 4.)

Now, it is time to remove the first half of the mold from the parting tray. I use a thin knife as shown in photo 5. It is important to work very carefully around the mold edges while trying to find a spot where the putty knife can be worked in under the mold. Once found, then continue all around the mold with the putty knife. Next, tip the parting tray up on its edge, and push the plug out of the parting tray. Be careful that the plug does not come out of the mold half. There is some caulking that will have to be removed.

In the next step, using a Dremel tool, cut in the keys. (Photo 6.) A key should be cut every 6 inches or so around the mold. The keys only need to be about 1/8 inch deep. The keys insure correct alignment



Photo 7 - Open mold. See text for removing paint.

when bolting the mold halves together.

This completes the first half of the mold, and the parting tray can be set aside, as it is no longer needed. But don't throw it away, yet. It can be used again to make another mold some day.

For the second half of the mold, repeat all of the above steps starting with the mold release, surface coat, and then the 8 layers of fiberglass cloth.

Of special note, when brushing on the surface coat, make sure that it is brushed into the keys and that there are no air pockets.

Almost done, using 3/4" plywood, make a frame about 1 1/2" wide around the edges of the mold on both sides. The frame is glued on using epoxy. Drill a 1/4" hole about 4" apart all the way around the mold. Install 1/4 X 20 T-nuts and bolts.

In the last step, before opening the mold, use a saber saw to trim the excess fiberglass off up to the plywood frame. There will be some rough edges, and a bit of sanding is then required. Now, you can see the center or parting line between the two mold halves. Remove the bolts. Using a thin screw driver, split the mold apart. If all goes well, the mold halves will come apart and the plug can be removed. Some force may be required.

Remember the aerosol spray

Material Used

BCC 6060 Epoxy Surface Coat
Porter Warner Industries
2800 N. Nichols
Ft. Worth, TX 76106
(817) 625-5321

4 oz. fiberglass cloth
7.5 oz. fiberglass cloth
FreeKote 1711

Parting Wax
FibreGlast Developments Corp.
1944 Neva Drive
Dayton, OH 45414-5598
(800) 821-3283

Safe T Poxly II (epoxy resin)
Alexander Aeroplane Co., Inc.
P.O. Box 909
Griffin, GA 30224-0909
(800) 831-2949

Plywood, T-nuts, bolts, washers
Local lumber yard
Rubbing compound
Local auto parts store



Photo 12 - Kirk Massey with completed model.

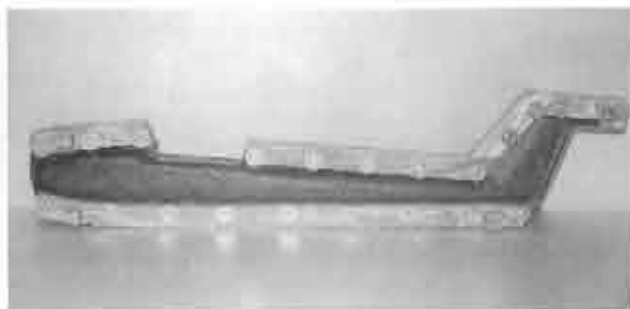


Photo 8 - Completed fuselage mold.



Photo 9 - Completed rudder mold.

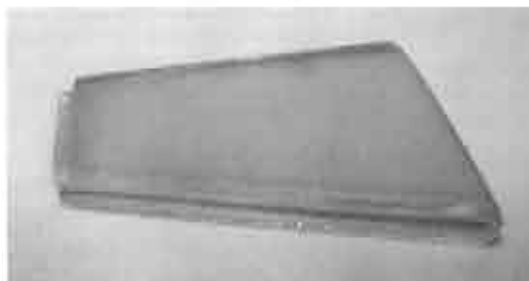


Photo 10 - Completed rudder.



Photo 11 - Completed fuselage.

paint that I used to paint the plug with? This is what happens if a good paint such as epoxy paint is not used. (Photo 7.) Of course, the paint can easily be removed using paint remover. But don't use Acetone, as it could damage the mold surface.

The last step is the hardest part: polishing the mold. Start with a good, fast cutting rubbing compound (red in color); finish with a white rubbing compound. When satisfied that the mold is well polished, 5 or 6 coats of parting wax is then applied. Done!!

I am not going to lay up a fuselage at this time. If you get this far with me, you can probably lay up a fuselage by yourself. If you have any questions, just give me a call and I will be glad to help.

The completed fuselage was laid up using 3 oz. crowfoot and 4 oz. fiberglass cloth with an added strip of Kevlar. The total weight of the fuselage is about 4.5 oz. The fuselages are available from Kirk Massey at New Creations R/C, Rt. 2 Box 500, Willis, TX 77378; (409) 856-4630, 8:00 A.M. - 10:00 P.M. C.S.T. ■

LIFT OFF!

...with Ed Slegers

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Getting Started in Electrics

With the weather changing and the building season upon us, I am getting lots of questions about what is needed to make an electric sailplane. Most of this has been written before, but for those of you who may be getting RCSD for the first time, or are just thinking about getting into electric, I will cover what I feel would be a good combination of equipment with which to start. The combination I will discuss is for the entry level pilot starting out in electric.

The Plane

I would recommend a two meter size plane. Any smaller, and equipment installation becomes a problem for the beginner. Any larger requires much more expensive equipment. A bolt down 2 meter wing is the best, because it is much easier to install and remove batteries. Although, some two piece 2 meter wings do work. Try to avoid a plane with a slip on nose cone. This makes getting to the motor very difficult. The prop and spinner would have to be removed to get the nose cone off. A fin that is wide enough to put a servo in also helps. By putting the rudder (if you need a rudder, which many electrics do not use) servo and elevator servo in the fin, there will be more room in the fuselage for the batteries. Some airfoils that work well are the E387, SD7037, and SD3021. For rudder and elevator only, the E205 is a good choice. Currently available, either the Falcon 550E or E Hawk would make a fine choice. For rudder - elevator only, something like the Astro Flite Challenger works well.

The Motor

It might be tempting to get an inexpensive "canned" type motor to start with, but they have less than the adequate power to do a good job. I believe that this type of motor has been one of the main reasons that electrics has not progressed as rapidly as it could have in this coun-

try. The best choice is the Astro Flite FAI .05. The FAI .05 will give you good performance at a reasonable price. The .05 that I would recommend is the 6 turn. If you think you might want more performance, get the 5 turn. But the 5 turn will give you less run time. For even more performance, you can spend a few more dollars more and get either the 5 or 6 turn, lightened and finely tuned by RC Creations.

The Prop

Volumes could be written about props and motor combinations, but for the beginner using a 2 meter with an FAI .05, a very good set-up would be a 40mm spinner, a 42mm yoke, and 8x5 blades. I would also recommend using carbon fiber blades. They are lighter and stronger and don't flex as much as glass blades.

Batteries

To keep the plane light and still get good run time, I use Sanyo SCR 1000. There are larger cells for more run time, but I do not think the extra weight is worth it. The idea is to get the plane up for thermalling, so long run time is not necessary. I would also recommend getting two packs, so that one can be charging while you are flying with the other.

Speed Controller - On/Off

Both work fine for our application. For 7 cell, B.E.C. is fine. This is what I use and have never had a problem, but any more than 7 cells and I do not use the B.E.C. A good choice is the FX35D. This can be used with or without B.E.C. Another good choice, at a very low cost, is the Robbe on/off switch. But it does not have B.E.C. Astro Flite also has some very fine controllers. Make sure that your choice of controller has a brake to stop the motor so the prop can fold back.

Chargers

There are many to pick from, but to get the best results, get a charger that can charge up to 10 cells, has adjustable amps, and definitely is a peak detection charger.

I believe that if you follow these guidelines, you can have many hours of fun flying. With the cold weather almost here, electric flying is ideal. You do not have to spend time setting up a winch or retriever. Just hop out of your warm car, take a flight, and then hop into your warm car while the battery charges.

Good Flying! ■

TRAINER CORD

Kitty Pearson

1075 Space Park Way #182

Mountain View, CA 94043

(415) 962-8048 (eve.)

Trainer vs Trainee Revisited

We've returned, the husband and wife trainer set team.

My first flight lesson was over the gravel pit in Issaquah, Washington. The wind went from variable to zilch. Intermittent lessons were at Four Corners, Mount Tamalpais, California where the slope lift was a little less turbulent. Glider Hill in Coyote Park, Fremont, California was a little narrow on our day. Eagle Butte, Washington has been the best, so far. The wind was light, but the lift band was wide and smooth.

Being determined to keep this trainer/trainee relationship amicable, my flight manager and I doggedly followed the protocol adhered to during our previous sessions. (Always carry your own set of car keys, just in case.)

First, we reviewed the operating parameters. For the benefit of repetition, I again took the time to work the controls of the Dodgson Pivot while it was firmly resting on terra firma. *Left rudder, right rudder...* This time, I really focused on how far the controls moved with each stick movement. It has been mentioned that the duration each movement is held is also of importance. *Wingeron up, wingeron down...* I reprogrammed my brain with the plane facts. When the elevators move up, the nose of the plane goes up. Conversely, when the elevators tilt down, the nose points down. (*Think up. Think up!*)

While I was thus engrossed, my trainer must have taken several patience pills.

After the Pivot was airborne and posi-



tioned high in the sky, my first task was to serpentine it (My dressage is showing.) directly away from me. I tried to get smooth, even, half circles, first to the left and then to the right. Two sets and the curator of the master receiver would reposition the plane so that I could complete the exercise. That went well, but my next task was to do a figure eight parallel to the hill.

Ah, the learning plateau. Who invented it? Would you believe that it is a named phenomena? A person can learn just so much and then, "WHAM!" The brain fills up and nothing more can be learned until new cells grow. (This particular theory has yet to be found in any scientific writing.) One minute you are a prodigy and the next, you are at the bottom of the class, left to relax and enjoy watching the other planes fly, hoping things will soon go right, again.

I hit my plateau. After hearing, "Never turn into the hill," ad nauseam hit; I realized that the perfect maneuver, about which I was ostentatiously proud, was in actuality executed by a certain know-it-all who neglected to inform me that my transmitter juices had been cut off. My controls had been terminated. (*Henceforth we will define who is in control...*)

That was it. My plateau reached, I unplugged the trainer cord with the confidence that next time, my figure eights would be great.

After I am able to execute figure eights with precision, I will learn to perform serpentes with the plane approaching me. I am told that it is tricky to reverse the eye to hand control directions. Landing will remain the challenge.

I'll know I have graduated when I send my instructor to the car for a Coke, and he goes! ■



P.O. Box 975
Olalla, Washington
98359-0975

Four Basic Concepts Part 3

All of the graphs shown so far point to markedly increased twist angles as sweep angle decreases, and so on the surface it appears a plank planform, that is a wing with no sweep of the quarter chord line (-1.15 degrees leading edge sweep in our example), is not possible. However, by incorporating wing twist into the airfoil section itself we neatly overcome this seeming difficulty.

To see how this works, we will use two reflexed sections with slightly different pitching moments, the E 228 and the E 230. (E 228: $C_m = +0.0143$, $\alpha_0 = +0.34$; E 230: $C_m = +0.025$, the pitching moment advocated by Dr. Panknin rather than the value published in MTB 1/2, $\alpha_0 = +1.73$). See Graphs 6 and 7, respectively.

These two graphs provide an interesting bit of information. The E 228 (Graph 6) requires washout (trailing edge up) for rearward sweep, as would be expected from what we've seen previously. This indicates the E 228 is not stable enough for a plank configuration with the static margin we've chosen. On the other hand, Graph 7 demonstrates the E 230 is actually too stable. The graph shows the E 230 requires washin (trailing edge down) for rearward sweep! To achieve a stability factor of 0.035, the wing tip must actually provide an up force if the wing is swept back, and a down force if the wing is swept forward — just the opposite of what we've seen in all of the previous examples.

A plank planform with a stability factor

of 0.035 and no sweep of the leading edge would, therefore, require an airfoil with a pitching moment between that of the E 228 and the E 230, but closer to the E 230. As an exercise, we computed the pitching moment required for this plank planform and stability factor; it turned out to be 0.021, as was intuitively anticipated. As a point of interest, the E 230, when used with the unswept plank planform described above, requires a stability factor of 0.04167.

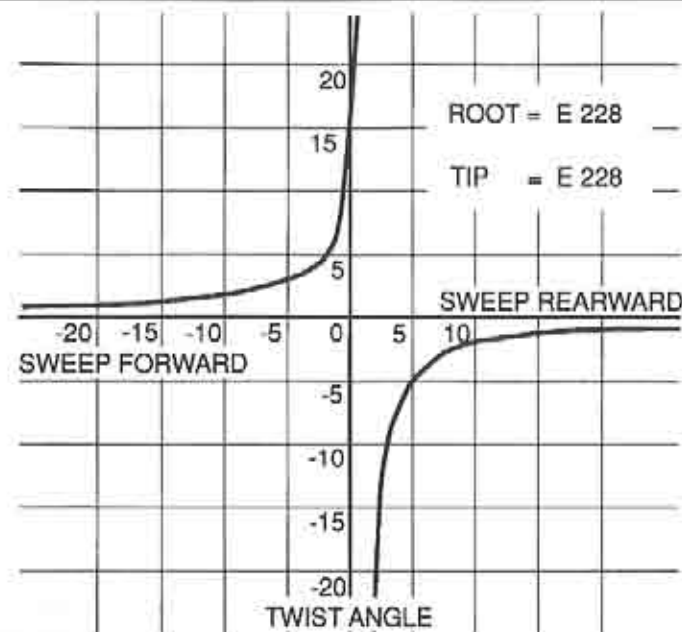
A few closing notes are in order.

- Bill chose the 100 inch wing span based on performance, ease of transportation, and a large number of viable construction methods. For those building other sizes, all linear dimensions can be easily proportioned, while all angles remain the same.

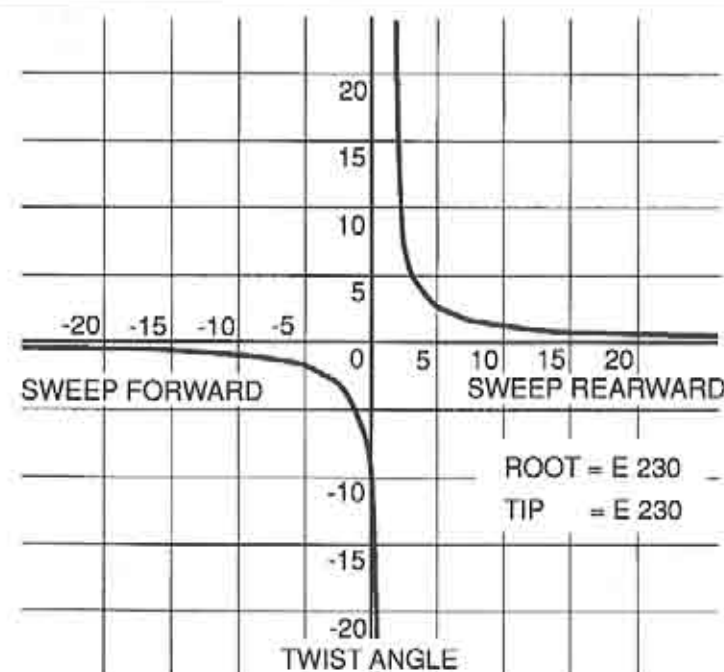
- We used a stability factor of 0.035 and an overall C_L of 0.6 for all of these examples. The required twist angle would increase in magnitude for a higher stability factor and larger C_L , and decrease in magnitude for a lower stability factor and smaller C_L value.

- While the stability factor is always directly related to both the location of the center of gravity and wing twist, changes in design C_L are related to wing twist only. We used a design C_L of 0.6 only for the purpose of constructing easily readable graphs. In the actual design process the C_L used in computations will be a fraction of this value and there will be an attendant lowering of the twist angle value.

- In practice, swept planforms have better performance than planks of the same dimensions. This is due to the inherent high drag of reflexed airfoils having markedly positive pitching moments. In designing a plank planform, therefore, you will want to use a reflexed section with no more reflex than necessary to provide a comfortable amount of stability. Additionally, swept wings tend to be



GRAPH 6



GRAPH 7

more maneuverable than planks.

