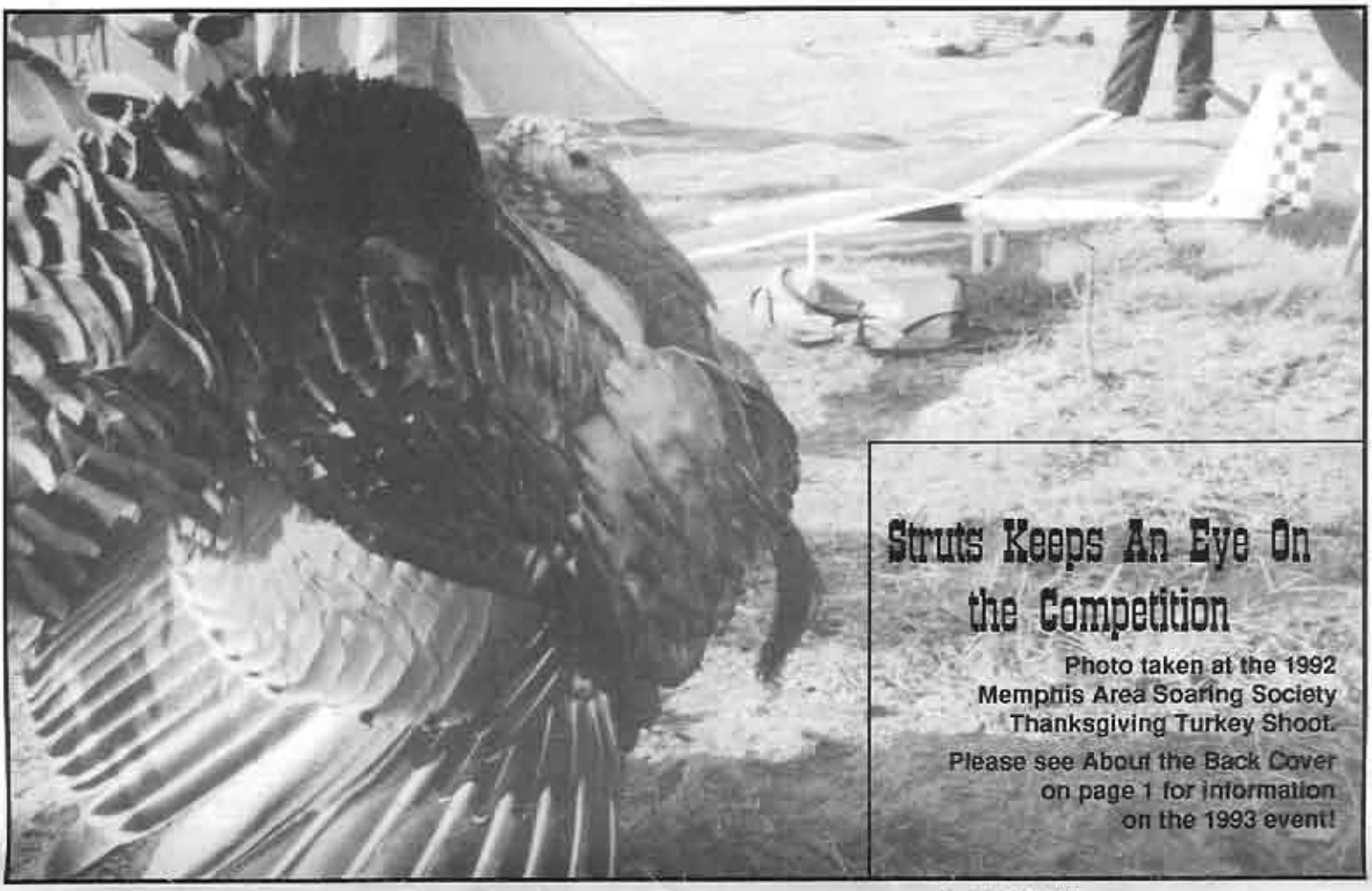
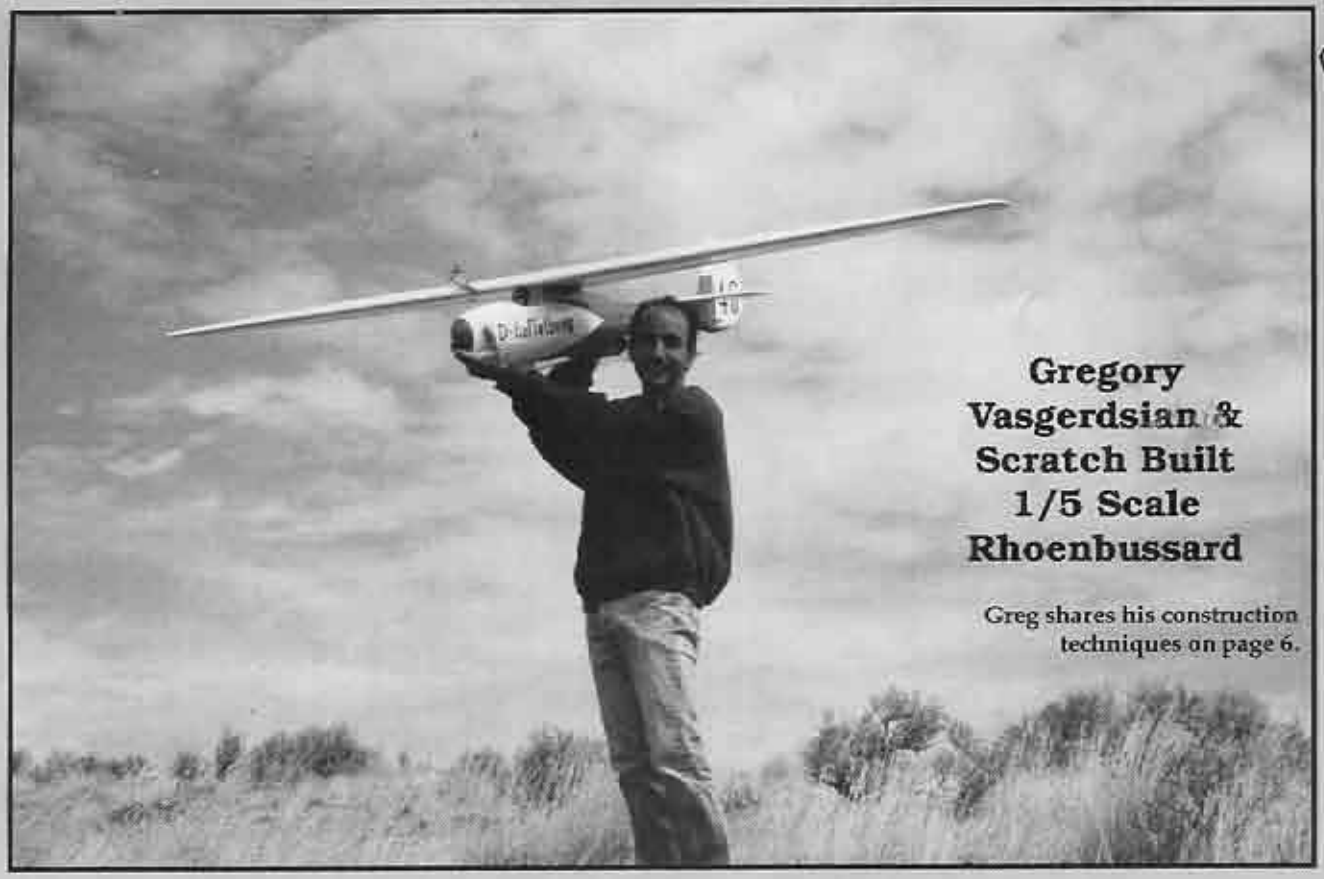


Struts Keeps An Eye On the Competition

Photo taken at the 1992 Memphis Area Soaring Society Thanksgiving Turkey Shoot.

Please see About the Back Cover on page 1 for information on the 1993 event!