- Swept wings utilizing airfoils with pitching moments close to zero are now generally accepted to be the best performers, even though these sections do not have the lift capability of more conventional sections. A sweep angle of 15 to 20 degrees and a twist angle of less than four degrees are usually sufficient to provide needed stability when low pitching moment sections are used.

- For convenience, Table 3 provides the moment coefficient and zero lift angle data for the six airfoil sections mentioned in this series of articles.

- The four basic concepts enumerated below should be an inherent part of the designer's knowledge base if an efficient design is to be the result.

- (1) increased stability (a more forward CG) requires more twist
- (2) a larger C_{mroot} requires more twist (We've now seen the C_{mtip} has an effect on the geometric twist required as well.)
- (3) increased sweep angle lessens the amount of required twist
- (4) a larger design C_L requires more twist

- As usual, we highly recommend readers explore avenues related to their own specific interests. This is an excellent learning environment which can provide much enjoyment.

- Lastly, a reminder for those of you with computers... Some time ago we wrote a BASIC program which determines both the required wing twist and actual location of the center of gravity as measured from the apex of the leading edge. The program is available in printed form, not on disk, but takes just a matter of minutes to type in. The code is available in Microsoft QuickBASIC for IBM compatibles and in Applesoft BASIC. The latter code is fairly generic and relatively easy to translate to other languages. We are now working on the QuickBASIC code for a Macintosh version using the same algorithm. Please send a legal size SASE for a copy. Be sure to note in your request which version you need.

In this series of articles we have attempted to explain how the location of the center of gravity, the pitching moments of the airfoils used, the chosen sweep angle, and the design lift coefficient dictate wing twist and overall pitch stability. We have tried to limit our discussion to pitch sta-

bility as it relates to only these variables. We thus have not discussed control surfaces. A number of readers have inquired about this topic and asked us to include information about control surfaces: their types, sizes, shapes, locations and ranges of deflection. These topics will therefore be explored in future columns.

Prior to publication in RCSD, we printed a copy of this article and gave it to Bill Kubiak for comment. Next month we'll share his thoughts on the material presented.

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und Handwerk GmbH, Postfach 2274, 76492 Baden-Baden Germany.

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Lichte, Dipl.-Ing. Martin; "Nurflügelmodelle," VTH Modellbaureihe Band 3; Verlag für Technik und Handwerk GmbH, Postfach 2274, 76492 Baden-Baden Germany.

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Allan Scidmore, 5013 Dorsett Drive, Madison WI 53711. ■

V-Tails... Why?

...by George G. Siposs
Costa Mesa, California

V-tails are becoming quite the rage these days and some modelers think that we're facing a brand new concept. Actually, I remember seeing articles about V-tails in modeling magazines in the 1940's. (Yes, I've been modeling that long.) There is nothing really magical about them; they're based on simple math and geometry.

On 3-view drawings you may have noticed that if you only look at two views of a model airplane's tail surfaces (let's say

plan view and side view), you can be fooled because the third view can take many shapes. For instance in one view (Fig. 1), an object can look like a circle, while in the other view it looks like a straight line (the edge of a flat plate), while in the third view it looks like an ellipse. Thus, you may have noticed that a V-tail looks like the tip of an arrow in the front view, whereas in the plan view it looks like a standard stabilizer-elevator, and the side view shows the outline of a standard fin-rudder. Having acknowledged that, we should really look at the front (or rear) view of the V-tail for the purposes of an analysis.

What are the advantages of a V-tail?

For the answer we go back to some basic dimensioning of a model's tail surfaces. Let's say that the stabilizer is 20% of the wing area and the fin is 8%. For conventional tail feathers we could say that, because the chord is about the same for fin and elevator, the entire elevator has a span of 20 units and the fin is 8 units tall. (Fig. 2a.)

This automatically makes one half of the stab 10 units long. Now we drag out Pythagoras' theorem and find that a diagonal "D" will be the square root of 10

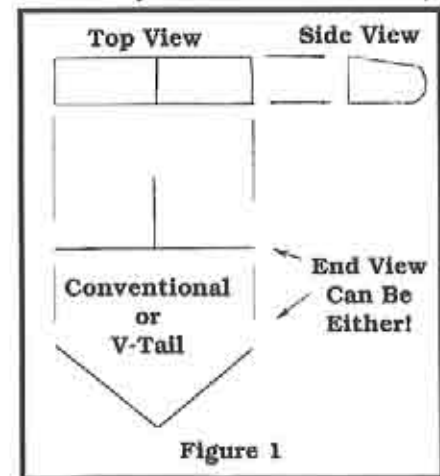


Figure 1

REF	DESIGNATION	C_m	α_0	SECTION PROFILE
1	E 205	-0.046	-2.37	
2	E 205 Inv	+0.046	+2.37	
3	Symmetrical	0.000	0.00	
4	EH 2/10	+0.00165	-0.74	
5	E 228	+0.0143	+0.34	
6	E 230.Eppler/MTB 1/2	+0.053	+1.73	
7	E 230.Panknin	+0.025	+1.73	

Table 3

squared + 8 squared = square root of 164 which is equal to 12.8. (Fig. 2b.) Thus, if we make one side of the V-tail 12.8 units long (and the same chord as the standard stab), the top view and side view will look the same as the top and side views of tail surfaces which are 10 and 8 units long respectively. Because there are two sides to the V-tail, and each side is 12.8 units long, the total length is only $2 \times 12.8 = 25.6$ units long. In contrast, the standard stab is 20 units long, plus the standard fin being 8 units long, their total length (as far as drag is concerned) is 28 units. The chords being equal, under these circumstances, the V-tail has about 9% less surface, hence less drag in the air, and approx. 9% less weight.

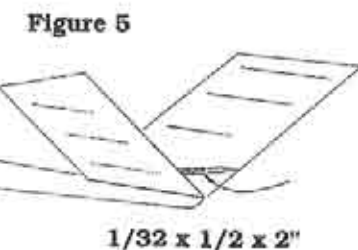
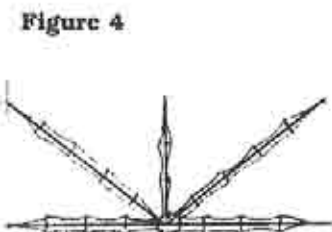
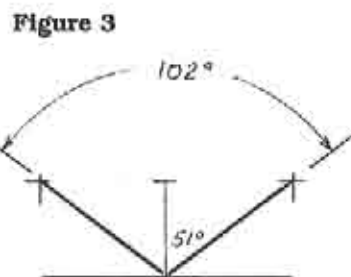
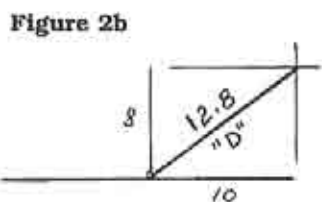
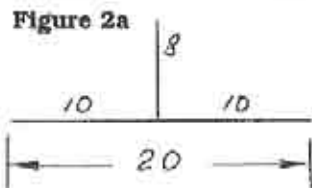
Therefore less weight will be required in the nose and the model will create less drag in the air. Huge advantages!

What about the angle between the V-tail surfaces?

Look at the conventional tail end view again. (Fig. 3.) If a right triangle has a rise of 8 units and a run of 10 units, the hypotenuse subtends an angle of almost 39 degrees at the base which automatically makes the other angle 51 degrees. This is the angle between the vertical fin and one side of the V-tail. Double the 51 degrees and you get 102 degrees "included angle" between the V-tail surfaces. That's why most V-tails have an angle of about 100 degrees. Less than that gives you more rudder and less elevator.

Converting your model.

You can convert your model to a T-tail configuration by making a simple drawing of the end view of the tail feathers. (Fig. 4.) Make a "box" by drawing parallel lines at the ends of each surface. Now draw a diagonal between the outer top and inner apex where the stab and fin meet. The diagonal line will be the length of the V-tail on one side. Place ribs along



this line with the same spacing as the stab. Build two such surfaces and join them at the appropriate angle. It helps to epoxy a small strip of 1/32 plywood (about 2" x 1/2") between the trailing edges to provide extra strength by triangulation. (Fig. 5.)

How about control surfaces?

Of course you will have to mount movable control surfaces on the V-tail just like on any tail surface. However, their actuation is quite different from conventional rudder/elevator servo action. You have to consider each surface as a fin and make the control surface move as if it were a conventional rudder. This means that, looking from the rear, in a left turn the left surface will move down and the right surface moves up. (Fig. 6.) For a right turn it is vice versa. "Up elevator" is conventional, both sides move up and vice versa. Now we have to mix these two actions.

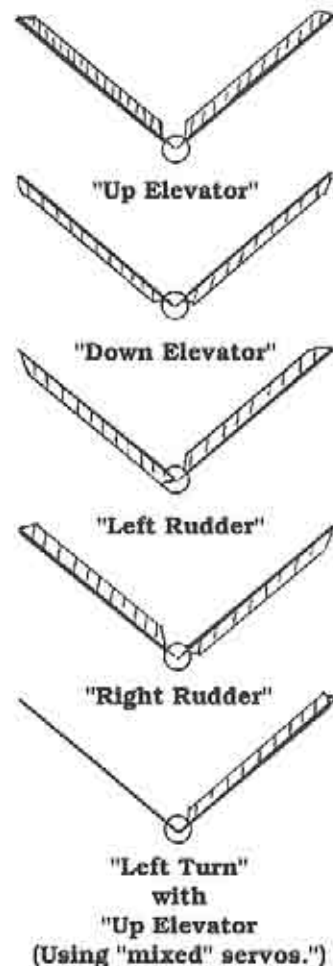
Rudder control action is achieved by connecting each surface via a pushrod to the two opposite arms of the same (rudder) servo.

The elevator servo moves the entire rudder servo so that both control surfaces move up when you want up elevator, and down when you want down, just like in a conventional model. The elevator servo can move the rudder servo along a tray or, in hobby stores you can buy other "mixer" accessories which can be attached to the servos. Alternatively, if you have a computer radio, you can program it to move the surfaces as required.

Thus, you can see that for a left turn with slight up elevator (as normal flying requires it), the right elevator will move up while the left elevator will move very little because its "left" and "up" actions will cancel each other.

But wait, you also get the Ginsu knife! In

Figure 6
Viewed from rear!



addition to aerodynamic and weight advantages, V-tails also present a great benefit during landing. Because the surfaces point up, they are out of the way and don't get banged up.

Cowabunga, get going already! ■

Understanding Sailplanes

...by Martin Simons

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South Australia 5069

Elementary Stressing Part III

Load distribution across the span

The load factor of 10.5 is applied, not to the weight of the entire aircraft, but to everything extra to the wing. It is safe to assume, with ordinary models, that the wing supports itself without adding to the bending moments. If large amounts of ballast are carried in the wing but not distributed evenly, this may not be true. The same applies if there are concentrated masses, such as engines mounted out on the wings of multi engine aircraft. However, such masses, while they may cause local stresses within the wing, tend to reduce the bending moments felt at the wing roots.

Unlike a simple beam supporting, for instance, the floor of a house, the wing, treated as a beam, reacts with the air along its entire span and each part except the extreme tip carries a share of the load.

As Figure 5 shows, the sharing of the load along the wing can be approximated very closely by taking a semi elliptical outline of the same area as the wing and finding the average between the ellipse and the actual wing chord at each station from root to tip. (This method of estimation of the load distribution is known as the Schrenk method after its originator. It is sufficiently accurate for use even in full scale aircraft stressing unless the wing is of unusual shape and has built in twist such as washout.)

Shear loads

When a beam comes under an upward acting load, each part of it tends to shear up away from its neighbours. Shear stress

is not the same as bending stress and model wings hardly ever fail in shear. But the upward shear force at each point is transmitted inwards to the next part of the beam and is felt there as a bending load. Hence to find the bending moments it is necessary first to discover the shear loads. In practice, it is good enough to divide the wing into a number of small segments, say ten, and work out the shear at a corresponding number of span stations.

In Figure 6 the load distribution curve for the straight tapered wing of Figure 5 is repeated but divided into squares, each square being one tenth of the semi span in dimensions. The squares are used to estimate the area under the curve by simply counting them. In this case, the count comes to about 35.5 squares. There are errors in this crude process. Greater precision, if needed, can be obtained by using smaller squares or even by using the calculus of areas, but the final outcome is not likely to be significantly different.

The total weight to be supported by the wing is assumed in this example to be 3.7 Kg. (A large and heavy model. The G and safety factor have not been applied yet. This is the actual 'extra to wing' weight as shown on the scales.) Since each wing carries only half, the area represented by the 35.5 squares corresponds to $3.7 \div 2 = 1.85$ Kg or 1850 grammes of load. Each square thus represents $1850 \div 35.5 = 52$ grammes. The number of squares counted in each column of squares is given along the bottom line of the chart. (The load distribution of the rectangular wing plan is also shown, with a fine broken line, and the corresponding square count, column by column, is given in the smaller figures.)

Since there are 4.9 squares in the column at the root end of the wing, this segment of the wing carries $52 \times 4.9 = 255$ grammes. The other columns are worked out in the

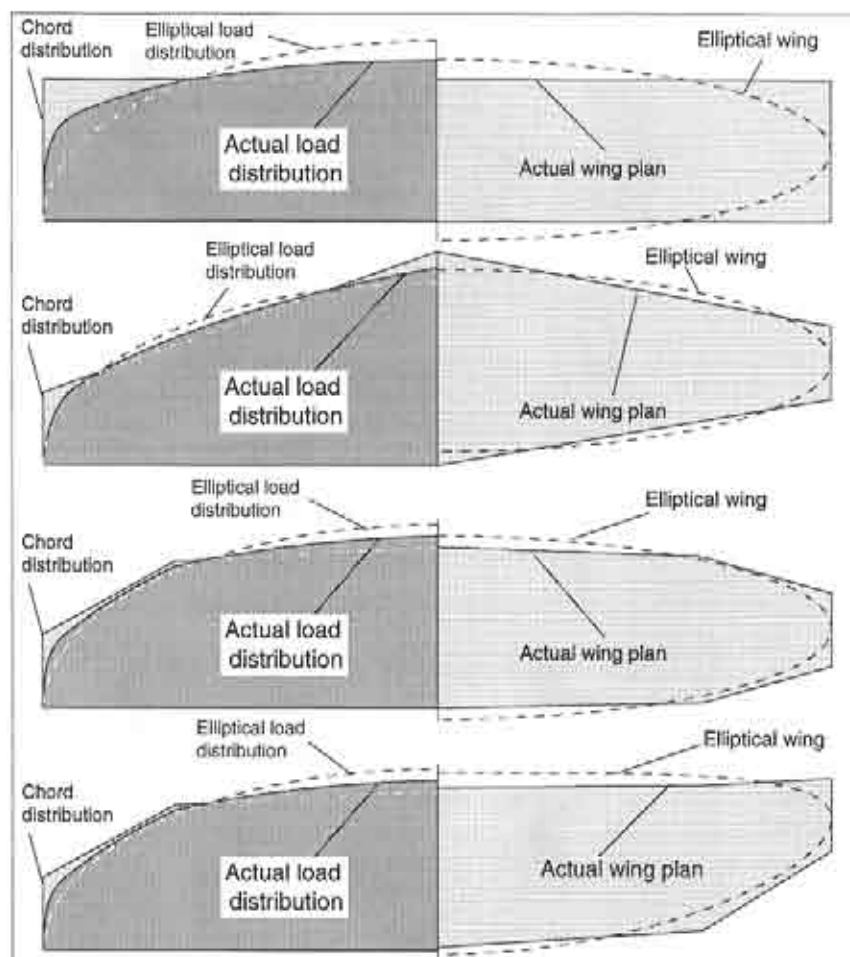


Figure 5. The lift loads felt by a wing can be approximated very closely by taking the average between the chord distribution of the actual model wing and that of a perfectly elliptical wing of the same area.

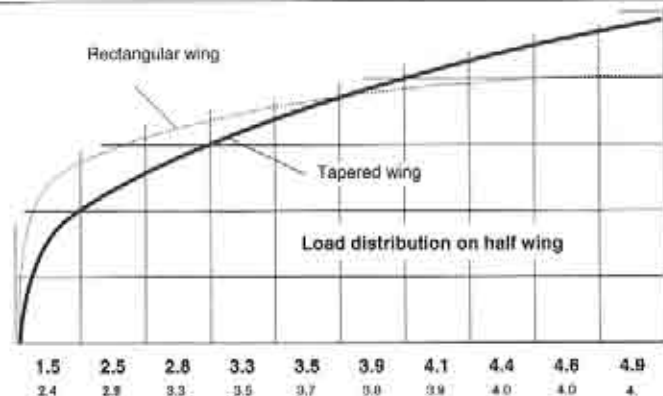
In the diagram note that where the elliptical load distribution lies outside the chord distribution of the model, this part of the wing will be forced to carry more load than its fair share. These areas of the wing will stall early.

Moderate sweep back or forward makes little difference

same way and the result is given in the first row of the table in Figure 6.

Between the extreme tip and the 0.9 span point, the column contains 1.5 squares and so at the inner end of this segment,

$1.5 \times 52 = 78$ grammes of shear force are felt by the next segment inwards. The segment 0.8 and 0.9 carries its own load of 130 grammes and feels the 78 grammes from the outer segment as well. The total



Total 35.5 squares approx.
 Divide HALF weight to be carried (fuselage, tail, undercarriage, motor, radio, not wing) by this number of squares.
 Then each square represents so many units of the total load carried.

E.g., weight of whole model less the wing, 3.7 kg (3700 grammes, 8.16 lbs), one wing supports half, then;
 $1850 / 35.5 = 52.11$ grammes, rounded off, 52 grammes. (0.115 lbs)

This information may be used to construct a shear force diagram. The load carried by each short segment of the wing span may be tabulated and added as shown below. (Figures rounded off)

Load =	1.5 x 52	2.5 x 52	2.8 x 52	3.3 x 52	3.6 x 52	3.9 x 52	4.1 x 52	4.4 x 52	4.6 x 52	4.9 x 52
	78	130	146	172	182	203	214	229	240	255
Shear = sum	78	208	354	526	708	911	1125	1354	1594	1849

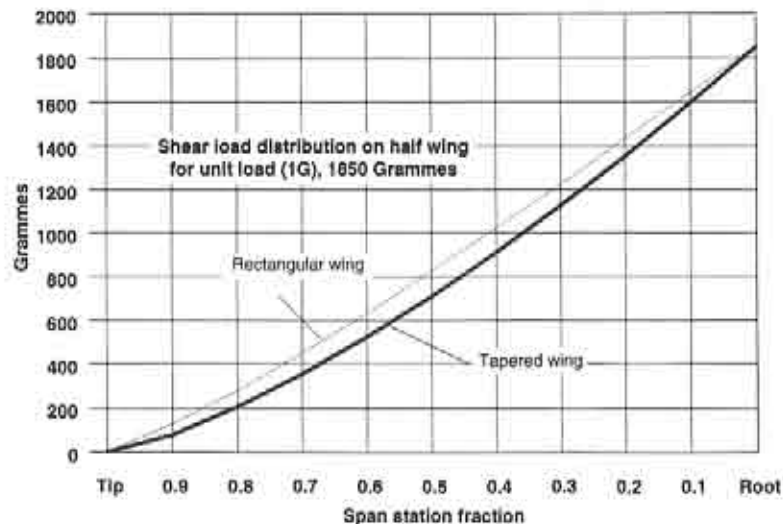
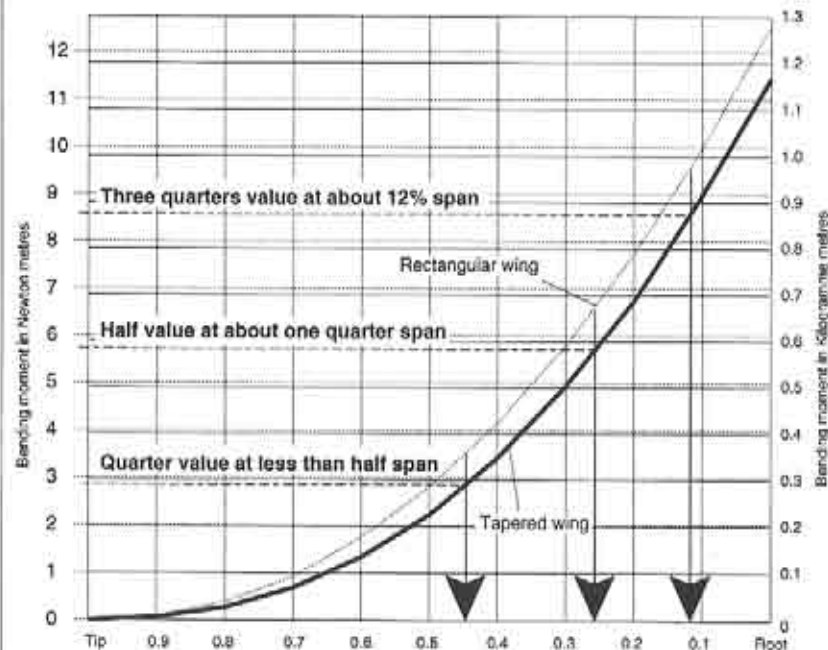


Figure 6: Working out the shear loads on a wing

Figure 7 Bending moment calculation, outline of method
 Assuming a model of 3 metres total span, then half span = 1.5 metres

Stn	Tip	0.9	0.8	0.7	0.6	0.5	0.4	0.3	0.2	0.1	Root
Dist	1.50 m	1.35 m	1.20 m	1.05 m	0.90 m	0.75 m	0.60 m	0.45 m	0.30 m	0.15 m	0 cm
Difference		0.15 m	0.15m	0.15m	0.15m	0.15m	0.15m	0.15m	0.15m	0.15m	
Shear, kg	0	0.078	0.208	0.354	0.526	0.708	0.911	1.125	1.354	1.594	1.849
Average		0.039	0.143	0.281	0.440	0.617	0.810	1.018	1.240	1.479	1.721
Multiply by Diff	0	.00565	.02145	.04215	.06600	.09255	.12150	.15270	.18600	.22185	.26815
Sum = BM Kg - M	0	.00565	.02730	.08945	.13548	.22800	.34950	.50220	.68620	.91005	1.16820



Conversion to SI UNITS. Strictly, kilogrammes are units of mass, not weight or force. The SI conversion brings the bending moments to Newton - Metres.

The weight of a mass of 1 kilogramme (on earth) is a force of 9.81 Newtons. Hence 1 kilogramme metre is equivalent to 9.81 Newton metres

felt at the 0.8 span station comes to 208 grammes, and so on towards the root. At the 0.5 span station, the total shear force is the sum of all the shears to the left in the diagram, i.e., 708 grammes as shown in the second row of the table.

The total shear force at the root should

equal 1850 grammes. Because of the fairly rough methods used here, there is a deficiency of one gramme, but this is of negligible importance.

The shear forces along the wing having been found, they are plotted in graphical form, as shown. The rectangular wing plan is also given.

The Bending Moments

In Figure 7, the information from Figure 6 is used to produce a bending moment diagram. As mentioned above, at each place along the wing there is an upward shear force which is the total of all the loads between this point and the tip. A force acting at a distance, produces a moment. The wing therefore experiences increasing bending moments all the way from tip to root at each point all the moments between here and the tip have to be added and passed inwards.

In practice, the average shear forces between each pair of stations is close enough to the exact figure, working from the tip inwards. The loads and their distance from the centre are accumulated to produce the BM at every place. The table of figures shows how this is done, the final row being found by adding the items in the row just above.

The bending moment figures are now graphed to show the general form of the curve. Note that the rectangular wing plan produces a similar curve, but, because more of the load is carried on the outer panels of the wing, the bending moment everywhere is somewhat greater.

It is now evident, as shown on this diagram and Figure 1 above, that, irrespective of the planform, the BM at half the semi span is less than a quarter of the total at the root. Half the root BM is reached at about one quarter of the semi span.

Approximating the bending moment

Having established the general character of the moment curve, it is shown in Figure 8 that the bending stress at the root of a wing can be estimated with sufficient accuracy by assuming that the entire load is concentrated at a point about 45% of the semi span. If the wing is rectangular, this gives a result slightly too small, if the wing is strongly tapered it will be slightly too big, but since all the

methods used are subject to small errors, these differences are hardly significant. Knowing the root bending moment, and the way in which the load reduces towards the tip, the strength calculation can proceed as in steps (6) to (9) above.

A note about strutted wings

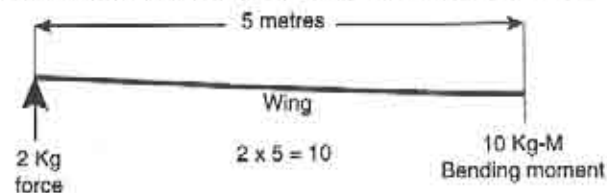
If the wing is strut braced, the general air load distribution of Figure 5 still applies and the shear diagram and square counting at the head of Figure 6 will be identical, as will the first row of the table. However, the addition of shear forces in the second row of the table proceeds inwards only as far as the strut attachment. The strut has to be strong enough to take all the shear at this position, including the contribution of the portion of wing between strut and wing root.

The bending moment at the strut attachment point can be worked out as if the strut were the wing root, but only that part of the total weight load which is supported by the wing outboard of the strut, contributes to the bending moment at this position. The spars required here will be the same as spars at a corresponding spanwise position on a cantilever wing. Taking a short cut, work out the wing root bending moment as if the wing were fully cantilever (i.e. half load to be carried multiplied by 45% semi span). Then use the generalised bending moment curve to find the bending moment at the strut location. At this point, the spar dimensions required can be worked out from Figure 2 as before.

From the strut inboard, the bending moment is more complicated but assuming the wing root fittings are simple pin joints which cannot resist any bending load (i.e., they act like hinges), the BM at the root reduces to zero. (There will be shear forces at the root, so a reasonably substantial attachment will be required.) Unless the strut is unusually far out along the wing, the spars may safely be reduced in strength inwards from the strut.

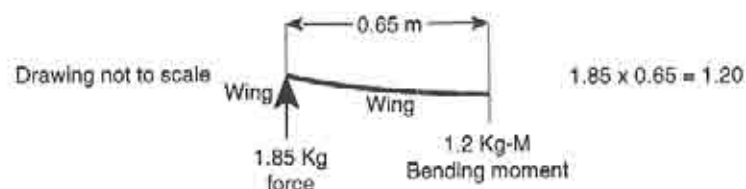
Figure 8. Simplifying bending moments on wings

10 kg metres BM could be produced by 2 kg acting at 5 metres.



In the tapered wing case approx 1.2 kg metres BM was produced by a force of 1.85 kg

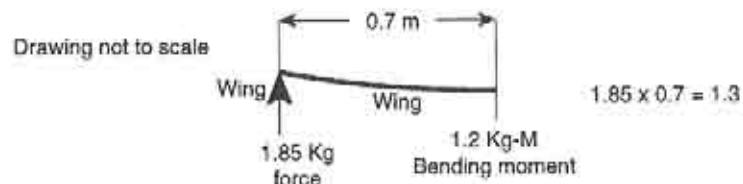
Such a BM could be produced by this force acting at $1.2/1.85 = 0.65$ metres.



The span of the model was 3 metres, semi span 1.5 metres. $0.65/1.5 = .043$, that is about 43% of the semi span.

In the rectangular wing case approx 1.3 kg metres BM was produced by a force of 1.85 kg

Such a BM could be produced by a force acting at $1.3/1.85 = 0.7$ metres.



The span of the model was 3 metres, semi span 1.5 metres. $0.7/1.5 = .047$, that is about 47% of the semi span.

Understanding the JR Propo X-388S Radio

Part I

...by Richard A. Eckel
Winter Springs, Florida
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Ever since I started flying RC sailplanes about two years ago I knew that I would eventually move up to a computer radio. I'm an engineer with a strong interest in computers and technology. Obviously the high tech sailplanes and computer radios have a strong attraction for me.

I have always admired the JR radios and finally decided that I would purchase and learn how to program the JR388. Let me lay it on the table - the radio is not hard to program but I found the manual very difficult to decipher. Perhaps I find the manual difficult because I am a "top down" learner. That is, I want to understand the overview before I learn which buttons to push. If you are the same way or are just interested in a different view of programming the JR388 I think that this article will be of interest to you.

Intent of Article

The intent of this article is to supplement the manual in some respects and to present my understanding of the programming and organization of the JR388. Along the way I will point out some potential traps in the programming. Af-

ter reviewing the organization of the radio and its functions I will recommend setup procedures and tell you about some programming tricks that might be of interest. I am hardly an expert on programmable radios. I do not know how other radios such as the Vision or Super 7 handle their programming and I will not be doing any comparisons. I have simply spent a good deal of time analyzing the JR388 and want to pass along what I have learned.

Receiver Channels

The receiver channel assignments are very important to the programming of the JR388. JR has preprogrammed a variety of useful mixes in the transmitter but they are dedicated to specific channels. If you want the radio to program easily and with maximum flexibility it is best to connect your servos to the channels specified in the manual.

To keep you interested, the receiver channels are referenced in the manual by a variety of names. Table I lists the channels and the aliases I found in the manual. In this article I will refer to receiver channels by their sailplane assignment followed by the channel number - i.e. Rud(4). When I use the term Flap or Aileron without a channel designation it refers to the mixed channels together controlling both flying surfaces. Table I lists the receiver channel number followed by its receiver label alias followed by its sailplane setup alias followed by any other alias I came across. Keep Table I handy when you are reading the JR manual.

Transmitter Controls

The sailplane version of the JR388 is specifically arranged and labeled to be accommodating to the sailplane flier. However, not every sailplane pilot will like the layout or the labeling. (We're

TABLE I
Receiver Channels

Receiver Channel Aliases			
Channel	Receiver Mark	Sailplane	Alias 3
1	Throttle	Spoiler	
2	Aileron	L. Ail	Aile 1
3	Elevator		
4	Rudder		
5	Gear	R. Ail	Aile 2
6	Aux1	L. Flap	Flap
7	Aux2	R. Flap	
8	Aux3		

TABLE II
Transmitter Switches

Switch Aliases				
Transmitter Mark	Program Alias	Alias2	Alias3	Alias4
CROW/Aux3	BTF0,BTF1	BTFly	Landing	Camber
FLAPS (3-positions)	F-U,F-D,FU+D	Preset SW	Flap Swtch	Reflex Preset
P.MIX	MXSW	Mixing SW	MX	
Trainer	TRN.			

an opinionated bunch!) But the biggest problem is that the manual references the controls with a variety of nomenclatures and the programming prompts do not correspond to the labeling or, often, to the manual references. I had a lot of trouble identifying switch references in the manual. Again I have provided a table, Table II, of the switch names and the aliases I found in the manual and programming. Again, keep it handy when you are reading the JR manual.

Before you set up any mixes, the control sticks are the usual setup with the right stick controlling the elevator (3) and the ailerons (2). The left stick controls the Spoiler (1) and the rudder (4). Each of the pots, pot 5 thru pot 7 control the same receiver channel as the pot number (i.e., pot 5 controls channel 5, etc.) Channel 8 is controlled by the CROW switch and any attached servo moves full throw when the switch position is changed. The P.MIX and FLAPS switches are unassigned and do nothing until mixing is set up. The TRAINER switch cannot be mixed but is used to switch in the trainer function or the timer function depending on the setup in the Function Setup Mode.

Model Setup Mode Functions

List of Functions

MOL
NAME
TYPE
MOL RST
mix V-TL → DUA.F
MODU
FLAP
COPY

The mode that I refer to as the Model

Setup Mode is accessed by holding down the UP and DWN keys on the transmitter while sliding the power switch from off to on. This mode has eight functions that are stepped through using the + or - keys. One additional function is available as a sub menu to the V-TL function, the DUA.F function. The eight functions begin with MOL, model selection, allowing selection of model 1 thru 8. The NAME function allows you to name the model selection using 4 alphanumeric characters and the TYPE function lets you set the type of aircraft you want to set up in the programming. Setting TYPE to GLID, AIRP, or HELI changes the programming in the radio to specially support the type selected. I will only address the GLID mode.