Gregory Vasgerdsian & Scratch Built 1/5 Scale Rhoenbussard

Greg shares his construction techniques on page 6.

R/C Soaring Digest

October, 1993
Vol. 10, No. 10

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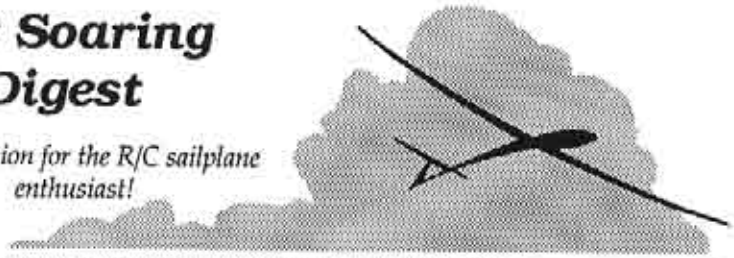
R/C Soaring Digest

A publication for the R/C sailplane enthusiast!



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R/C Soaring Digest (RCSD) is a reader-written monthly publication for the R/C sailplane enthusiast and has been published since January, 1984. It is dedicated to sharing technical and educational information. All material contributed must be exclusive and original and not infringe upon the copyrights of others. It is the policy of *RCSD* to provide accurate information. Please let us know of any error that significantly affects the meaning of a story. Because we encourage new ideas, the content of all articles, model designs, press & news releases, etc. are the opinion of the author and may not necessarily reflect those of *RCSD*. We encourage anyone who wishes to obtain additional information to contact the author. *RCSD* was founded by Jim Gray, lecturer and technical consultant. He can be reached at: 210 East Chateau Circle, Payson, AZ 85541; (602) 474-5015.

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The Soaring Site

About the Back Cover

In the August issue, we mentioned the fact that Struts was not in attendance at the Mid-South Championships. Soon after he received his copy of *RCSD*, his picture showed up in the mail, along with the following announcement from Bob Sowder, Memphis, Tennessee.

"The Memphis Area Soaring Society (MASS) invites all soaring enthusiasts to our 5th Annual Thanksgiving Turkey Shoot on Sunday, November 21th. This fun-fly has become such a popular local event that we decided to sanction the event as a fun-fly and spread the fun. The contest is a duration event full of fun and unique challenges. We promise to once again "break the mold" from traditional sailplane events and ensure a good time to all. Classes will be Junior, Novice, Sportsman, and expert - fly what you bring.

"Back by popular demand MASS mascot, Struts, will once again be at the Turkey Shoot. Struts, who is allegedly working on an AMA Scholarship, resides with C.D. Mike Kelly and wife, Dana. About 100 people had the honor of meeting Struts at the 1992 Mid-South Soaring Championships in Memphis.

"We invite one and all to shake a tail feather in Memphis on Sunday, November 21th, and share in the fun of the 5th Annual Thanksgiving Turkey Shoot. For additional information, call Mike Kelly at (901) 756-9410 or Bob Sowder at (901) 757-5536."

A couple more photos are included on the next page!

Michigan International Soaring Society

We received a brochure in the mail from the Michigan International Soaring Society (MISS). The club was formed on March 19, 1981. According to the brochure, "The outstanding thing about this club is that not all members fly. Some just like the

building of aircraft, and others just like to see the ships soaring in the thermals, and drifting in the wind. After a long day at the field everyone had fulfilled their interests, and that's what made this club grow. Club members have worked closely together from the start."

Their primary flying field is located on Berry Road between Ford Rd. and Warren in eastern Washtenaw County. For additional information, or to obtain a copy of the brochure, contact Robert W. Paulson, M.I.S.S. Treasurer, 236 N. Lafayette, Dearborn, MI 48128-1523. "Prospective members are required to attend four M.I.S.S. Club meetings or activities before becoming eligible to join."

Elevator Trim

We received the following request regarding elevator trim from Clark Bowlen, Manchester, Connecticut.

"I have a question — in the form of an observation — about elevator trim. (After a year's rest, I guess it's safe to bring this topic up again.)

"The bench test on the FAI .15 in my new Falcon 550E set my novice thumbs atwitching — way too much thrust for a safe first flight, I thought. To help even the odds, I set the C.G. at 35% of the average chord, rather than at the 40% recommended in the kit. The last thing I wanted was a touchy elevator.

"Once I got over the adrenaline rushes and 'gee whizzes' of the motor runs, I began to notice that the plane did not fly turns well at thermalling speed. It mushed around, losing altitude and needed a lot of up elevator to hold the turn — full throw in some cases. I decided to move the C.G. back a little. The thermal turn performance improved, and kept improving as I moved it further and further back. It is now at 45%. The instructions tell me that's where Mark Allen flies his plane. I thought it hubris to go further back than the designer.

Struts is in the foreground with (L-R) Bob Canada, Al Larson, and Bob Dillan.

C.D. Mike Kelly presents 1st place Junior award to Chuck Thomas. Chuck was the lucky winner of a Saturn 2.9 at the 1993 Mid-South Soaring Championships raffle.

"Now here is my question — in two parts.

"Part one — Am I correct in assuming that the thermal turn problem was caused by elevator (actually stabilator) drag? My theory goes like this. The forward C.G. necessitated lots of elevator deflection in the turns, which generated lots of induced and/or profile drag. Moving the C.G. back reduced the deflection needed for a given radius turn and thus reduced drag. The drag problem showed up more in the turns than in straight and level flight because the plane must fly at a higher angle of attack in the turns to maintain a given glide slope (Martin Simons' article in June, 1992 *RCSD*).

"Part two — If this is true, isn't getting a plane to fly the turns well a good way to set the elevator trim? After all, flying turns is the *sine qua non* of thermal duration performance. One would move the C.G. back far enough to get good slow speed turns, but not so far as to make the plane twitchy and sensitive. Granted there is subjectivity in defining these parameters, but the whole issue is pretty much a matter of individual taste anyway.

"I'd like to hear what more experienced fliers think."

A Question from California

Gregory Vasgerdsian of Concord, California would like some input on the following subject: Proper location for full-flying T elevator pivot rods and linkage attachment point. Greg says, "I think I know the basic rule on the pivot point to stab area and sweep. It seems that on scale models with T-tails, some have the linkage point at the leading edge, and some towards the trailing edge. Is one more likely to stress a servo and cause flutter? Perhaps you could put this one to a knowledgeable source/writer."

S.O.A.R.

We received an announcement from the Silent Order of Aeromodeling by Radio (S.O.A.R.) which is addressed to the Soaring Community and the Hobby Industry. It reads as follows:

"Like many others in the modeling community, SOAR fell victim to urban sprawl. We lost our field on January 1, 1993. We knew it was coming, and using the information supplied to us by the AMA (A big help - Thanks!), we began our search for a new field.

"This brought us to a dilemma. Do we plan to have a GREAT RACE, or do we give in? With confidence, we went ahead with planning for the GREAT RACE, hoping we could find a field. You can imagine the logistics of staging the greatest spectacle in model soaring. It takes time, planning, and the help of many people. As a hedge against further urban sprawl, some aspects of planning (read $DOLLARS$ commitments) were not made in the early planning stages. Being a club of limited resources, like most, we felt it wise to hold off on any non-refundable cash outlays.

"Thanks to the efforts of Club Officers like Wayne Fredette, our VP, and others, we were able to secure a new and magnificent field. Central Sod Farms of Naperville has been our gracious host since March 1, 1993.

"When we obtained the commitment of Central Sod, planning for the GREAT RACE went into full swing. Here is where we ran into problems. Getting the people, planning, and money together on short notice was a bigger task than we imagined. As the date for the race rapidly approached, we realized that the undertaking was more than we had bargained for. Rather than do a poor job in staging the race, we decided to postpone it until next year.