The MOL RST function allows resetting all programming for the specific model selected. It resets all servo adjustment, all mixing, the model name, everything back to the factory defaults. If you hit this function your programming is tossed into the great bit bucket in the sky. The only way to get it back is to go back and start over again.

The V-TL function can be used if you have a v-tail plane and want to enable the radio's pre-programmed v-tail mixing function. Preprogrammed v-tail mixing takes place between the receiver channels RUD(4) and ELEV(3) and reduces throws to 75% (I assume to avoid over travel when full elevator and full rudder are pulled on the sticks). If you want to use other channels you will have to plug the servos into them and mix them manually using the free mixes that will be

covered later. You could also mix RUD(4) and ELEV(3) using the free mixes to accomplish v-tail mixing. I recommend using the pre-programmed v-tail mix, particularly if you have more than just v-tail controls on your plane.

The sub-function DUA.F under the V-TL function is important for a couple of reasons. First and most simply is that it sets the pre-programming to synchronize (mix) the servos plugged into L.FLAP(6) and R.FLAP(7). It also is instrumental in full trailing edge control including mixing flaps and ailerons for full length ailerons. In the Function Mode settings it lets you set up and mix flaps as a single entity rather than having to work with each servo. If you have two flap servos and at least a 7 channel radio it makes your life easier to enable DUA.F. If you have only a 6 channel radio or want to use channel R.FLAP(7) for something else you can use a y-harness for the flap servos plugged into L.FLAP(6), mechanically install and adjust them to work together and disable DUA.F.

Some interesting things happen to the trim potentiometers on the transmitter when you select different combinations of DUA.F and FLAP. Rather than try to explain in paragraph form each of the possibilities and their effect on the trim pots, I have provided an outline. (See Pot Controls.) Each of the four DUA.F/FLAP possibilities is listed along with the transmitter potentiometer control use. This can be a handy quick reference when you are planning your setup for an airplane.

The MODU setting sets the transmitter up to broadcast to an FM (PPM) type receiver or to either a SPCM or ZPCM type receiver. Just match the setting to the receiver type in your plane.

The FLAP setting has rather far reaching ramifications in the programming of the radio. Its default setting of POT.6 has Pot.6 on the transmitter directly controlling channel L.FLAP(6) on the receiver.

The full throw of the servo plugged into that channel is available by twisting the pot. Setting FLAP to SW+T pre-programs the control of the flaps to the FLAP switch with Pot. 6 becoming a trimming device. The really off the wall thing here is that with SW+T set, the travel adjustment (T.ADJ) in the Function Setup Mode for the flaps changes from defining the endpoints of the flap servo throw to defining the offset of the flaps for the Flap switch up and down positions. Keep this in mind. It will come up again.

The COPY function allows you to copy all of your settings and programings from the current model to one of the others. You can only copy from the current model to one of the others, not directly from another to another.

I have used the terms flap style and aileron style in the table. By flap style I mean that both flying surfaces trim up or down together. By aileron style I mean that the flying surfaces trim in opposite directions. Notice that the pots change not only in what they control but also whether they are full throw or trim controls.

Summary

Essentially the Model Mode settings on the radio set up the radio programming for the type of aircraft, the type of receiver and special servo configurations to match the airplane you are setting up. Additional functions to select the model, name the program or aircraft, and reset or copy the program are handy convenience functions. An understanding of how the settings affect the programming can make life a lot simpler when you get into adjustments in the Function Setup Mode. Although the JR388S has a lot of flexibility I recommend that you try to use the functionality pre-programmed into the radio whenever possible. Stick with the receiver assignments that JR has defined and use the pre-programmed functions until you have a thorough understanding of the radio. Then go ahead and experiment with alternate setups. ■

POT CONTROLS

DUA.F=INH and FLAPS=POT.6 (Both are the defaults)

- Pot.5 -- Trim of R.Ail(5)
- Pot.6 -- Full throw of L.FLAP(6)
- Pot.7 -- Full throw of R.FLAP(7)
- *Pot5 can be disabled using the POT function

DUA.F=ACT and FLAPS=POT.6

- Pot.5 -- Trim of R.Ail(5)
- Pot.6 -- Full throw of Flaps - L.FLAP(6) and R.FLAP(7)
- Pot.7 -- Aileron style trim of Flaps - L.FLAP(6) and R.FLAP(7)
- *Pot5 and Pot7 can be disabled using the POT function

DUA.F=INH and FLAPS=SW+T

- Pot.5 -- Flap style trim of Ailerons
- Pot.6 -- Trim of L.FLAP(6)
- Pot.7 -- Full throw of R.FLAP(7)
- *Pot5 and Pot6 can be disabled using the POT function

DUA.F=INH and FLAPS=SW+T

- Pot.5 -- Flap style trim of Ailerons
- Pot.6 -- Flap style trim of Flaps
- Pot.7 -- Aileron style trim of Flaps
- *Pot5, Pot6 and Pot7 can be disabled using the POT function





Flying HL off a slope site, Mt. Akagi; friends Tomita and Shintani, Buzz on launch.

RCHLG In Japan

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RC Hand Launch is about to happen in Japan, too. The September 1994 (Vol. 34, No. 477, p. 202-205) issue of *Radio Control Technique* is sure to become the launching of RCHLG's popularity in Japan, as surely as Dave Thornburg's article in the 1979 March issue of *Model Builder* did in America. As the article states, hand launch gliders have been around in Japan for some time now, but RCHLG has never really caught on. *RCT*, in fact, published an earlier feature article in November, 1989. Two reasons are given for this lack of popularity. Good flying areas are few and far between, which is really true. Further, the climatic conditions in Japan are said to not lend themselves to creating the kind of thermal activity that makes for good RCHLG flying; conditions are much like the humid mid-west; everything is green and most flying sites are river bottoms.

The issue's feature article on hand launch is centered around a kit review/construction article with a pull-out blueprint of MM Glider Tech's "Merlin" (Downey, California). The article as such is a come-on for trying RCHLG, and the four page spread gives a good portion of space to talking about RCHLG. It is also a write-up of the activities of the Takatsuki

Buzz, Tomita and Shintani with Skeeter, Merlin, and original design.



Denpata Kaku Han (Takatsuki Field Flyers Group), headed up by Mr. Nobutsuke "Buzz" Tokunaga, a professional (racing) bicyclist. A group picture of TDKH, along with other action shots is included. TDKH is actively promoting RC hand launch and detailed information is given about the national RCHLG contest the club is sponsoring the third of December. They have been able to acquire the use of the park on the former Tachikawa Air Force Base for the contest.

The write-up extols the prowess of Joe Wurts as a world F3B champion and America's number one RCHLG pilot. TDKH is bringing Wurts to Japan for this contest. Gordon Jennings, second behind Wurts at the first Inland Empire Soaring Society (ISS) "Dash for Cash" RCHL contest of Riverside, California will also be there as well as Paul Clark, the "Sky Pilot" from Osaka, Japan. Joe is remembered for his flying and finding thermals in the middle of a misty F3B contest with a sponsored guest appear-



Nobusuke "Buzz" Tokunaga and wife Harumi and Skeeter.



"Tonbi" (Japanese Kite) original design and Harumi. Flies great confusing strangers on the ground with its loops, and birds in the air join up.



Buzz with Alpina, Harumi, Brother Yoshiaki with Olympic II.

About the Photographs

The photographs were sent in by Nobusuke "Buzz" Tokunaga. He says, "I am a RCHLG fan in Japan. Mr. Paul Clark has given me a lot of information about RCHLG in U.S.A. I went to see Joe Wurts and we flew together in the U.S. last summer, and I started an import business with RCHLG."

"A lot of people call me and ask me to order HLG kits, lately. I realize that many people want to do this (fly RCHLG). There is one problem flying RC aircraft (especially powered), and it has been getting worse: a safe area. Japan is small. Sometimes they (planes) crash, and there could be a serious incident to people if you crash. So, the government rules are getting more strict. A lot of people are thinking that they must give up flying, but some are still hoping to fly, so bad, even if it is a hand launch glider at the park. People are starting to do it, and it is getting popular to fly RCHLG in Japan. But some people still don't believe that you can hand launch and that it will climb up in a thermal. It might take awhile."

Thanks for sending the photographs, Buzz, and have fun flying RCHLGs! For our subscribers and readers in Japan, Buzz can be reached at Hayabusa Soaring Models, 267 Nagaokahasebe, Mizuho - T, Tokyo #190 - 12, Japan. Or you might contact Dr. Clark for Buzz's telephone number. ■

ance in Japan. It is also noted that, to everyone's amazement, he took his F3B Eagle to "a dot in the sky" from hand launch. Joe's hand launching procedure is well outlined with the article, including his use of a two-finger hole and his running all over the field barefoot looking for thermals. (Is there some humor here, or technique?)

In addition to the above, the issue has a one page (page 18) color presentation of another RCHLG enthusiast being coached by a recognized RCHLG designer, Mr. Shuhei Okamoto, and his pod and carbon boom HL-1. This has become a popular kit here for those interested, and sells for \$170.00 with pre-sheeted, E-205 wings, and \$300.00 ARF. Also, in the new product section (page 32) the DJ Aerotech Monarch is shown, price ¥20,000 and ¥26,500 (\$200 or \$265), available from Hayabusa (Falcon) Soar-

ing Models, which sells for only RCHLG. Mr. Tokunaga is Hayabusa Soaring Models, and the issue carries an ad for his company. The going price for imports in Japan is two times suggested retail price, and no discounts.

It is evident that there is scattered interest in hand launch around Japan already, but being the first to do anything doesn't necessarily mean getting something off the ground. While TDKH isn't first by any means, the time is right. With this issue of *RCT*, TDKH's enthusiasm, "Buzz" Tokunaga's charisma and drive, and this first RCHLG contest of any national significance, no doubt the turning point in generating a sustained interest in this addicting art form has come, as has already happened in the United States and Europe. Thank you, Dave Thornburg. Watch for coverage here and in *Model Builder*. ■

Wing/Stab Bagging

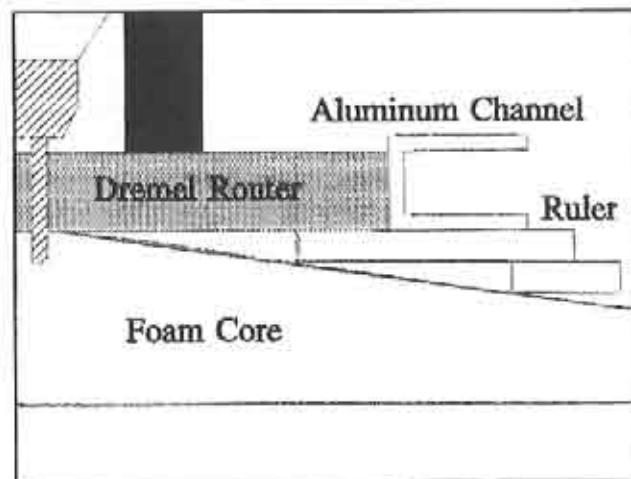
...by Lee Murray
Appleton, Wisconsin

I've now gotten some more vacuum bagging experience. I painted mylars when making some stabs for Viking Models ASW-20. The SuperPoxy paint didn't wet the waxed mylar in a few places. I cleaned the mylars with MEK before doing the next paint job.

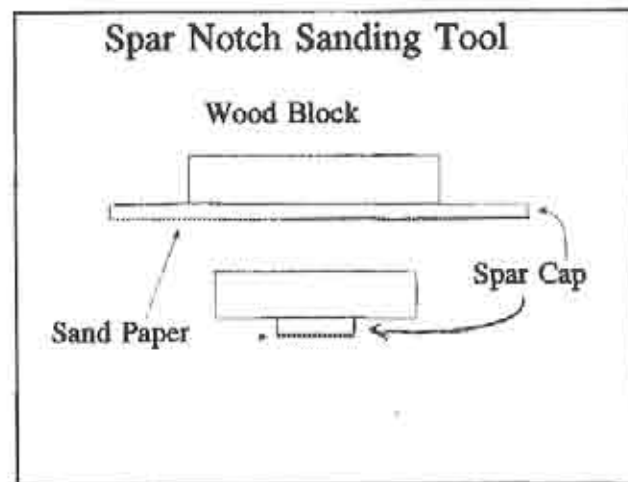
The carbon fiber toe I used over the blue foam showed through the white paint transferred from the mylar, so next time I will back up the white with silver which is a more opaque pigment. Actually, white pigment is clear on a microscopic scale. The white pigment (TiO2) is like diamonds which simply refract the light efficiently. Silver has aluminum flakes in it which are opaque.

In setting spars into the foam wings, I used a Dremel tool with an 1/8" router bit to make the groves. I made long guides out of inexpensive hardware store wooden rulers. These were taped in place so that the router would make a straight cut along the wing. A spacer the width of the spar cap was placed against the guide for the first cut. Actually, using several thicknesses of the 1/8" thick spar cap material worked great. The width of the spacers was decreased 1/8" at a time, until I had created the full 3/8" width of the spar notch.

A sanding tool was made by sticking sandpaper on a piece of the spar material with some back up material to keep from going too deep into the foam. This gets the spar just below the surface of the wing. A similar tool was made to get the servos the perfect depth into the wing. ■



Router Guide



Tools to Set Depth of Spar Notch



ZIKA

How High?

A Little Less for a Little More

...by Nick Trubov

Secretary/Treasurer

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(Nick Trubov sent in this article with a note to say, "I thought I should write and thank you, not only for your great magazine (I know you can NEVER hear that enough!), but especially for a hint that you recently published. The tip by Steve Savoie for making a "low tech tow hook" (10/94 RCSD) made my day. I have been bothered by my tow hook "manufacturing" abilities for years. I never thought of such an elegant and simple solution. I was constantly searching in the hardware store for items that would make suitable hooks. I always ended up with a hook that wasn't QUITE what I wanted. Now I am able to make hooks of any size and they are replaceable and I can install them quite rigidly. I found that I can use ANY size of nail or bicycle spoke or piano wire by selecting the appropriate size of die. I am in the process of replacing several tow hooks in my gliders now."

Thanks, Nick and Steve! Ed.)

Just in case you would like some stuff to put in the *Digest*, I thought I would write something that I would like to see. I have always enjoyed hearing about other peoples strange or wonderful episodes or encounters or problems. You know what I mean, the stuff that is sort of out of the ordinary, but that could be of use to anyone who flies sailplanes.

I have often found myself in thermals that were just so strong I couldn't help but go up. I was reminded of this a couple of weeks ago while visiting Albuquerque, where I learned to soar. There are days when even an "idiot" finds and stays in lift. We used to call this "idiot lift". It has been some time now, since I flew in such conditions. The lift that I

find now, very often is quite a bit stronger and much more extensive. I have even lost a couple of planes trying to get DOWN from thermals that were so large I couldn't find the edge where the SINK is supposed to be. I have sort of developed a method for dealing with this problem. I thought other pilots might be interested in hearing how I deal with this "problem".

First it should be realized that most problems that occur when flying, whether full scale or model aircraft, develop into BAD problems when they are not anticipated, when they are not dealt with in a timely fashion, and if they distract the pilot from the rest of the job of flying the aircraft. Realize that most of your flying is done in your head and incorporates the anticipation of what you will or should do. The part of flying that you do with your hands (and feet in a full scale craft) is a very small part of the job.

That being said, I will admit that I often let my model sailplanes "fly themselves" until I realize that I am "in trouble". This happens to me when I am at such an altitude that my visual contact with the model is marginal. When I have trouble seeing my glider when it reaches an altitude or distance at which I cannot be certain of its attitude or heading, I have committed the first sin of piloting. I have let my model fly itself. Now with the old "gas bag" models it was often quite safe to just point the nose down and "fly" back down to a safe altitude. Those models often had so much "parasitic" drag that it was nearly impossible to reach VNE (that Velocity which you must Never Exceed). With cleaner airframes, it has become easier to reach this air-speed. If I cannot see the attitude of my plane, I have very little idea how fast it is flying when it is really high up. I have folded wings and ripped off horizontal and vertical stabilizers by allowing planes to fly too fast. This is not the ideal way to get an aircraft back down to a comfort-

able attitude. With three axis control it is not too difficult to slip or skid an airplane. If the rudder is pushed one way and the ailerons are pushed the other the plane will fly "sideways" and this causes a LOT of drag and thus the aircraft comes down pretty fast. Flying inverted is also a pretty "draggy" way to lose altitude but, again, with the plane too high to see well, I find it quite difficult to maintain a safe attitude which will prevent the speed from building up. Constant loops will lose more altitude than will straight level flight, but I have been in thermals which were rising faster than my aircraft was descending, even looping. I have also been in thermals that were strong enough to keep the plane rising with the spoilers or the flaps fully deployed. I guess there really are thermals that rise more than 1,000 feet per minute. A fully stalled and spinning plane may not "fall" that fast. I have always been shy to spin an airplane for the first time if it is really high. The problem with a spin is that it may be, in

fact, a spiral dive. The difference is that a spin is a 1-G maneuver. A spiral dive may become a 5-G maneuver or more. This is one of the interesting things that I learned while soaring full scale aircraft. A spiral dive may easily become a terminal maneuver.

So, what have I learned? I am more careful about getting high now than I used to be. I begin my "descent" phase at a more comfortable altitude. Only I know what the right altitude is for ME, and only YOU know what that altitude is for YOU. Secondly, I have practiced the various methods of losing altitude at a much earlier stage when flying a new model. I have not been able to curtail my enjoyment of "getting high". I even do it while slope soaring. If a thermal blows in, I go up as long as I can or dare. But I have learned that it is better to stop a little earlier even if it means flying a little less. For me, a "little less" always seems to earn me a "little more". ■



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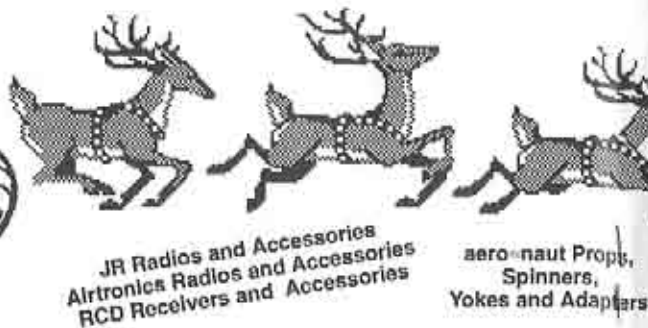
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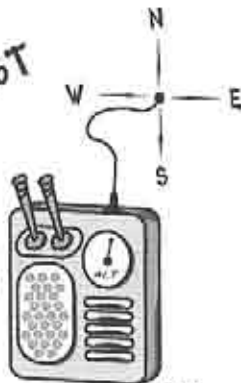
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ZIKA

Introduction

Have you ever made an innocent suggestion to someone only to find yourself volunteering to do it? I recently faxed an idea for a column to Jerry and Judy hoping they would know someone who would say, "Yes, I'll write the column." With a little prodding, YES came from me, and here I sit committing pen to paper - well, computer to disk, for the readers of RCSD.

So what was this suggestion all about? I have had the good fortune over the years to meet some wonderful soaring enthusiasts, attend some great events, and share some exciting experiences with soaring pilots in many different cities. I thought it may be fun, entertaining, and hopefully informative to introduce to you some people, their personal experiences, clubs, club activities, and events throughout the soaring community. I would like this to be a reader written column by which you share your experiences and photos on the pages of RCSD, and together, let's paint a descriptive picture of soaring east to west.

Who is this guy with such a bright (Why don't you do it?... Yes, I'll do it!) idea? I am a life-long modeler, with roots beginning in control line during the early '60's. My early interests as a junior flyer were control line combat, stunt, competition gas free flight, and girls. The last half of

my 30+ years in modeling have been devoted exclusively to building and flying RC sailplanes, my wife Jules, and our son Grant.

I consider myself an enthusiastic contest flyer, achieved LSF Level V a few years back, and am currently working on LSF Level V once again. I am not a "tech type", but do appreciate the aesthetics of a well thought out design. I am an

active Contest Director, past member of CASA in Washington, D.C., a founding member of the Wichita Area Soaring Association, and the Memphis Area Soaring Society.

While I want to share YOUR experiences in future columns, to get the ball rolling, I want to explore a topic that I have some strong feelings about: The importance of encouraging the beginner in your club, and how he can help build depth and TEAM WORK within your soaring organization.

In every organization (soaring or otherwise) there is typically a TEAM of highly committed people who make huge contributions to ensure long term success and growth. I'll bet that if your club has scheduled events throughout the year, that pretty much the same group of dedicated people are always on site EARLY to set-up the winches, lug out the batteries, and walk out the turn-arounds. Almost always, someone can be heard saying, "Gee, where's all the help?"

There is one consistent link with leaders in our sailplane community that I believe occurs with many successful clubs: The ongoing encouragement and development of new people joining your soaring organization. Those of you who realize the importance of providing instruction, help, and encouragement to beginners, also realize that these people are the life-

blood of the continued existence, growth and development of a hobby for which we share a common passion.

Second to learning to fly, newcomers typically have a keen interest in learning to use the equipment that abounds at the field. Encourage these individuals to come out and help set-up for your next fun-fly or contest. It will be a great learning experience for them and a valuable team building process for your club. If you don't invest the time to show a beginner how to use and set-up field equipment, you are missing a big opportunity to increase your club's assets.

I was recently reminded that most people want to be involved in some capacity... They just don't know what to do. New people certainly fit into this category and can provide some capable help. Seek them out. Show your beginners what needs to be done and how it is best accomplished. The result is that you will build depth, team work, and camaraderie in your organization.

Some positive by-products can ultimately result; an enthusiastic beginner can quite possibly open up needed resources for your club. Example: "The new guy says he can machine a spool for the winch we're building." The ardent beginner is often the source of new ideas, and collectively, they promote further growth in the hobby, from which we all benefit. I urge clubs and individuals everywhere to invest time in the beginner. It's a great personal experience from which you, your club, and soaring in general will flourish.

In future columns, we'll acknowledge local clubs and soaring enthusiasts from many different points across the map. Your club, and the dedicated people who run it, deserves tremendous credit. Without their commitment, you may not have a flying field, a contest to attend, or a new pal to go flying with.

Club of the Month

And speaking of clubs, Alan Oliver, President of the Mississippi Valley Soaring Association, submitted the following overview of soaring in St. Louis. I believe Alan's comments will give you some insight on his personal interests as well as soaring activities in St. Louis.

Here is his report.

"Hello, my name is Alan Oliver. I have been flying sailplanes for about 10 years. I have on occasion fallen from the purer faith and flown power. Usually this happens when I visit my Dad (who has been flying models since R/C radios had tubes).

"I am currently the President of the Mississippi Valley Soaring Association (MVSA). Our club boasts roughly 50 members of which perhaps 20 could be considered active. We have monthly meetings and contests during the spring, summer, and fall, totaling 6 to 8 per year weather permitting.

"WHAT WE FLY: Many of our members have opted for full house gliders — Falcon, Eagle, Shadow, Saturn, and are competing with the same. These planes seem to be successful here like most places. The beginners in our group seem to gravitate to the Spirit and Easy Eagle. I have not flown an Easy Eagle, however I have flown a Spirit and they perform very well. We also have members who fly their tried and true designs. Mark Nankivil flies a modified Oly II with great success. Nelson Itterly flies an OLD poly ship called the Daedalus. The Daedalus uses a modified S4233 (14% Thk. 3.3% Cam.), and is the club's current long flight holder with 2:16:36. Tough to beat. Several of our members are building fairly sophisticated airframes and some of the models our club members produce are as high quality as any I have ever seen.

"CLUB CONTESTS: Our contests are

typical duration events with target times of 7 to 9 minutes although 10 minute targets have been called for. We usually use the runway or modified spot landings and our serious competition pilots have a fair mastery of these tasks. Like most contests, "It ain't over 'til it's over," applies to our contests as well.

"Our most recent event of any magnitude was on September 10th and 11th. Saturday's targets were 4, 6, 6, and 8 minutes with a runway landing. Sunday's event was 5, 7, 7, and 9 minute targets, using a modified spot landing. The events were challenging and many fliers missed a few of their times (myself included). The weather cooperated, however, the morning air had a nebulous quality one might associate with the conversation on a first date. You knew it was going well in places but whether it was leading to something really good you didn't know until you were back at home. (Ed: great analogy).

"Several people did really well on first flight and others were glad there were 4 and 5 minute rounds available. The afternoon flying was much more conventional with respect to thermals, however there was still very uncertain quality to the air. Swallows were not as reliable as usual (at least for me) for the purpose of spotting lift. More than a few flyers skied out and there was even some sport flying upon completion of the fourth round. There was a dinner social at Chez Trevino's house on Saturday evening. The dinner was very enjoyable and many thanks to Gene and Rachel Trevino for having us over. Over all, I would call the weekend very successful."

"Thank you for reading...
May all your wind blow up."

— Alan Oliver

Thanks for the letter Allan. Their club, MVSA also does a bang-up job on their newsletter. I would like to encourage you to submit information about your club on a regular basis as Alan plans to do.

People in Soaring Chuck and Mark Thomas Memphis, Tennessee

"When I was asked to write the story of how my son, Chuck, and I got involved in RC sailplanes, I wasn't sure what to write or even how to start. So, I decided to start at the beginning and consolidate 30 years of modeling.

"The year was 1963. I got ready to fly a Stuka control line model my parents had given me for Christmas. My dad wanted to test fly it and to make sure everything was set properly. Neither one of us knew a glow plug from a needle valve but we managed to get it going. With my dad holding the control handle, I released my screaming Wen-Mac .049 powered Stuka into what I thought was going to be the first of many fun filled flights. The flight lasted less than one lap when the Stuka crashed and disintegrated. I was saddened, but the mystery of model airplanes had me hooked. I was 10 years old.

"My interest in gliders began when I started to tinker in free flight. I remember one flight in particular with my 'Lil Champ. It got caught in a thermal (Although I didn't know it then.), and flew away. Fortunately, I found it 3 days later about a mile from the launch site. Very exciting stuff for a youngster!

"In the late '60's, I bought an F&M Electronics Galloping Ghost radio, scratch built a Mayfly from M.A.N. plans, and never flew the airplane. However, I became quite proficient at taxing. Today, the Galloping Ghost is in perfect condition because it stayed on the ground.

"With the help of a local club, my first successful flights in RC were with a Sig Kadet - the original one without ailerons. I finished out the '70's and '80's building and flying a myriad of "sport" RC models. By now, my son Chuck was showing interest in the hobby and started going to the field with me to watch. Chuck was 10 years old when I built a Sig



People in Soaring
Chuck and Mark Thomas
Memphis, Tennessee

800. Early on, Chuck had an interest in hand-launch. I built a Micro Spirit which was an immediate hit with both of us. That led me to organizing a club hand launch event which opened up a whole new way of fun for our club members. As a result of

Senorita for him and he quickly learned how to fly.

"Time went by and flying power became redundant for us: takeoff, fly around, do some rolls, loops, spins and land. After 15 years, I was ready for a new challenge and Chuck was willing to go along. We wanted something more specific and it had to have a contest circuit. I considered pattern, scale, and Formula I racing.

"Then one day while visiting our local hobby shop the light came on. A contest announcement for an "electric fun-fly" sponsored by the Memphis Area Soaring Society caught my eye. Chuck and I went to that contest, and after talking to some of the club members and seeing the magnificent field, we had found what we were looking for!

"A 2-meter Spirit for me and a 2-meter Riser for Chuck got us going in RC soaring. While both of us were quite capable of flying around, we couldn't recognize a thermal if it hit us in the face. It's been 3 years since we made the switch to sailplanes. We have both been to 3 LSF Nationals and 3 Mid-South Soaring Championships, plus numerous club contests.

"Chuck has progressed from the Riser to a 2-meter Alcione to his current ship, a Saturn 2.9T, which he won at the MSSC raffle. I have since built a Spirit 100, a Legend, and am currently flying a Falcon

Chuck's initial interest, and many of the club members enjoying hand-launch, we decided to include this growing event in the 3rd Annual Mid-South Soaring Championships. Anyone who says that our younger fliers have no influence on this hobby should think again!

"Chuck has now completed his 3rd year of flying. He has also completed LSF Level III. His first three years were infinitely more intense and high tech than my early years. Only time will tell, but I hope he is now as committed to the hobby as I was at his age.

"This is not the complete story, but just a few highlights. I can't finish this without mentioning my wife, Kay. When I flew the "powered" stuff, she would always go to the field, but never got involved with the club. Since we have joined MASS, she has worked as score keeper, and in impound at major contests as well as our local soaring events. She has been very tolerant and supportive of the expense of high tech equipment, and has become a frequent traveler with Chuck and I during contest season. I don't think Chuck and I could enjoy this hobby as much as we do without Kay's interest and support."

Thanks, Mark. I'll bet that many of us share a common thread with Mark's evolution in modeling. What's better than sharing these experiences with a youngster!

Great "Non-Tech" Ideas

There is, I believe, a wealth of information on contemporary construction techniques, airfoils, new designs and general "How To's". As I mentioned earlier, I am not a tech type, but there are some great ideas out there that will make your every-day flying more enjoyable.

For example, as a result of our visit to the TNT contest in 1993, we solved some of our winch line problems by running 330 lb braided line from the winch spool through the turn-around and then tying on 220 lb test line as the top tow line. Guess what? No more winch line breaks. We also changed our "Rahm style" re-

triever line to 90 lb twisted. Works like a charm, but you've got to have a good 200 lb test line swivel to help the line unravel. That's just one good idea we picked up from one contest. I'd like to hear your "non-tech" ideas!

This first column represents the type of thoughts that I plan to share with you during the months ahead. Think of this column as a bulletin board of people, clubs, and ideas from sailplane enthusiasts like yourself, east to west. Season's greetings to each of you and let's look forward to a successful and enjoyable year of soaring in '95. ■

F.Y.I. - Controlled Airspace Considerations for RC Aircraft

The following letter and accompanying article were addressed to Jim Gell of Farmington Hills, Michigan in response to Jim's article on airspace restrictions for model aircraft (October 1994 RCSD). Jim says, "I thought that Jim Smith's piece on 'how high they fly' was a nice piece of work and want to pass it along."

...Jim Smith

MRCSS, Minnesota

I spent many hours passing through those inverted wedding cakes that you mention in your October, *R/C Soaring Digest* article. I retired from Northwest a couple of years back.

I believe that if we honor the first tier of the TCA (i.e., flying no closer than ten miles to a major airfield), we'll be clear of all air carrier aircraft. At that ten mile point, most approaching planes are at least three thousand feet above the ground. Patterns at smaller fields are as low as 1000' above the surface, and can string out with training craft for many miles on a sunny Saturday afternoon,

and so are potentially more of a problem. Prudence would dictate that you not fly along the projected center line of any runway, or at least be very watchful if you do!

In regard to your question, "How high can we fly our R/C sailplanes and still see them?", I have enclosed an article that I wrote for our local soaring club newsletter in 1991.

My Casio altimeter watch has hit 3060 feet while in my Ultra IV electric sailplane with a 9 inch chord, and I think she would have been out of sight in a hurry if I hadn't done a couple of dozen spins. So! I tend to believe that .7 minute number. The model was truly a 'speck' against brilliant white clouds. As a result of decreased contrast, it disappeared when flown out into the blue sky! No one would be comfortable flying at that height for very long!

The only thing that I no longer hold to in the article is the reference to blue-blocker lenses. I may have had a bad prescription, but after really trying them for a full season, I abandoned them because of what felt like extreme eyestrain. I have no problem with dark green.

20 / 20 ? or

Where, Did That Airplane Go?

...by Jim Smith

I have been considering writing an article on sailplane visibility for some time. The graph of "Index of Visibility" (color) in the May issue of "Looking Up" forced me to action.

What is good vision, anyway? On the familiar Snellen eye chart, the one your doctor uses to check your eye sight, 20/20 vision equates to the ability to identify letters that fill a visual angle of 5 minutes (.08 degrees) of arc. Of course, your sailplane is not a letter of the alphabet. When it is "specked out", you only have to be able to identify it as a "T" shape (conventional airplane) or a "V" shape (flying wing), you just have to see something!