"The Board of Directors of SOAR, and the entire SOAR membership, would like to take this opportunity to apologize to the Teams and Fliers who planned to attend. We deeply regret having to cancel the race, and the inconvenience that it may have caused you. To the Hobby Industry who has generously supported us with donations for prizes and raffles, THANK YOU! Your donations will be held until October 9 & 10, 1993, when we are planning a big FUN FLY, DEMONSTRATION, and GENERAL GET TOGETHER of as many SOARing enthusiasts as we can find. The merchandise will be used as prizes then. We would like to be able to count on you again next year. THERE WILL BE A GREAT RACE in 1994. Planning is already underway and we hope to make it BIGGER and BETTER than ever.

"Thank you for your understanding and patience. Good Lift, (signed) S.O.A.R."

B.E.F.A.

We received a FAX from Gordy Stahl of Milwaukee, Wisconsin. He said, "At Keith Shaw's recent electric fly I met Dave Durnford, editor of *Electric Flight U.K.*, the *RCSD* of electrics in England. Dave's address for subscriptions is 32, West Drayton Road, Hillingdon, Middlesex UB8 3LA, England."

So, we dropped a letter in the mail to Dave and he sent us a copy of their quarterly publication along with the specifics on how to subscribe to *Electric Flight U.K.*, the magazine of the British Electric Flight Association (B.E.F.A.). This publication is the same size as *SOARER* and a bit larger that *RCSD*. It is packed with how to information for the electrics enthusiast.

In his letter, Dave said that sample copies are available for £ 1-50 and that they can only accept International Checks payable to B.E.F.A. in Pounds Sterling due to bank costs. As an "Electronaut" he signed with "Full Charges & Happy Flying"!

Details of their Association, aims, activities, and subscription costs are as follows:

"The British Electric Flight Association was formed at the end of 1990 by a group of modellers who felt that Electric powered model flight needed further encouragement and representation than it was already receiving. We aim to cater for ALL forms of Electric powered flight, be it Free Flight, Control Line or Radio Controlled.

"Our main asset is our quarterly magazine, *Electric Flight U.K.*, currently the only publication in the U.K. which caters exclusively for Electric Flight. Since our inception, this magazine has grown into what is regarded by many as the World's leading Electric Flight publication.

"Each year, we hold fly-ins which serve as a meeting point for enthusiasts to come along and fly or talk electrics. The main emphasis of these days is fun-flying, but various low-key competitions are also run for those who wish to enter them. We have also started a new competition class, the Sonata "E" class, where only the one type of model is allowed and the longest flight of the day wins. The only restriction is on weight of battery pack.

"Every year, in October, we hold a Technical Workshop where members can come along and listen to speakers on different aspects of Electric Flight. At the same event we also hold a market for specialist traders to come along and sell their wares.

"One of our aims is to help disseminate information about Electric Flight. Some people, we have found, encounter great difficulty in finding the correct information about Electric Flight. To help these people, we have an active Technical Enquiry service for members which will answer all those difficult questions.

"We are now recognized by the B.M.F.A. as the Specialist Body for Electric Flight in the U.K. This enables us to have a say in how Electric Flight is administered at all levels.

"We also have various items for sale. These normally include back issues of the magazine, decals, sweat shirts and T shirts.

"Membership is open to all members of the BMFA (SMAE). If you are not a member of the BMFA, then a magazine only subscription is available.

"Membership normally runs from April 1st to March 31st of the following year. A reduction of 50% is applicable should you join after October 31st. A reduction of 50% of the full rate is made for those under 18 at date of joining.

"To become a member, please complete the application form below, ensuring that you quote your BMFA membership number. If you live overseas and belong to your recognized national body for aeromodeling, then please supply that body's name along with your membership number.

"If you do not supply us with a valid BMFA number, then you may only subscribe to the magazine and receive no other benefits of membership. Cost is the same as membership.

"Upon receipt of your completed application, you will be sent a membership card (if applicable), a decal and the current issue of *Electric Flight U.K.*

"Please send your completed form along with the appropriate fee to: The Membership Secretary, B.E.F.A., 123 Lane End Road, High Wycombe, Bucks HP12 4HF England.

Membership Application Form

Name _____

Address _____

_____

Postcode _____

Telephone No. _____

BMFA Membership Number _____

Date of Birth (If Under 18) _____

I apply for membership of the British Electric Flight Association and agree to abide by its constitution and any rules which may be published from time to time. *

I apply for a magazine only subscription. * (Delete if not applicable.)

I agree to my personal details being held on computer for the use of the Association and its members only.

Signed: _____

Rates

"Please make your cheque payable to B.E.F.A. Please remit in Sterling. U.K. £ 10.00 or £5.00 if after October 31st. (U.K.) Juniors 50 % reduction on above rates.

"Europe is £ 12.00, rest of World is £ 17.00. All foreign rates include airmail postage. Sorry, no reduction for foreign Juniors.

Subscription Increase

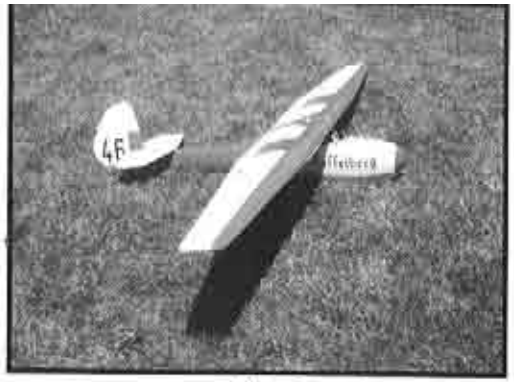
Our analysis says it's time to increase the subscription and advertising costs for *RCSD* in order to stay with the 80 page size. As most of you are aware, our last increase was in October of 1990 when we increased the size of *RCSD* from 32 to 48 pages. However, in 1991 we were able to increase the size to 64 pages with no increase in subscription costs. In December of 1992 we went to the 80 page size which pleased many of you. Well, we know that going back to 64 pages is out of the question, so it is time for a price increase, instead.

Category	Old	Oct. 1, 1993
USA - 3rd Class	$19	$21
USA - 1st Class	$26	$30
Canada/Mexico	$26	$30
Europe	$36	$45
Africa/Asia/ Pacific Rim	$42	$52
South America	$31	$39

RCSD, including the envelope, weighs close to 4 oz., which means that it is expensive to mail and, hence, the reason we do not have a heavier cover. The difference between the 3rd class in the U.S.A. and all other categories is the direct result of postage costs. Each 3rd class mailing costs approximately $.25 while 1st class in the U.S.A. is $.98 per copy (almost 4 times as much), and the cost to other countries is as shown above!

Well, we know that many of you share your copies and hopefully your subscription costs, but we gave some careful thought to the fact that many of you, outside of the U.S.A. and Canada/Mexico, have been with us a long time. Surface has been a bit of a headache on and off over the years, but for those of you that have supported us for so long, you may continue to obtain your copies by surface mail. While all of the renewal notices that go out will have airmail rates, just add a note when you renew that says, "Please renew by surface. $31 is enclosed." Please write that down somewhere where you can find it again. It is the new surface cost and will not be shown elsewhere in *RCSD*. And, please wait 3-4 months for delivery.