A 1966 study by Lockheed says, in part, "The smallest image that can be perceived at the fovea (the spot on the retina where vision is most acute) ranges from .5 to 1.0 minutes of arc, with a mean value of .7 minutes of arc." That's roughly .01 degree. However, the same study revealed that when the target moves as little as 20 degrees from straight ahead, the minimum detection angle rises to 10 minutes of angle. That's more than a ten fold increase!

In recent years, the National Transportation Safety Board (NTSB) has come to the more reasonable conclusion that the probability of sighting other aircraft (in a potential airborne collision situation) is about 12 minutes (.2 degree). (The diameter of the full moon is .5 degree.)

How does this relate to flying your model? Obviously, the wing's the thing! From our vantage point, the stabilizer and fuselage will disappear before the wing. So, let's consider the wing alone. A two meter wing will reach the .7 minute size at a distance of about 34,000 feet. But

wait a second! We must consider the wing chord, not the span! A telephone line stretches for miles, but we can not see it beyond a certain distance because it has a very small "chord"!

Okay then! Let us consider the 10 inch chord on that two meter plane. That dimension reaches the .7 minute size at 4200 feet. And don't forget that's straight ahead. If you look aside the 20 degrees noted above, you could lose sight of your plane at less than 500 feet! Of course, at that altitude it still appears quite large, and is easy to find! At higher altitudes, as the airplane becomes smaller, it is much more difficult to re acquire if you look away momentarily!

So! At about 4000 feet, it is virtually impossible to see a model with a ten inch chord, unless you're Chuck Yeager, who states in his autobiography in reference to on coming Luftwaffe fighters, "Andy (Clarence E. "Bud" Anderson) and I were the first to see them coming; at fifty miles or more..."

Referring back to the Snellen chart, have you ever had your eyes checked on a chart having colored letters? Certainly not! Because maximum contrast gives the best results! The same holds for sailplanes. Colors may have some relevance for power flyers, who operate up close to their planes, but glider guiders need contrast! Give me black wing bottoms every time. You can't get more contrast with clouds or bright sky than you can with black. Since I've been flying with "blue blocker" sunglasses, I use dark blue under surfaces which look black through the orange lenses.

Paint 'em or cover 'em as you wish on the top, but I think dark below is a must. This from a fellow who has had two brightly colored transparent covered two meter airplanes go "out-of-sight". ■



Air Jam or Hand-Launch Topics

...by Scott Smith

2 Sugarpine, Irvine, CA 92714

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World Handlaunch Jamboree

Well, the World Handlaunch Jamboree has come and gone, but those who participated will not soon forget. As one very competitive participant put it, typical hand-launch contests are not long enough to "take the luck out of it". The Jamboree, with 10 rounds plus 3 flyoff rounds, was a marathon; it became a matter of attrition. Other articles will cover the contest aspects; this column, as usual, will look at it from a technical point of view. The conditions were mildly difficult, perfect for a premium contest.

Winning Designs

The technology evolves. First, the Climmax, the most popular handlaunch here in Southern California, did not place in the top three. Instead, two custom ships placed 1st and 2nd followed by an out-of-town Monarch. Second, the aileron ships showed that they can be competitive. Joe Wurts won again with his 12 oz. RG15 "sloper". Another aileron ship made it to the flyoff.

Why Aileron

Those who were successful with the aileron ships said they were pleased with the ability to maneuver and penetrate in gusty and turbulent conditions. They excelled when gusty conditions on the ground made it difficult for polyhedral planes to "get down". All of the aileron planes used spoilerons or flaperons to make descent easy and precise. The aileron planes also seemed to be able to hunt farther for thermals.

...And Why Not Aileron

In light conditions, the aileron planes

were not as buoyant as the polyhedral ships, especially the lightly loaded ones such as the Monarch. And, when the plane drifted far away with the thermals during the 10 minute flights, they were harder to control since they were less stable and less visible. Interestingly, none of the aileron pilots claimed that an aileron plane was more competitive than the polyhedral standard; it was simply a different challenge. It makes me wish that I was so good I would enter one of the world's most prestigious contests flying an aileron ship because I was "bored" with the polyhedral ones.

7037 vs. RG15

Joe Wurts was launching 15-20% higher than most everyone else. Could it be (at least partially) the reduced drag of the RG15 over the 7037? Pilots were talking about trying out airfoils that were compromises between low sink/good L/D airfoils like the 7037 and the fast, low drag RG15. Look for airfoils like the 7012, 7084, and 6080 in the future.

Wing Tips

Several pilots who were experimenting with custom designs called my attention to the widened wing tips they were flying this time. Reason? Narrow wing tips tend to tip stall. Some of the custom ships were constant chord or very nearly so. And they flew very well.

Sheeting Techniques

Much to my satisfaction, several pilots extolled the use of "low tech" adhesives for sheeting the balsa to the foam cores. For example, Stan Sadorf explained how he used plain old white glue thinned (75% glue/25% water); others are using water-based Varathane. If vacuum-bagging using these, be sure to have bleeder material (such as paper towels) completely cover both sides of the wing panel so that the water vapor has a way to escape. Work quickly, or do fewer panels at one time, since the glues dry more quickly than epoxy. Let it sit under pressure for at least two days, longer if you

have the patience. All were completely satisfied and claimed lighter wing panels than they could achieve using conventional laminating epoxy. Several Monarchs have been built using this technique; the total weights have been averaging around 10.3 oz without using special techniques for lightness. I.e., no one took the case off their radio, or sanded the sides down on their servos, or anything like that.

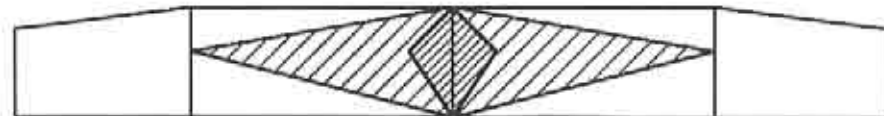
Launch Tuning

High on the list of many contestants was getting the plane to launch at the desired angle. Several pilots reported success by adjusting the CG for best launch angle. If the plane arcs up too quickly, move the CG back. If the plane doesn't lift much on launch, move the CG forward.

Don Van Gundy has a fascinating additional technique, a lifting V-tail using the 7037 airfoil. Don said he did this primarily to get his plane to not zoom up so much on launch. The effect of the lifting tail doesn't seem to matter much during normal flight speeds. It was interesting to note that Don's battery was now too heavy to put in the nose, and so now sits under the wing.

Using Fiberglass Instead of Balsa Sheeting

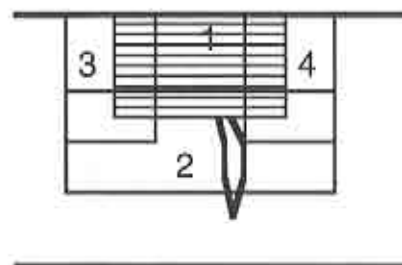
Don had another construction technique dear to my heart: using fiberglass instead of balsa sheeting. He and Art Marchevitz both use 1.5 lb gray foam. The entire wing is covered with 0.75 oz. glass with additional 0.75 oz. "diamond" doublers as shown below:



I like the use of all composite materials for wings; as an indoor rubber model enthusiast, it pains me to see all of that light contest grade balsa go for wing sheeting when I could build 20 "living room stick" models with one 36" sheet.

Quick Field Repair

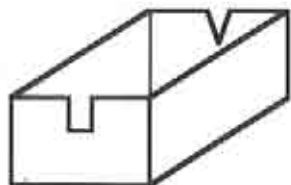
Joe, seeing another contestant's wing almost get sliced through in a mid-air, ran out with a sheet of balsa, some clear 2" wide plastic tape, and scissors. In twenty seconds, he had the wing repaired by applying the tape and balsa sheeting shown in the following illustration (the numbers indicate order of application):



The balsa sheet (1) was laid down first along the leading edge and held down by a strip of tape (2) across the break, which also served to stabilize the wing. Tape strips 3 and 4 were also laid down on the ends of the balsa and wrapped around the leading edge of the wing. Even though the balsa sheet was 1/16 inches thick, the plane flew well enough to be competitive in the contest. Congratulations on fast work, Joe!

Cheap Plane Holder

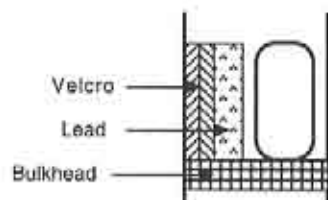
Try a shoebox with notches as follows:



Cut the front notch and the rear V so that the wings rest on the sides of the box. Thanks to Don Van Gundy for this one.

Quick Ballast Holder

Art Marchevitz showed me his quick, yet effective, method for adding ballast: lead and velcro inside the finger hole cavity as shown:



The finger hole has been shown exaggeratedly too narrow to illustrate how a strip of Velcro is glued along the inside of the fuselage side. The lead sheet has the other sheet of velcro glued to its side. This shows how ballast can be easily added and removed through the finger hole. Art says that the force of throwing is not nearly enough to "shear" the velcro sheets apart. This is convenient enough to be very useful during the middle of contest rounds if the wind suddenly picks up or drops off.

What's New?

Manny Tau has the very hard-to-find count-up/down stopwatches from Cronus, model C609TCL, in stock for \$25 + tax + \$1.00 S&H. Call him at Taucom, (714) 492-9553.

Mark Hamil of DCU is assembling a limited number of competition hand-launch aileron ships called the Viper. Call him at (714) 535-6969 for details. ■

An Easy Leading Edge Finishing Technique for Bagged Wings

...by Harley Michaelis, LSF 023
26 S. Roosevelt
Walla Walla, Washington 99362
(509) 529-2562

In bagging a wing the first time, I extended the mylar and the cloth layup over the front of the core. This left a very rough and irregular epoxied area there. It took too much time and effort to attempt to properly shape, fill and smooth the hard epoxy. The end result was too crude to be happy with. With access only to more common builder resources, my expectation of a glass smooth, unmarred, overall painted finish, was unrealistic.

Regarding painting, it's best to spray the waxed mylar before bagging. An ample paint skin there, smoothly transfers with negligible pin holes, even with bargain

paints such as Zynolyte Spray Brite or Krylon. Pre-painting, however, creates some other considerations. Unfortunately, a film of release wax ends up on the paint. So, even if an epoxy LE could be nicely smoothed to paint, adjacent pre-painted areas need to be feathered into for best overall appearance. This requires sanding adjacent areas or the new paint won't stick to allow feathering. This sanding takes off the nice sheen from bagging. Overspray from new painting calls for rubbing out, which takes a lot of elbow grease. Rubbing out requires full cure first, which can take many days. New paint may react with the old, causing crinkling, pin holes and a general mess. This is likely why some ARFs have the LE covered with tape. It avoids the need for LE paint and is an easy way to make pits and other irregularities of a poorly finished LE less apparent.

Considering the above, an easy way to get a smooth LE and acceptable overall

finish was preferred. My simple solution was to:

- 1) Size the mylar and the cloth pieces to keep the front of the core clean.
- 2) Cleanly trim off a uniform amount of core and layup along the LE area.
- 3) Add a wood LE.
- 4) Finish it without marring the adjacent paint.

Procedures are as follows:

- 1) The mylar pieces are sized to end about 1/8" **behind** the front edge of the cores, top and bottom, and the mylar fold line positioned 1/4" **behind** the rear edge of the cores. The layup includes 2 overall 1.5 oz. glass cloth pieces cut to bridge the fold line. This produces a glass-reinforced TE that can be trimmed, as needed, to align aileron and flap TE's and still retain a sharp edge. Kevlar used **does not** bridge. Rather, separate top and bottom pieces are sized to extend from the **core TE** to 3/4" **behind** the front edges of the mylar. This avoids Kevlar where sanding is to be done, both at the TE and LE areas. For additional reinforcement up front where there is no Kevlar, extra 2" wide strips of glass cloth are cut to overlay on the Kevlar and, preferably, to extend **just to** the front edges of the mylar.

- 2) After taping the core in the mylar, wipe off any oozing epoxy up front. After bagging, sand off any epoxy on the extreme core edge. Remove a uniform strip along the LE pressing against a guide clamped on a bandsaw table. The raw glass/epoxy/foam face is easily and cleanly fine-sanded smooth for attachment of the wood LE. Incidentally, the Sears 10" table top bandsaw, with 15 teeth per inch blade, gives a clean cut and is an absolute jewel for model work.

- 3) Balsa strips for the LE can be beveled to approximate fit, before attaching. Prop up a panel, TE down, over something soft. It goes most quickly, with no adhesive oozing on the paint, if the wood LE pieces are first sprayed with accelerator and thicker UFO lightly dabbed on the raw core. Do not spray accelerator on the panel as it may etch or eat the paint. Anchor at the root end, while avoiding contact elsewhere. Then use the thumb and forefinger to progressively position the wood and press to secure. Carefully shape and fill any gaps with One Time Spackling, etc.

- 4) Some tapes used around LE's are rather thick and may cause unwanted tripping or otherwise distort the LE radius beyond limits acceptable for best performance. Mike Selig says anything over .004" is too much. A thin, very suitable material is the tacky Goldberg ULTRACOTE Plus. You can select colors to match or contrast with top and bottom colors. Single strips may be sized to wrap fully around straight sections. These can overlap on the adjacent painted areas. If you want to trim the LE in a contrasting color tapering toward the tip, a suitable bottom strip could be first attached and then a top one to overlap it. Heat is not needed unless curves are tight. Residual wrinkles or puckers can be fixed at low heat with the sealing iron. Just keep it off the paint. Don't use a heat gun as it may bubble the paint.

The ULTRACOTE Plus over paint gives a smooth, respectable appearance. It's easy to apply and sticks well. Balsa, as always, absorbs lumps well to help spare worse damage. If the wood LE gets dinged or the film marred, either can be replaced. ■

NASSA NEWS

...by Gregory Vasgerdsian
Martinez, California

Sorry, we missed out on the last issue but thanks to the winds of luck you're reading this now! In case you aren't already aware, we have some definite dates for a few scale events. The DUST scale event in Palm Springs, December 10 and 11th, may well be happening as you read this. The Los Banos Scale Fun Fly is set for May 5, 6 and 7th at Los Banos Reservoir, California. The other scale event headed our way will be the NASSA Fun Fly at Point of the Mountain Utah, set for July 21 through 24.

Going in to the new year, NASSA wants to become a stronger club with more to offer its members. For new members there's been a delay in getting out materials as we are switching to a new program to handle the membership data base, mailing labels, etc. We are going to reconfirm the board of directors and try to nail down some formal positions like Membership Chairman, etc. Over the past year I've spent a great deal of time in helping to get things done and I am currently straightening out the club by-laws and some other details. Among the issues to be nailed down is the basic day to day running of NASSA, how business is run, and how new issues are approached.

Also, the exact requirements for NASSA to sponsor an event will be down in writing: what is required of the event organizer and what he or she can expect from NASSA. There is also the question of a regular NASSA newsletter, other than our NASSA News in R/CSD. This space has been graciously granted to us by R/CSD, and although we put out two separate scale packs this year, there are some that feel NASSA needs a regular newsletter. The thoughts are that this would make NASSA more attractive to join, but it would require a hardworking

newsletter editor, and additional costs. Current membership dues are only \$10.00, which I think for most is a pretty insignificant amount.

All of this comes down to, "What do we want NASSA to be and do?" If scale modelers really want a great organization, it takes some effort and some input.

Got a new scale ship you're proud of? Well then show it off! Since our membership doesn't have meetings to let you do so, send a photo in to NASSA and give your fellow members something to drool over! Gerry Knight of Saint Catherines, Ontario sent me a nice photo with his arms wrapped around his newest scale flier, a 1/4 scale Olympia 2b. Built from Cliff Charlesworth plans of England, it's beautifully finished with red and white sunburst wings, and red fuselage. Spanning 3.75 meters, Gerry says it's a real floater and flies much slower than his Charlesworth ASK-18. A great example of a vintage model that really performs from the flat! Send your photos or other contributions to NASSA, P.O. Box 4267, W. Richland, WA 99352. ■



**BEST WISHES FOR
THE NEW YEAR!**

**FLY SAFELY,
HAVE FUN,
AND WE'LL SEE YOU
NEXT YEAR!**

*Merry Christmas and a
Happy New Year from all
of us to all of you!*



ZIKA

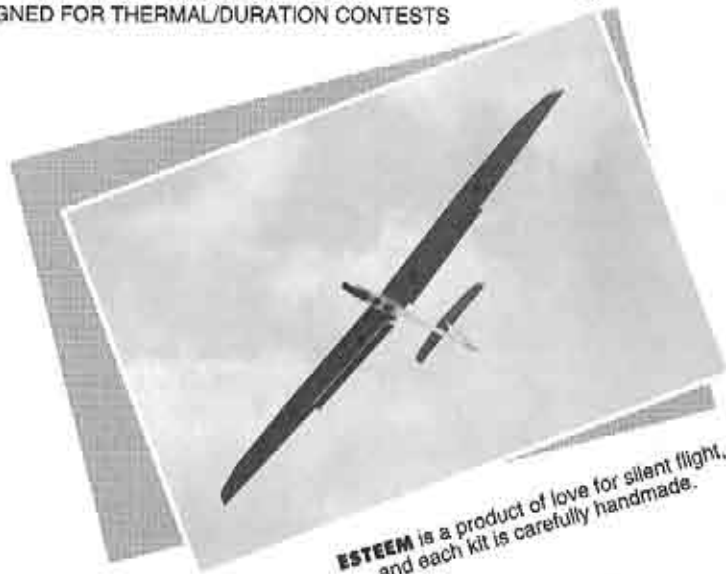
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Wing Span:	110 in.	122 in.
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NASSA NORTH AMERICAN SCALE SOARING ASSOCIATION

The North American Scale Soaring Association is an organization of scale soaring enthusiasts dedicated to the furtherance and enjoyment of scale soaring in North America. Membership dues are \$10.00 a year or \$5.00 after August 1st, and provide for sponsorship of NASSA Scale Fun Flies & Rallies, and for the implementation of a National Scale Building and Soaring Achievement Program. Join NASSA and join a network of scale soaring enthusiasts that influence the direction of scale sailplanes in North America. Please provide your address, phone #, and AMA #, and we will send you a membership card and membership roster. A bi-monthly column keeping NASSA members up to date is included in RCSD, with additional information available periodically direct from NASSA. Help promote and support the continuation of scale soaring by sending \$10.00 (or \$5.00 after Aug. 1st) to: NASSA, P.O. Box 4267, W. Richland, WA 99352.

F3B/USA • F3F/USA

RC SAILPLANE TECHNICAL JOURNAL

F3B/USA is a bi-monthly publication dedicated to the sports of F3B and F3F. The journal is intended for the beginning as well as experienced multi-task soaring enthusiast. Articles cover a wide variety of areas including: technical data issues, description of techniques, and articles written by and about the top people in the sports.

Subscription Rates: \$14 per year (6 issues)
For More Info Write: F3B/USA,
87 1/2 N. Catalina, Pasadena, CA 91106

LSF



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.

League of Silent Flight
10173 St. Joe Rd.
Ft. Wayne, IN 46835



The Vintage Sailplane Association

Soaring from the past and 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. VSA publishes the quarterly BUNGEE CORD newsletter. Sample issue: \$1.00. Membership is \$15.00 per year. For more information, write to the:

Vintage Sailplane Association
Route 1, Box 239
Lovettsville, VA 22080

T.W.I.T.T.

(The Wing Is The Thing)

T.W.I.T.T. is a non-profit organization whose membership seeks to promote the research and development of flying wings and other tailless aircraft by providing a forum for the exchange of ideas and experiences on an international basis. T.W.I.T.T. is affiliated with The Hunsaker Foundation which is dedicated to furthering education and research in a variety of disciplines. Full information package including one back issue of newsletter is \$2.50 US (\$3.00 foreign). Subscription rates are \$18.00 (US) or \$22.00 (Foreign) per year for twelve issues.

T.W.I.T.T., P.O. Box 20430
El Cajon, CA 92021

You are invited to join the NATIONAL SOARING SOCIETY

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For Info., Contact NSS Secretary/Treasurer

Robert Massmann
282 Jodie Lane
Wilmington, OH 45177
(513) 382-4612



R/C Soaring Resources

The contacts listed here have volunteered to answer questions on soaring sites or contests in their area.

Contacts & Soaring Groups - U.S.A.

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; (602) 325-2729. SAGE welcomes all level of flyers!

California - California Slope Racers, John Dvorak, 1063 Glen Echo Ave., San Jose, CA 95125; (408) 259-4205.

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

California - Desert Union of Sailplane Thermalists, Buzz Waltz, 3390 Paseo Barbara RD, Palm Springs, CA 92262; (619) 327-1775.

Florida - Florida Soaring Society, Ray Alonzo (President), 3903 Blue Maidencane PL, Valrico, FL 33594; (813) 654-3075 H, (813) 681-1122 W.

Georgia - North Atlanta Soaring Association, Tim Foster, (404) 978-9498 or Tom Long, (404) 449-1968 (anytime).

Illinois (South & Southwest) - Silent Order of Aeromodeling by Radio (S.O.A.R.), Jim McIntyre (contact), 23546 W. Fern St., Plainfield, IL 60544-2324; (815) 436-2744.

Illinois (North & Northwest) - S.O.A.R., Bill Christian (contact), 1604 N. Chestnut Ave., Arlington Heights, IL 60004; (708) 259-4617.

Iowa - Eastern Iowa Soaring Society (Iowa, Illinois, Wisconsin, Minnesota), Bob Baker (Editor), 1408 62nd St., Des Moines, IA 50311; (515) 277-5258.

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

Maine - DownEast Soaring Club (New England area), Steve Savoie (Contact), RR#3 Box 569, Gorham, ME 04038; (207) 929-6639. InterNet e-mail <jim.Armstrong@acorbnbs.com>.

Maryland - Baltimore Area Soaring Society, Bill Cavanaugh (President), 1428 Park Ave., Baltimore, MD 21217; (410) 523-0778.

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.

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

Nebraska - S.W.I.F.T., Christopher Knowles (contact), 12821 Jackson St., Omaha, NE 68154-2934; (402) 330-5335.

Nevada - Las Vegas Soaring Club, Jeff Burg (President), 853 Shrubbery Lane, Las Vegas, NV 89110; (702) 459-8100.

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

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

New York, aerotowing Rochester area, Jim Blum and Robin Lehman, (716) 367-2911.

Northwest Soaring Society (Oregon, Washington, Idaho, Montana, Alaska, British Columbia, Alberta), Roger Breedlove (Editor), 6680 S.W. Wisteria Pl, Beaverton, OR 97005; (503) 646-1695 (H) (503) 297-7691 (O).

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

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

Tennessee - Memphis Area Soaring Society, Bob Sowder (contact), 1489 Wood Trail Circle, Cordova, TN 38018, (901) 757-5536, FAX (901) 758-1842.

Texas - Texas Soaring Conference (Texas, Oklahoma, New Mexico, Louisiana, Arkansas), Gordon Jones, 214 Sunflower Drive, Garland, Tx 75041; (214) 271-5334.

Utah - Intermountain Silent Flyers, Bob Harman, (801) 571-6406. "Come Fly With Us!"

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

Outside U.S.A.

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

Canada - Southern Ontario Glider Group, "Wings" Program, dedicated instructors, Fred Freeman, (416) 627-9090, or David Woodhouse (519) 821-4346.

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

BBS

BBS: SLOPETECH, Southern California; (714) 525-7932, 2400 - 8-N-1

BBS: South Bay Soaring Society, Northern California; (408) 281-4895, 8-N-1

Seminars & Workshops

Free instruction for beginners on construction & flight techniques, Friday & week-ends (Excl. contest days), Bob Pairman, 3274 Kathleen St., San Jose, CA 95124; (408) 377-2115.

Schedule of Special Events

Date	Event	Location	Contact
Dec. 10-11	Winter Soaring Festival	Indio, CA	Buzz Waltz, (619) 327-1775
Jan 13-15	18th Annual IMS	Pasadena, CA	Anita Northrop, (702) 896-2162
Feb. 5-6*	Southwest Winter Soaring	Gilbert, AZ	Iain Glithero, (602) 839-1733
Apr. 8-9	Masters of Soaring	Covina, CA	Pete Olsen, (909) 597-2095
May 5-6*	Rosebowl Soaring Festival	Pasadena, CA	
June 15-18	Mid-South Champs (International Contact)	Huntsville, AL	Ron Swinehart, (205) 883-7831 Tom Ernst, (901) 767-9518
Oct. 7-8*	Fall Soaring Festival	Visalia, CA	
1998	World Soaring Jamboree		
* Western States Triad			

Reference Material

Still a few copies available of some issues of the printed transcripts of talks given on RC Soaring at the Previous Annual National Sailplane Symposium. Prices reduced to clear out stock. Talks were on thermal meteorology, flying techniques, hand launch, cross country, plane design, airfoil selection, vacuum bagging, plastic coverings, flying wings, etc., etc. Send SASE or call for flyer giving details. Many copies of most recent (1992) transcript left. Clubs have found them good for raffle prizes, gifts, etc. Al Scidmore, 5013 Dorsett Drive, Madison, WI 53711; (608) 271-5500.

Hobby Shops

Listing of hobby shops that carry RCSD.

Action Hobbies
3723 S. Mendenhall
Memphis, TN 38115
(901) 365-2620

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

Gyro Hobbies
23052 Lake Forrest Dr., Unit C2
Laguna Hills, CA 92653
(714) 583-1775

HiTechHobbys
284 - B Wellisian Way
Richland, WA 99352
(509) 943-9241

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

Hobby Counter
1909 Greenville Ave.
Dallas, TX 75206
(214) 823-0208

Hobby Warehouse
4118 South Street
Lakewood, CA 90712
(310) 531-8383

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



Update

1st Annual Winter Soaring Festival

Indio, California

December 10 - 11, 1994

...from Buzz Waltz (D.U.S.T.)

Palm Springs, California

(619) 327-1775

On Saturday morning, December 10th at 10:00 A.M., to start the opening of the festivities for the 1st Annual Winter Soaring Festival, several full-size vintage sailplanes will fly in and land on the Empire Polo Field. Among those scheduled to arrive are: 1938 BA 100 Baby Bowlius Albatross, 1944 Laister, 1951 Sedbergh Slingsby Type-21, 1959 Schweitzer, and a 1961 Schleicher Ka-8.

These sailplanes will be on public display during the two day festival. Times for the event are 10:00 A.M. - 5:00 P.M. on Saturday the 10th and 11:00 A.M. - 2:00 P.M. on the 11th.

Pioneer Sailplane Pilot to Give Away Trophy

Pioneer sailplane pilot, Mr. John Robinson, who once flew over the Palm Springs area on May 8, 1938, on his way to Banning Airport from Clark Dry Lake in Borrego Springs, established an unofficial altitude record at that time for the highest flight of a sailplane: 10,400 feet. Mr. Robinson will be presenting the John Robinson Perpetual 1st place trophy for the Best Vintage R/C Scale Sailplane. ■

Masters of Soaring To Be Held in California in 1995

The Silent Wings Soaring Association (SWSA) will host the seventh annual Masters of Soaring competition on April 8th and 9th, 1995, at the SWSA field in Covina, California.

This contest typically draws the country's top fliers and presents a very challenging format. Contestants can expect ten tough rounds to compete in during the event. To participate in this contest, a flier must have achieved LSF level V or hold Level IV and all contest points for Level V, hold a national record, or have won a major two day national or regional contest. SWSA President, Pete Olsen, will send invitations and will accept the application of those who qualify. Spectators are cordially invited to watch and learn.

Pete may be contacted at (909) 597-2095 or by mail at 15409 Oak Grove Court, Chino Hills, CA 91709-2448. ■

The Western States Triad Is On!

...from Iain Glithero
Mesa, Arizona

At a special meeting held at the recent Fall Soaring Festival at Visalia, California, it was unanimously agreed to go ahead with the proposed Western States Triad series in 1995. This event is a compilation of scores from the three major soaring contests in the western U.S.

The meeting adopted the proposal as amended, and the three contests used to determine the Triad winner will be:

- 1) The SWWSC held in Gilbert, Arizona. The traditional date is the first full weekend in February.
- 2) The Rosebowl Soaring Festival in Pasadena, California. The 1995 dates are the 5th and 6th of May.
- 3) The Fall Soaring Festival in Visalia, California. The traditional date is the first full weekend in October.

Points from each contest (open class only in the case of the Rosebowl) will be normalized and added.

A significant trophy will be awarded, bought with contributions from each host club. The trophy will be awarded at the Fall Soaring Festival in Visalia. Computerized record keeping will allow almost instantaneous determination of the winner.

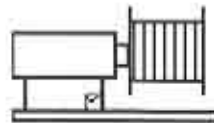
The annual trophy will be returned to the C.D. at the Fall Soaring Festival the following year after it is awarded and the previous winner will be presented with a plaque or replica of the perpetual trophy.

Teams representing any AMA chartered club will also compete for an annual team award. The members of the team need not be the same at each contest.

The winning team will be presented with a banner suitable for display on club tents or awnings with the club name, the names of all the pilots involved in the team effort, and the year for which it was won.

The purpose of the Triad is to add another dimension of interest to the growing sport of Radio controlled soaring.

Get those entries in! You can't win if you don't fly! ■



Winch Line

Gordon Jones, 214 Sunflower Drive,
Garland, Texas 75041; (214) 271-5334
After 5:00 P.M. CST

Magazine Photography

With all the articles and photographs that we receive, the number of photographs that meet the requirements of the article, or in some instances advertisement, are not as good as they could be. Taking photographs for a magazine article or an advertisement is different than when you are taking photographs of the family or other events. With these you are trying to capture a moment in time. Of course, this is also true of photographs taken outside at a contest.

Magazine photography is illustrating a product in an advertisement or a procedure in a construction article. I want to provide you with the basic understanding of the key aspects that affect the quality of a photograph. Let's look at a basic definition of a photograph, elements of quality in the photograph, how to plan a photo session and the reproduction techniques used with photographs. While most of the following relates to inside photography, the basic principles apply to outside photography, as well.

Photographs are tonal graduations from black to white or in color that record the actual appearance of an object using a camera and light sensitive materials. Photography is generally used to establish a product within an environment or to record the actual appearance of a product. Photographs are used as a supplement to written text to capture building techniques or illustrate a completed step in the procedure.

Composition is the most difficult factor to evaluate because it is subjective. With most photographs of a product or procedure, a three-quarter view works well because this view shows at least three surfaces of the subject. It is easy to get the proper lighting and provides the most information to the viewer.

Composition also has an affect on the way the picture is set up in the magazine. By this I mean what percentage the picture is reduced or enlarged and how it is cropped. Cropping is cutting out the edges of the picture to just include the subject with a small photo border. With the subject in the center of the photograph this is easier for the magazine to set the photograph up for inclusion in the article. This is also true for pictures to be used in an

advertisement.

Another consideration in composition are any props that are used in the picture. If the picture is a product for an advertisement, the product by itself is best. Additional items, people, trees, etc., detract from the product in most cases and the viewer has a tendency to look more at the background. If it is a product that requires a person to demonstrate use of the product, then be sure that you have good contrast for the background to highlight the product.

If detail shots are required, they should be taken at a distance where the orientation is clear to the viewer. Be sure that the photograph is not taken too close or too far away for the subject to be identified. Generally, the closer shot comes out the best. When you set up to take a picture, try to center the object in the frame and, viewing the object, adjust the range as necessary to obtain the detail you want.

Lighting can make or break a good photograph. Lighting adds dimension to the subject and as a result poor lighting looks flat or lacks depth and dimension. With proper lighting, the detail in the subject is brought out giving good definition to the subject. Lights on a couple of sides, or natural light if it is bright enough, work best. If you don't think the picture has enough detail change the lighting around until you get the detail you want.

The quality of the photograph is determined by several factors. The first thing is to make sure the picture is focused. Most people are familiar with the term focus, which is sharpness, distinctiveness and clarity of an image as it relates to the actual appearance of an object. To determine whether a subject is in or out of focus, look at the outside edges of the subject; then look at the seams of the object on the inside of the viewing area. Each of the items should be very sharp and straight.