Happy Flying
Jerry & Judy



1/5 Scale Rhoenbussard Notes

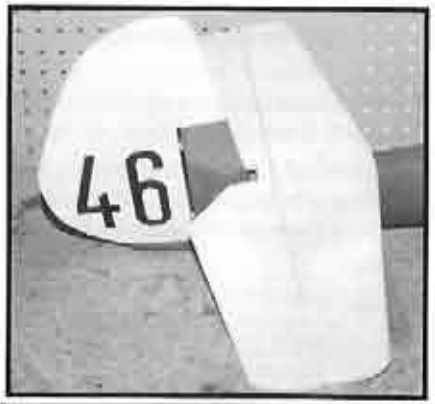
...by Gregory Vasgerdsian
Concord, California

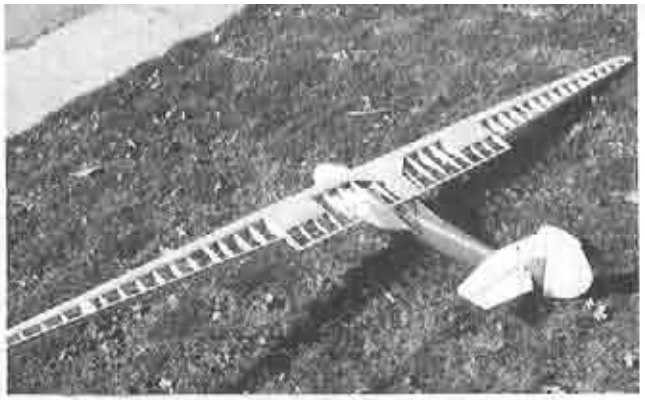
Over a year ago I purchased from Viking Models USA, a 1/5 scale 112.5" Rhoenbussard partial kit consisting of a nice epoxy fiberglass fuselage and a set of plans. Before building my thoughts were that this should make a very nice flying scale model with a wing loading of 11oz.-sq./ft., a rather thick under-cambered airfoil (scale Gottingen 535), and a moderate aspect ratio. After working on this vintage 1933 German scale model sporadically for the past year I finally finished and flew it and thought I would pass along some tips on scratch building such a scale model and on its flying attributes.

Being a vintage model, all empenage and the wing are built up construction, featuring rudder, elevator, aileron and top and bottom spoilers. Building from scratch is not really much harder than building from a kit, but you must carefully think everything through. I find this to be what slows me down, rather than being able to just read instructions and mechanically assemble pieces together. Though not a necessity, having a band saw will help you make parts quicker.

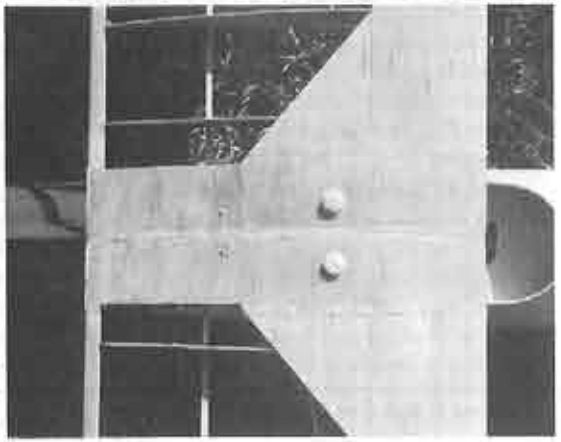
I first began with the tail feathers. The Rhoenbussard posed no real problems here, just straight forward built up construction for a nice light tail. Rather than fuss with separate ribs shaped to the specific airfoil, I cut rectangular rib blanks, assembeled the pieces, and then sanded each assembly to the proper shape.

All moving surfaces were hinged with Robart hinges. To move the rudder I opted for a single braided cable pushrod which was secured at the tail, and passed through the three formers in the fuselage. The stabilizer was secured to the fuselage with two nylon bolts so I could





detach it. To operate the elevator I used an aluminum arrow shaft from a local bow hunting outfitter. To this I added the threaded pushrod ends and clevises. The elevator horn was made of two 1/16" plywood pieces laminated together with a piece of 4 ounce fiberglass cloth in between.



Since the fuselage was an epoxy-glass one, I did not have as much work to do here. Three formers were made and fitted; one was located about 2" ahead of the stabilizer and the other two were mounted under the wing pylon as shown on the plans. The critical areas were the stabilizer and wing mounting. Two 1/4" hardwood blocks were epoxied in the tail for the stabilizer to bolt to. For the wing mounting, a 1/2" hardwood block was carefully shaped and epoxied with chopped fiberglass to the inside under the wing pylon. Also, two small blocks of hardwood were epoxied inside the fuselage for where the skid would attach. The radio tray was made from 1/8" birch doorskin with a recess up front to help secure the 1200mAh battery.

The wing went together no different than say an Airtronics Sagitta. A built up "D-tube" wing is pretty straight forward with ribs, spars, and 1/16" balsa sheeting from the leading edge to the main spar, top and bottom. The only problem is you must make the ribs yourself. If all the rib patterns are shown on the plans, you simply need to copy these to rib blanks and start cutting. However, with this model, only the root and tip ribs were shown on the plans, so I had the option of using an airfoil plotting program, or using the traditional stack method. I went with the stack method. With the ribs made I checked the plans for balsa sheeting and cap strips that would require the ribs to be trimmed down for proper fit. I added extra gussets around the aileron cut outs for extra strength as this would be a weak area should a tip catch while landing.

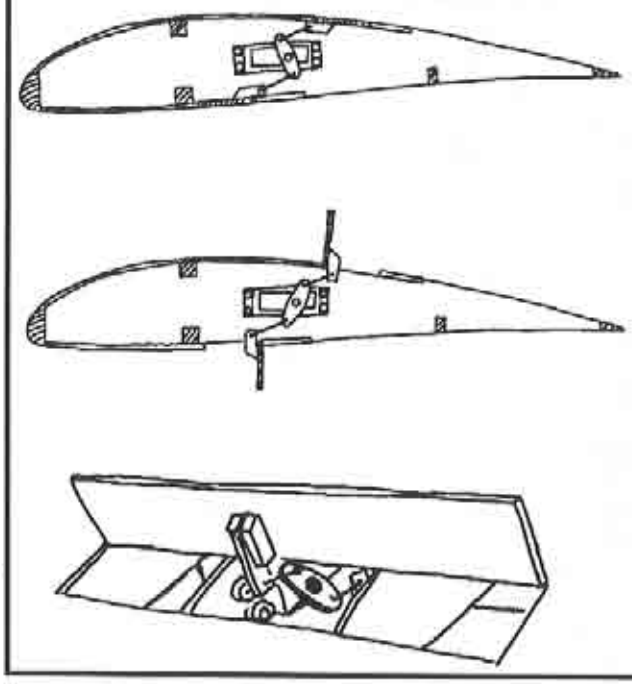
A lot of thought went into making the top and bottom spoilers. Though the plans showed only a top spoiler, my documentation showed top and bottom spoilers. Since the airfoil was so thick, the thought came up to just put a mini servo right in between the spoilers. After sketching it out, doing some measuring, and making sure the geometry was right, I decided this would indeed work. The servo was mounted sideways in between the spoilers, and then small pushrods were made with paper clips. Rubberbands were added later to keep

them closed tightly (See Figure 1)

With all the pieces built the wing and tailplane were aligned on the fuselage, and holes were drilled and tapped for the nylon mounting bolts. After sanding I used Coverite's 21st Century Fabric in white for the fabric look, but the iron on ease. I highly recommend Coverite's 21st Century Fabric. Compared to their older product this stuff adheres well to the wood, shrinks great, and goes around curves very well. It is also extremely strong and puncture resistant to sticks and weeds as it is actually a painted fabric and not a mylar film. The fuselage was masked and painted with Krylon brand spray paint.

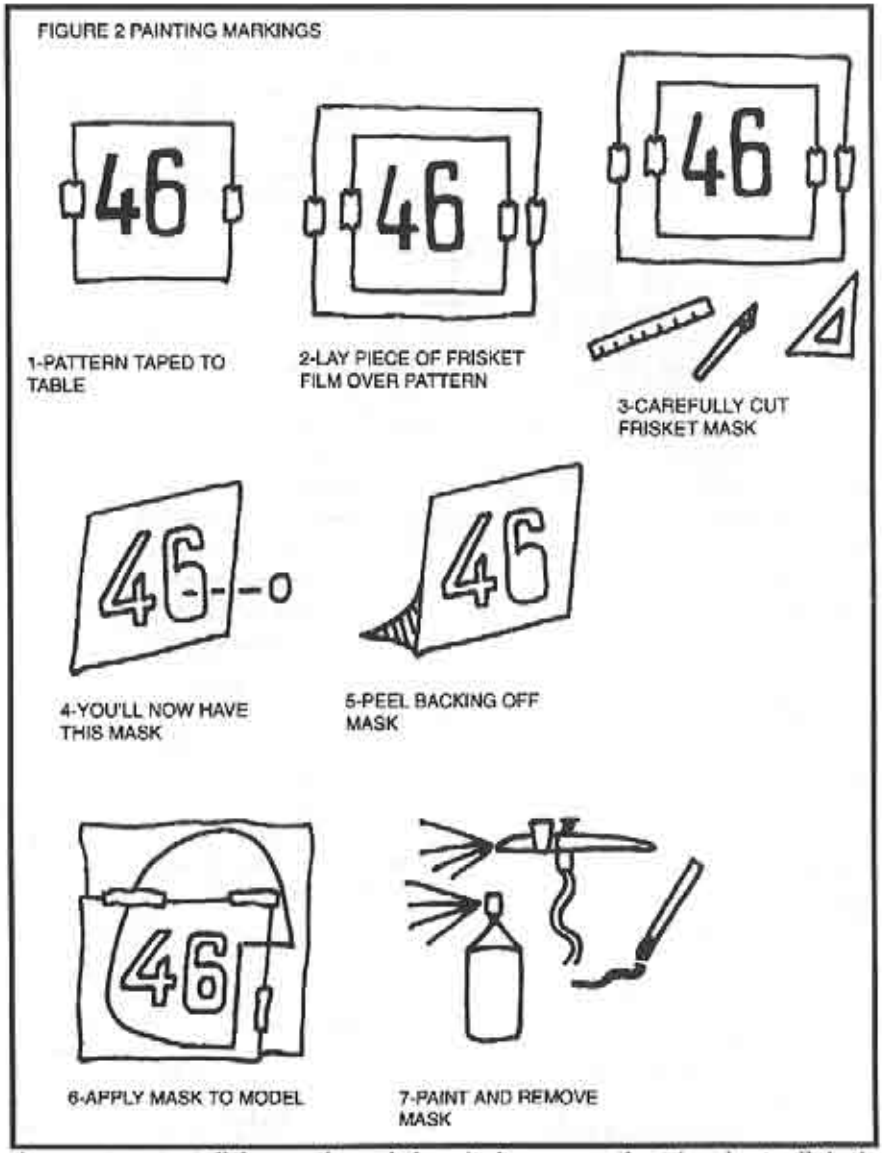
I used a Williams plastic model bust, which I painted with flat plastic model paints. The biggest single step to improve the scale appearance was to paint the registration and contest markings. I began by finding the best straight on view of each marking in my photopak from Bob Banka Scale Documentation. I then enlarged these on the copy machine and then went over them with a straight edge and black marker so I could further enlarge them to the proper size. If you are computer equipped you may well be able to run out your pattern from your computer. With that done I placed Frisket Film over the particular marking and using a straight edge and xacto knife cut my painting mask out of the Frisket. Frisket Film is a sticky backed thin mylar used for making airbrush masks; predominantly for airbrush artists, illustrators, and photo retouching, it can be found at any good art supply store and is sold under a number of different brand names. With the mask cut, peel off the backing and apply the Frisket mask to the model. Then, paint with either a brush, spray can, or airbrush. If you use an airbrush, go for a thicker paint mixture to help prevent it from creeping under the mask. After painting peel off the Frisket mask (See Figure 2).

Figure 1 Spoiler Details



A second method for doing the registration markings is to make stickers instead of painting. Use a Topflite Trim sheet or an equal brand of the proper color for the markings. As before, enlarge your markings to the proper size to make a pattern. Tape the trim sheet color side up to a flat surface, and tape your pattern over the trim sheet. Now use an X-acto knife and a straight edge to cut the numbers into the trim sheet taking care to not cut all the way through the trim sheet and its peel off backing. Once all the numbers have been cut, remove the paper pattern. Now you don't want to mess up the nice even spacing of your markings by attempting to put each one on individually, instead get the Frisket Film. Cut a piece of Frisket Film large enough to cover the numbers; then peel the backing off the Frisket Film and stick it down over the trim sheet. Rub the Frisket down over the markings. Next, peel the backing off the trim sheet carefully; the markings will stick to the Frisket while all staying nicely lined up and evenly spaced. Now, simply line up the number sheet to the proper place on the model and stick it down working from the center out to avoid air bubbles. Once down carefully peel the Frisket and un-

FIGURE 2 PAINTING MARKINGS

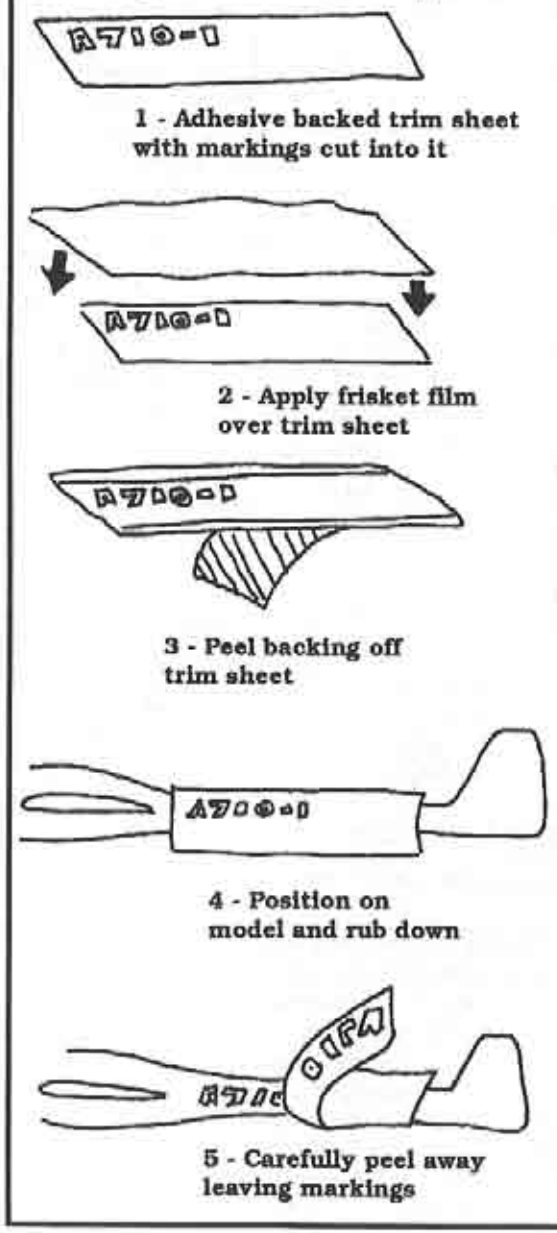


used trim sheet material off. Ta-Da! Nicely spaced numbers on the side of a round fuselage (See Figure 3).

Later, I attached the skid and popped in the servoes. The pitot tube was made into a push/pull-on/off switch, and was made with music wire and two sizes of brass tubing all soldered together (See Figure 4). The windshield was made from two pieces of 1/32" light ply laminated together with epoxy and a piece of 6 oz. unidirectional fiberglass cloth. This was all glued together and then rubber banded around a coffee cup to give it the right bend. After it cured I cleaned it up and glued it to the model, finishing it off with a piece of clear acetate. I did manage to build one inconvenience into this model because of how I built the removable cockpit. Since the wing hangs over the top of it, once the wing is on I cannot remove or replace the cockpit. So if I'm out flying and want to check the flight pack battery the wing has to come off first. Another point to mention when building any scale model is to make sure your model matches your documentation. I deviated from the plans which showed a scalloped effect on the center section wing sheeting, because the documentation I used did not show this. To date the model still needs blue trim painted on the wing to fully replicate its full size counterpart.