Use a plain, untextured background of a color that adds contrast to the subject. Medium gray, varying shades of blue or tan seem to work the best. Don't use an elaborate background as these usually detract from the subject. In addition, the background will affect the lighting, so keep this in mind when you are selecting a color.

Planning the shooting of a picture is not difficult after a couple of times. First prepare a list of the photographs you need. On your list decide on the background, composition and subject. Once you have set up the subject, check for proper focus, depth of field, composition and lighting. Take a couple of shots, varying the angle slightly and, if necessary, the exposure.

Now for a couple of tips. Use a small film roll

(12 exposures); this lets you take the pictures quickly and you can have them developed and check your work sooner. This is especially important if you are doing a construction article and the next step covers the photo you wanted to use to illustrate a feature or technique.

If you insist on taking a picture of an airplane in the grass, find some short grass (like a golf course as green would be ideal), and then prop up the airplane so that it is out of the grass. Nothing looks worse than blades of grass obscuring the airplane you are trying to present. For other outside pictures, try to find a contrasting backdrop; a dark concrete parking lot with a light colored subject can work out fine. Remember contrast is the key.

If you take a little time to plan your photography it will come out right almost every time! ■

NEW PRODUCTS

The information in this column has been derived from manufacturers press releases or other material submitted by a manufacturer about their product. The appearance of any product in this column does not constitute an endorsement of the product by the *R/C Soaring Digest*.

DIGI-SET 2000

...from Aero Scientific

New from Aero Scientific, the DIGI-SET 2000 digital servo driver/tester with READ function. The DIGI-SET 2000's positive pulse output is adjustable over the range of 0.70ms to 2.20ms. Precision repeatability of the pulse width makes servo testing and matching easy.

To assist in setting up your plane, boat or car, two servo travel limits can be programmed into the DIGI-SET 2000. In addition, a READ function permits reading the receiver servo channel output signal. This information can be used as an aid during servo set up or for testing receiver and transmitter outputs. Each transmitter/receiver combination can be measured and recorded for future use. This can eliminate the guess work of servo set up.

Power requirements are 4 "AAA" cells (not supplied). The internal batteries also supply power to the servo and receiver being operated, eliminating the need for external battery packs. The large liquid crystal display shows the pulse width in milliseconds and the function being performed.

Available direct from Aero Scientific Inc., P.O. Box 292, Grayslake, IL 60030-0292 for \$89.95 + \$4.00 S&H. Phone (708) 223-9066, FAX (708) 223-9719. Visa/Mastercard accepted. Qualified dealer pricing available upon request. ■

Update

UIUC Wind Tunnel Tests

Dr. Michael Selig
305 Talbot Laboratory
104 South Wright Street
Urbana, IL 61801-2935
(217) 244-5757, FAX (217) 244-0720
e-mail: m-selig@uiuc.edu

• The bulletin #1 is available to anyone who sends in a SASE.

• Several new airfoils have been designed: S7012 for F3B, S4083 for hand-launch, S7055 for flat-bottom construction/thermal duration, and S1210 and S1223 for heavy lift competition. Each of these airfoils (among others) will be tested in October and reported in Soartech — probably to appear in February.

• A new airfoil(s) for thermal duration is next to be designed. Will it be an improvement over the SD7037? Probably not in every respect. Will it be better for thermal duration competition? Certainly. Stay tuned and keep up the support. This is a tough way to fund a major research program, but it seems to be working. ■

Spyder Foam™

...from Composite Structures Technology
Spyder Foam is a new product developed expressly for composite construction. It has two to three times the compressional strength of blue foam and greater shear strength.

Spyder Foam achieves its strength not only from its fine cell structure, but from the fact that the cells are aligned perpendicular to the wing surface, creating a honey comb effect. In blue foam, the cells run parallel to the wing surface and when subjected to a compressional load, the cell walls easily collapse, creating a spongy surface. In addition to increased rigidity, Spyder Foam's vertical cell alignment provides for a stronger bond with the laminate. Capillary force pulls the resin further down the open cell walls creating greater shear strength between the foam and skin, and reducing the possibility of de-lamination.

Spyder foam weighs about 10% more than blue foam, and because its strength allows for lighter laminates, it is possible to build wings that are both stronger and lighter.

Since Spyder Foam is an extruded styrene, it can be hot wire cut in the same manner as other styrene foams. Because the cut is cross grain to the cell direction, it is recommended that the cutting wire size be .020, using sufficient tension to reduce or eliminate wire lag. On small panels (under 15 inches in length), smaller wires may be used with excellent results.

Composite Structures Technology, P.O. Box 642, Tehachapi, CA 93581-0642; Order Desk: (800) 338-1278; Technical Support & Staff: (805) 822-4162. ■



Cronus C-609 TCL Stopwatch

...from Taucom

Taucom is pleased to announce the availability of the Cronus C-609 TCL stopwatch. This stopwatch is ideally suited for thermal duration and F3B competition, and is commonly used at many contests.

The Cronus stopwatch has a dial with pre-sets for count-up and count-down times, along with the ability to program custom times. A lap counting function for 2 simultaneous models is also possible with the "SET" mode, ideal for slope racing and F3B distance tasks.

We are happy to provide this stopwatch to the aeromodelling community at a discount price of \$25.00, 7.75% CA res. sales tax, and \$1.00 S&H; check or money order only. Orders can be placed with: TauCom, 2490 S. Ola Vista #28, San Clemente, CA 92672; (714) 492-9553, FAX (714) 586-8508; 73617.1731@compuserve.com. ■



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Advertiser Index

74	Aerospace Composite Products
61	AMAP Model Products
66	Apderson, Chuck
66	B- Streamlines
69	Bowman's Hobbies
75	Charlie's
63	Clarke, John
67	Composite Structures Technology
76-77	C.R. Aircraft Models
66	D & D Specialties
63	Dave's Wood Products
65	Dodgson Designs
3	International Modeler Shows
52	Inventec Corporation
61	J&C Hobbies
72	Just Plane Fun Models
63, 68	Kennedy Composites
71	Layne/Urwyler
72	Levoe Design
75	Mike's Hobby Hanger/Henry Bostick
73	Perret's Studio
70	Quiet Flight International
64	Performance Composites
64	RA Cores
73	RuR Products
69	Scanlogix
62	Sky Bench Aerotech
BC	Slegers International
38, 39	Slegers International
68	Soarcraft
62	Spectrum Enterprises
63	Squires Model Products
72	Taucom
65	Tekoa: The Center of Design
63	The Birdworks
64	TLAR Enterprises
74	Viking Models, U.S.A.
67	Windspiel Models
37	Wood Logic, Inc.
63	Zatloka, George
69	Zoomit Creations



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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

GLIDER RETRACTS - high quality, 1/5, 1/4, 1/3 scale made in U.S.A. 1/4 are standard or heavy duty. Contact Bill Liscomb, 7034 Fern Place, Carlsbad, CA 92009; (619) 931-1438.

"All the pleasures and joys that we experience while we build and fly airplanes are being handed to us by those who were here before us." One of over 670 quotes and stories by Frank Zaic in FRANKLY SPEAKING. \$6.95 plus \$1.25 postage. Model Aeronautic Publications, Box 135, Northridge, CA 91328.

SILENT FLIGHT CLASSIFIEDS, the newsletter for sailplane and electric builders and pilots. Our classifieds sell your "experienced" planes and equipment. Latest info. for the sportsman and contest pilot. Yearly for \$10.00, 12 issues, sample \$1.50. SFC, 329 Little Ave., Ridgway, PA 15853.

CANNON R/C SYSTEMS, world's smallest radio systems in business since 1953, is your best choice for HL sailplanes, R/C assisted FF or electrics. Servo weigh .35 oz., 4 ch receiver weighs .54 oz. Flight Paks available for most other make transmitters. Free catalog. Sky Bench Aerotech, Ray Hayes, 58030 Cyrenus Lane, Washington, MI 48094; (810) 781-7018.

LJM Associates announces the availability of PC-Soar Version 3.5 for use with all versions of DOS. Previously, different PC-Soar versions were required for DOS 3.x, DOS 4.x & 5.x, and DOS 6.x. Free upgrades are available for 1994 customers while others will be charged a minimal \$10 upgrade fee. Also new is a one command installation and new manual with index. PC-Soar Sailplane performance analysis program is available to new customers for \$40 for the basic programs and \$30 for the extensive libraries of sailplanes and airfoil polars. Please include \$3 P&H for upgrades and orders. LJM Associates, 1300 Bay Ridge Road, Appleton, WI 54915; ph: (414) 731-4848.

For Sale - Business

VIDEO - "THE 1994 INTERNATIONAL SLOPE RACE - RETURN TO DAVENPORT". Don't miss out on this Hot Slope Race Video narrated by Mark Allen who says, "This is slope racing at its best!" Running time approx. 80 min. Send check or money order for \$24.95 + \$5.00 S&H. (CA res. add 7.5% sales tax.) Tallant Productions, 6922 Hutchins Ave., Sebastopol, CA 95472; (707) 823-3534.

For Sale - Personal

GENESIS, NIB... \$325.00; FALCON 880, 2 seasons, ec, with or w/o servos, 2... \$300.00; SAGITTA 900, ready to cover... \$200.00; WINDSONG w/3 sets of wings... \$125.00 or best offer; Multiplex ROYALE MC, PCM/FM... \$150.00 or best offer. Ron @ (614) 761-0704 (D), (614) 268-3363 (E), Ohio.

1/3 sized ASW-20, completely finished, RTF with servos, 5m span... \$900.00; 1/4 sized ROKE ASK-18 kit with spoilers and wingrods installed, ready to cover and paint, 4.2m, absolutely the easiest to fly and best floater of all 1/4 scale gliders... \$950.00. Robin Lehman @ (212) 744-0405, New York.

SAGITTA XC, minus wing rods otherwise NIB... \$200.00; AQUILA GRANDE, NIB... \$175.00; MAGNUM 12, nostalgia legal, glass T-tail, 12" w/s, NIB... \$150.00. Prices do not include S&H. Edwin Wilson @ (502) 239-3150 days, or leave message on machine, Kentucky.

FALCON 880 kit, NIB... \$250.00. Bob Harman, 10424 Golden Willow Dr., Sandy UT 84070; (801) 571-6406.

Graupner CIRRUS, all white with factory decals, very little flight time, rare... \$300.00 + \$20.00 S&H; beautiful all red WINDFREE Old Timer... \$150.00 + \$20.00 S&H. Both like new. Ray Hayes @ (810) 781-7018, Michigan.

Multiplex DG-300, built, excellent condition, all servos included... \$550.00; Multiplex DG-600 kit... \$250.00. Cash & carry or plus shipping. Ask for Mark Foster @ (213) 257-4573, after 5 PM PST, California.

RTF FALCON 600, 2m with 2 wings: one is balsa/white foam 3-piece S3021 (joined at the flap-aileron junctures), giving an all-up weight of 47 oz.; the second is obechi/white foam 3-piece SD-7037 (joined at the tiplets) giving an all up weight of 41 oz. Stab is vacuum bagged blue foam... \$400.00 + shipping. Jim Thomas @ (206) 488-2524, Washington.

NIB kits: 2m MARIAH... \$125.00; SHADOW 118, original, not pre-sheathed... \$250.00; Multiplex SCHAUMPUS, 3m/3.5m with optional tiplets, for F3J & thermal... \$450.00; original HOBIEHAWK... \$250.00. Kit prices incl. shipping. Jim Thomas @ (206) 488-2524, Washington.

Airtronics GRAND ESPIRIT, NIB... \$200.00. David Layne @ (209) 529-8457.

Airtronics "Module 7SP" with receiver & instruction book, like new, used only a few times and never crashed, ch 50... \$250.00; Bob Francis CIRRUS from the 70's, F/G fuse, built-up wings & stabs, 3m span, ailerons... \$225.00; Airtronics SAGITTA XC, very nice, RTF... \$300.00; Carrera DRACO 3003, V-tail, ailerons & spoilers, 3m span, RTF... \$225.00; Airtronics CUMIC PLUS, almost finished, poly with spoilers... \$150.00; Sailplanes International ASW-20, RTF, 3m span, spoilers and ailerons... \$250.00; Graupner DISCUS, 4m, RTF, needs recovering... \$350.00; Multiplex ALPINA, 4m, RTF, beautiful... \$400.00; Graupner K8B scale kit, NIB, F/G fuse, sheeted wings, 2.8 m... \$300.00; Graupner CIRRUS kit, NIB... \$275.00. All RTFs less radio and all prices FOB. For info., call Dave Darling, (209) 521-5412, 7 AM - 7 PM, California, or write to 2705 Harvest Road, Modesto, CA 95355-3430.

2M ELF, fuse fiberglass reinforced w/kevlar, wing 2.5/10 - 3/9 QB, foam core, obechi skin with carbon fiber & fiberglass reinforcement, stab & rudder are foam obechi, ready for your paint and radio... \$350.00; GENESIS, built with 4 (141) servos in wing, red & white, just add radio and go fly... \$570.00 + S&H. Dale (Head Elf), (214) 475-8093, Texas.

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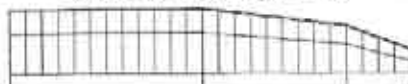
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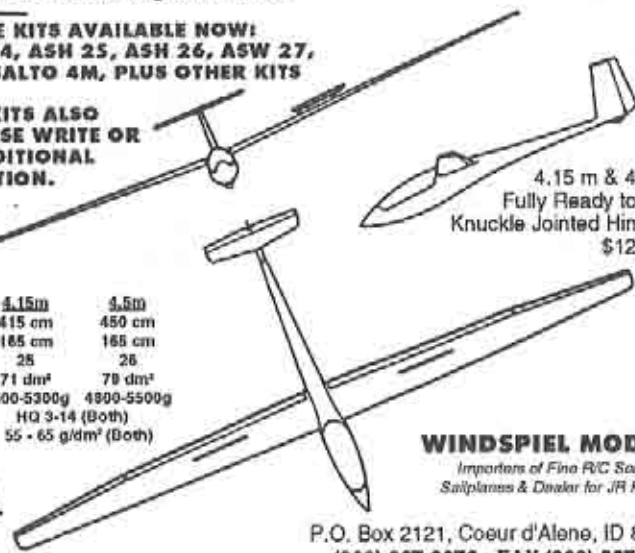
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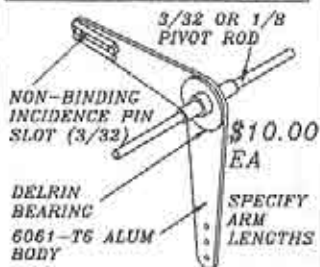
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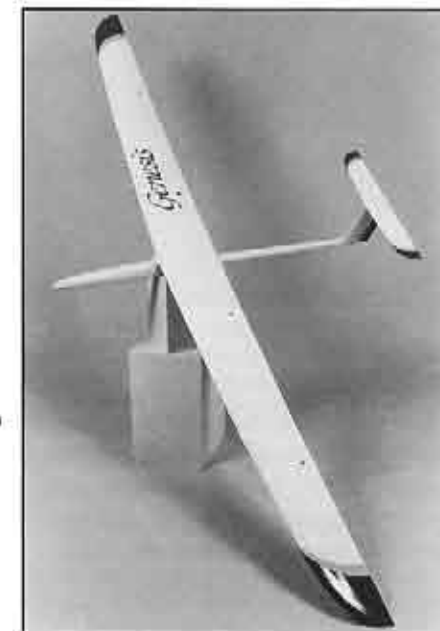
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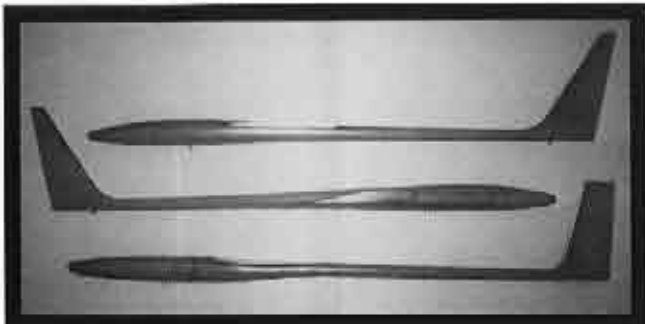
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