In the end, the model was completely assembled, the radio checked out, then balanced. I added 5oz. of lead shot mixed with epoxy and dumped it into the nose, for a final weight of 5lbs. (80oz.). On a sunny Saturday with 3 other friends I hit the slope. With a light but steady 7 mph

Figure 3 Sticker Markings



1 - Adhesive backed trim sheet with markings cut into it

2 - Apply frisket film over trim sheet

3 - Peel backing off trim sheet

4 - Position on model and rub down

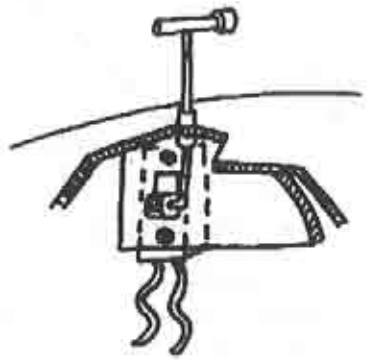
5 - Carefully peel away leaving markings

breeze I said, "Okay," and my friend George put the Rhoenbussard in the air. On launching I was a bit apprehensive, but within seconds I was shaking! I had to apply every trick in the book to get it to turn! I managed to keep it moving, and get it out away from the slope and into some altitude so I could figure the thing out. After about 6 minutes and a loss of lift I had to go for the landing while I still could, and managed to bring it down without damage. Luckily my slope has a very good and forgiving landing area.

At this point I wasn't really sure what the problem was; had I just spent all my time building a scale model which flew like a piece of junk? Was it the short tail moment? Did it need more weight in the nose? Well, the Rhoenbussard has about 1/2 degree of dihedral... In other words, the wing is basically flat. After collecting my nerves and reflecting on the first flight it dawned on me that it was not rolling much at all when ailerons were deflected. The ailerons are very large, and being so large I had surmised that 3/8" - 1/2" of aileron throw would be more than enough for a good roll rate and maneuverability. I was very wrong! Without enough aileron deflection it would barely roll, and for any flat wing aircraft this translates to poor turning ability.

With that thought I changed the aileron deflection to 3/4" and with the benefit of a stronger breeze we launched the Rhoenbussard again. Sure enough I could now guide it with authority. The second flight lasted much longer and allowed me to get the model trimmed out and more accustomed to its handling. By the third flight I had it settled down and on the move. The model currently has ailerons at 3/4" - 1/2" differential, rudder at 1 1/2", and elevator at 1" throw each way. The model could do with less elevator throw as with its short tail moment it is very sensitive to up and down. It could probably do with a little less

Figure 4
Pitot tube switch assembly



rudder too, but I like having plenty for emergencies.

I wasn't sure how the scale Gottingen 535 airfoil would perform on the model, and I was pleasantly surprised. The stall is not sharp or sudden, and I've found the Go 535 to be very responsive to lift. The Rhoenbussard is not a floater but it isn't a rocket either; with the nose down it will scoot by, and a nice 10 mph breeze will have it quickly climbing out of your hand on the hill. The model has yet to go up a tow line but judging from its characteristics in light slope lift, it will need to be flown aggressively like the new thermal contest ships to find lift for prolonged flights. I have found the up and down spoilers to be very effective; the model flies slow enough to not mandate them but it's always nice to have some sort of lift killing device to make a bad landing set up into a good one. The real Rhoenbussard was quite aerobatic, but I've yet to roll or fly the model inverted to date. The model was taken to the NASSA Scale Rally in Washington this past July, where it majesticly cruised Eagle Butte. The model looks fabulous in the air especially on low fly byes, and the distinctive looks really stand out when it's airborn. ■

on the Wing

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

Rudder Differential Revisited

Our February 1992 column explored some of the details involved in Gregory Vasgerdsian' s building of a scale model of the Storch IV, a swept wing tailless design of the late 1920s which has rudders mounted at the end of each wing tip. Ideally, the inboard rudder should move outward during a turn, while the outboard rudder remains in its neutral position. One of the problems Greg encountered during the pre-building stage was finding a simple but effective method of achieving this maximum rudder differential without relying on a computer radio.

Figure 1 shows the simple cable mechanism we described in that February 1992 column. A small spring or rubber band forces the rudder against a stop at the neutral position. The cable then pulls against the spring and moves the rudder outward, but slips when it pushes. Rudder movement is thus in one direction only. There is an inherent conflict in this set-up: the spring or rubber band must be strong enough to hold the rudder firmly against the stop, while the servo must be strong enough to overcome both this force and the air loads imposed on the deflected rudder.

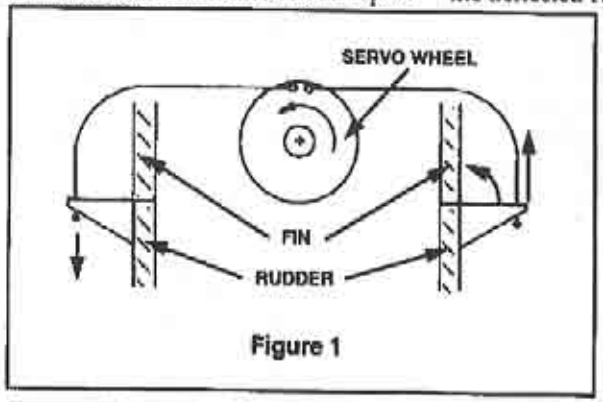


Figure 1

A rigid mechanism which overcomes these failings was submitted by our Minnesota friend Bill Kubiak. This system, presented in the September 1992 issue of *RCSD*, uses stiff pushrods and relies on servo wheel geometry to achieve differential action. This set-up is shown in Figure 2. When properly built, the mechanism allows no extraneous rudder movement, as the rudder is locked in the neutral position by the servo wheel. This rigidity makes the system less likely to flutter.

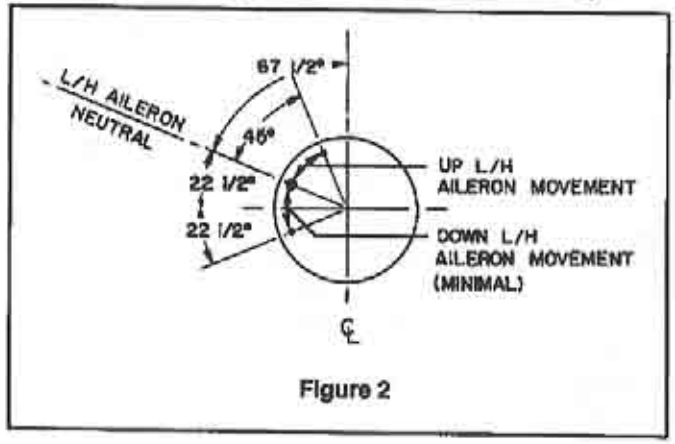


Figure 2

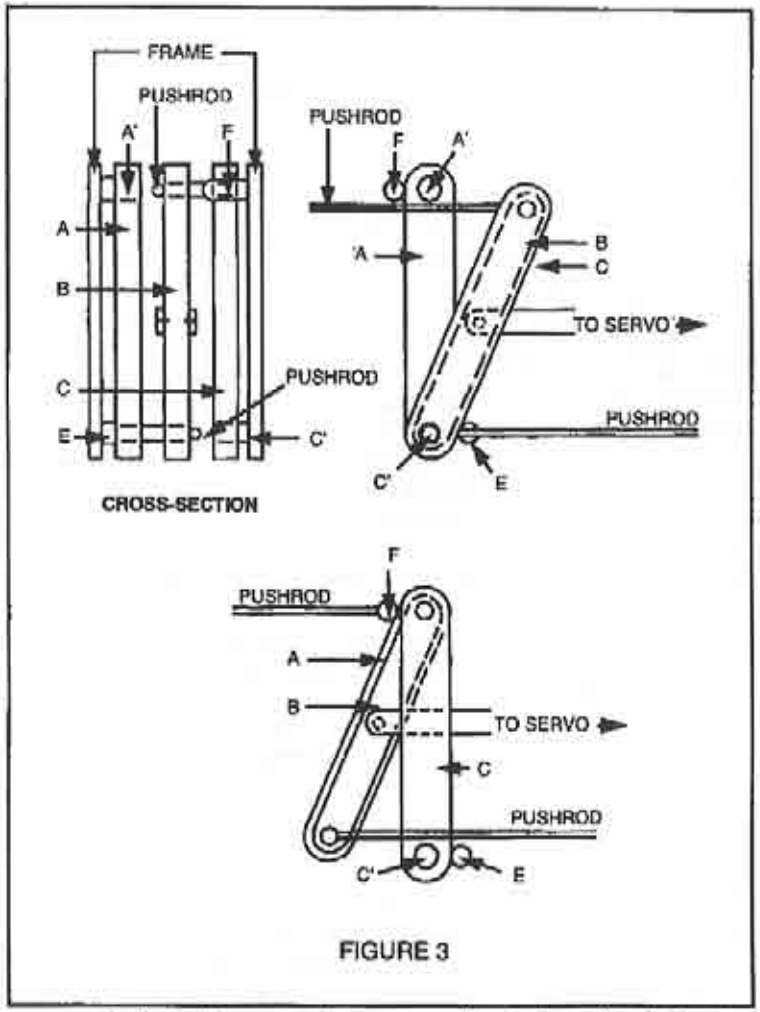


FIGURE 3

Bill Foshag, of Carlisle Pennsylvania, recently sent a packet of information to us which included a means of achieving maximum rudder differential by means of a "walking beam." The walking beam mechanism itself, shown in Figure 3, appears to be easily constructed and quite robust. (In the accompanying letter, Bill relates its successful use in a centrifugal field!) It has the additional advantage of being able to be placed remote from the single servo needed to drive it. The walking beam's role in providing 100% - 0% differential to outboard rudders is covered by a U.S. Patent given to Bill and Gabriel D. Boehler in 1966. That Patent (3,2662,656) is now in the public domain.

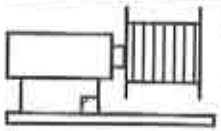
The walking beam mechanism consists of three interconnected beams. Beams A and B are connected by a movable joint, as are beams B and C. The beam ends A' and C' are mounted to the mixer frame, and the servo pushrod is connected to the center of beam B. The movement of joint A-B is limited by pin E, and that of joint B-C by pin F. As the servo pulls beam B, the joint A-B is held in place by pin E, and the joint B-C moves in the same direction as that of the servo

pushrod. When beam B is pushed by the servo, the joint A-B moves away from pin E and the joint B-C is restrained by pin F.

It should be noted the geometry of this walking beam magnifies the movement of the servo pushrod - a lever effect which places a proportionally larger load on the servo - so care should be exercised in the choice of the servo used. By adjusting the placement of pins E and F and the control surface pushrods, it should be possible to create a situation where the control surface is locked in the neutral position by a "toggle-over-center" action.

The walking beam shown in Figure 3 is a generic device, and this drawing should be used as a guide only. Materials and specific methods of construction are left to the builder. Plywood, plastic, or metal could be used. In fact, a small device consisting of three modified nylon bellcranks is an attractive alternative. No matter the construction method or materials used, a substantial load test needs to be successfully completed before the device is installed in an aircraft.

As mixers of various types are always of interest to RCSD readers, we invite individuals building a walking beam mechanism to provide construction details. ■



Winch Line ...by Gordon Jones

Gordon Jones, 214 Sunflower Drive, Garland, Texas 75041; (214) 840-8116 After 5:00 P.M. CST

High Starts & Winch Motors

How quickly we forget! A couple of weeks ago we were sitting at the flying field waiting for the guy with the winch to show up. One of the guys had arrived early and set out a high start to get in some flights early. When, after a while, the winch failed to appear, I decided to get a flight or two on the high start. Radio on, hooked up to the line, pulled back to the proper tension, and away we go. Well almost, after not launching from a high start for several years the results were less than satisfactory. I launched with considerable flap dialed in and tried to pull in as much tension as possible to get a good launch.

The result of all this was an ungainly stall about half way up the line that resulted in quite a few chuckles. Aside from the fact that there was almost no breeze to help the launch, I had committed all the cardinal sins of trying to pull in too much at the beginning of the launch rather than letting the plane build up some flying speed before trying to pull in some more tension, and launching at too steep an angle.

My mistakes were quite obvious. I had tried to launch at too high an angle for wind conditions, I had tried to use too much flap, and these resulted in a loss of airspeed and thus a stall. Had I thought about it, and not been in the "winch mode", I would have used much less flap and launched at a much shallower angle. With this approach I would have obtained greater airspeed and could have pulled in some elevator on the launch to get a little more altitude resulting in at least a decent launch.

Launching using a high start is basically the same for every sailplane; the only differences being weight of the aircraft, flap/no flaps, and wind speed. For lighter planes less tension is required to attain a good launch. First hook up the plane to the high start; then pull the plane back so that there is a good amount of tension built up by the rubber. Set a small amount of flap or no flap if you are using flaps for the first launch. Release the plane at about a 45 degree angle on the first launch. (This can be increased after the first launch as you learn what the plane and high start will handle.)

One note here; it is better to throw more out than up at first and work into the right throwing angle.

As the plane climbs out, at about half of launch height, pull in a little elevator to increase tension and gain some more altitude. If you notice the plane wandering from side to side push the nose down slightly - this means the plane is beginning to stall. (Or take out some of the flap that has been dialed in for launch.) If it appears the plane is not climbing steeply enough, it means you either need to launch at a steeper angle or possibly move your tow hook back a little. For the first couple of launches dip the nose and fly off the line.

As you gain experience you can change the amount of line tension, add flap, and change the angle of the launch to suit your plane and style. As with everything else, all it takes is practice, and a bit of experimentation. One mistake that is often made is the newcomer will get an Upstart (a small high start) for that 2 Meter he has built. When you are first learning to fly you want all the altitude you can get so that you can stay up longer. Do yourself a favor and buy a standard high start or one of the heavy duty ones if you plan to fly off a high start exclusively.

On another subject; for those that are building a winch and are looking for a starter motor the following Ford numbers are said to be good: Light Duty, 12 volt, 2 winding motor #3115; Heavy Duty, 12 volt, 4 winding motor #3136 (This sucker will launch my van). The shaft length is 5 3/4" if you want to look for another brand of starter motor. The Mercedes Diesel starter motor is reported to work well, but be prepared for the big bucks. If anyone out there comes up with other motors please send me a description and I will pass it on in this column. ■

Jer's Workbench

Need a new tool box?

This one is kind of unique. It's called Step N Stor. I have been looking for a tool box that I could put my transmitter into. By removing the antenna from your transmitter, two transmitters will fit into the bottom of this box under the lift out tool tray. If you only put one transmitter into this box you will not have to remove the antenna. I found this box at my local K-Mart for $16.88. If you don't need another tool box, this will make one heck of a lunch box and a place to sit while you eat your lunch.

Step N Stor or "Sit" N Stor Tool Box

Making a Glass Fuse

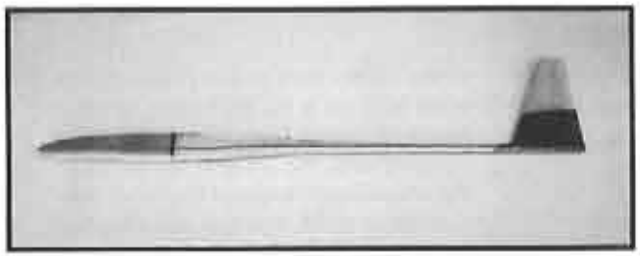
The following letter is from Kale Harden, Palm Harbor, Florida.

"I have read your articles on making a glass fuse with avid interest. and I wish to tell you that they are great! In this regard, I saw a neat glass fuse when I was in Australia last year visiting my daughter and some of my old glider friends. Garry Jordan is one of these and he is my correspondent for the International Postal Contest for Australia. He has been a member of the Aussie F3B team on several occasions and is still into F3B. His latest model is called the Australis and is

Front view showing cross section.

all composite, making the liberal use of Kevlar, glass and graphite-boron. The wing is 1.5 lb. foam covered with graphite cloth which give a very strong wing and saves as much as 1/4 lb. per panel. He uses the cloth on a 45 degree bias which increases the tortional rigidity which is necessary for those high speed runs in F3B. The model is smaller than previous ones that he has used having a span of 108". This is the trend in F3B according to Garry and is the result of the decrease in winch power currently used in this venue.

"In view of your articles on fuse construction, I thought you might be interested in the enclosed pictures. These are pictures of Garry's fuselage which he made the mold for and produced. This particular one is one that he made for me and sent it through the mail. It was in a unique package as you may have guessed and the mailman was so impressed that he delivered it to my front door in person and wanted to know just what it was. He was amused when he found out what it was. It had been packaged in a 3" mailing tube with a slot cut for the rudder. The rudder was then protected with pieces of 1/16" aluminum bent to precisely cover the rudder and glued to the mailing tube. At any rate, I had admired the original fuse so much when I was in Australia



Garry Jordan, Brisbane, Australia, Australis II fuse.

Fuse. nose cone / servo board detail, Australis II.

that he said he would make me one and send it to me. I am currently in the process of making a wing and tail for it.

"The fuse itself has a clear jell coat and is constructed of unidirectional kevlar with graphite cloth and strips reinforcing in critical areas. It has a removable nose cone and a vertical servo board. The servo board is made of 1/8" aircraft ply covered with graphite cloth and is inserted and glued into the fuselage proper after the push rods and wing securing system have been installed. The servo board also carries the battery, switch and receiver. Suitable openings are cut into the board for these items as well as the two servos for rudder and elevator. The wing contains four servos for ailerons and flaps. Garry used one of the Graupner computer radios." ■

Low Cost Power Scale Slopers

...by Paul Brabenec
Wilson, Wyoming

House of Balsa is producing "Anniversary Kits" for a P51-D Mustang and ME-109 Messerschmitt that make great little slope warriors. My ME-109 built up in a week, looks great, is fast, agile, and FUN. The parts were well-cut and fit very well. Here are my modifications to make the kit a glider:

a) A large hole cut in the fire wall allows a 250 mah nicad pack to slide forward into the engine cowling area.

b) A small receiver (Futaba 114H) and elevator servo (Royal Mini) fit into the fuel tank compartment.

c) A 1 1/2 inch spinner gets glued to the nose, after having its holes filled with balsa and getting painted.

d) All details (landing gear, exhaust stacks, etc.) can be painted on rather than gluing on all those balsa blocks.

There's very little to these 36" span warbirds.: ailerons and elevator, semi-symmetrical airfoil, box fuselage, molded top deck which includes the canopy, very low parts count. If you've got a week of building time and $30.00, you can have a hot little slope warbird! ■

Understanding Sailplanes

...By Martin Simons

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13 Loch Street, Stepney,
South Australia 5069

Flying in Wind & Weather

The soaring beat

To make the flying more interesting, it is necessary to trim for a greater airspeed. The more nose down trim will increase the sinking speed. Alternatively, a glider may be ballasted to increase its wing loading. This too will increase its flying speed and again, other things being equal, also the sinking speed. At the greater airspeed, if heading directly into wind, the model will not hover but will begin to move forward ahead of the slope. This will take it out of the lift before long. To keep within the upcurrent, it is necessary to turn the fast-flying glider to a heading somewhat out of the wind, so that it begins to move along the slope crabwise rather than pushing out ahead of it (Figure 39, B and C). Because the heading is inclined while some of the airspeed is used to combat the wind there is a component in the lateral direction. It is quite wrong to imagine that at any time the wind is blowing sideways over the model (This was discussed previously.). As the diagram shows, the airflow, if the glider is correctly trimmed, is always directly from nose to tail, although it does not look like this from the ground. After moving along the slope in this fashion for some way, the model may be turned to come back again, so working a 'beat' along the slope, back and forth, as long as the wind blows.

Hill soaring in weak lift

Slope soaring actually becomes more interesting when the lift is weak, such as when the wind is not quite 'on' the slope, and when the hill itself is irregular in form. A typical example is sketched in Figure 40. Here there are some places where the hill runs almost parallel to the wind so there is no upcurrent. In other places the slope faces the breeze more squarely and the lift will be stronger. Variations in the angle of the slope, fluctuations of wind strength and direction and the existence of various obstructions or awkward areas, also add to the excitement. Gullies sometimes concentrate the airflow into bands of strong, but turbulent, lift. The pilot learns where the best lift is, and where the regions of sink and other difficulty are. It is a common mistake for the pilot to fix rigidly on a limited 'beat', going back and forth along the slope and always turning at the same points. If at some place along the slope the model is in strong lift, this is the place to linger, which can be done by performing several short beats in figure of eight pattern (Figure 40). In a turn, the sinking speed of a glider increases but if the lift is good this does not matter. The glider will gain more height by remaining in the good lift, than by floating gently through it and then having to turn in an area of sink. Having some extra height to play with, the glider then may set off on a longer excursion, passing through any weak lift or sink areas by flying fast and straight, to reach another good patch where a few turns and short beats will restore the loss.

Catching thermals off the slope

Often the slope soaring glider will start to gain height much more rapidly than expected. Where on the previous pass there was ordinary slope lift there might, next time, be a very strong upcurrent producing unexpected altitude. There is every probability that this sudden surge of lift is caused by a thermal passing through, or even that one has been 'triggered' by the slope itself. If this is suspected (and on almost any soarable day it should be **expected**), after one or two short beats to and fro to confirm that extra height is available, the pilot should let one of the turns continue round into a

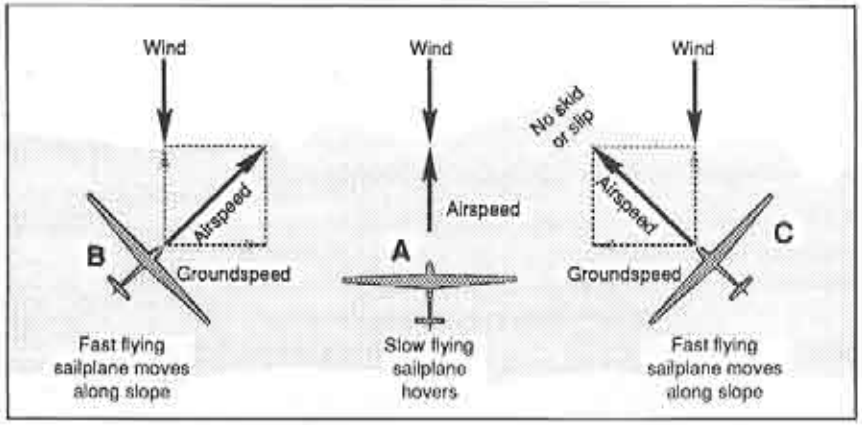


Figure 39 Slope soaring: effects of flight speed and heading

full circle and watch the model carefully. If it still rises, let the circling go on, continuing to watch carefully. As discussed at length in previous articles, the correctly circling model will make a cycloidal pattern relative to the ground and, in a slope soaring wind, this will very quickly carry it behind the slope into what would normally be sinking and turbulent air. However, a good thermal has no difficulty breaking through this and if the model continues to gain height, it may be allowed to go on circling and climbing. Often, a thermal caught off the slope will carry the model very high as it drifts back and then it becomes possible to break away from the hill altogether for a while, looking for more thermals, with the assurance that a reliable source of lift is always at hand if the other sort fails.

By monitoring the angle of the model relative to the pilot's standpoint, it is possible to judge whether the rate of climb in the thermal is enough to enable a return to the slope. If for any reason the pilot becomes doubtful about returning against the wind, the model must be flown **fast** and **straight** back to the hill. To penetrate the wind and to get through any sinking or rough air regions quickly, the airspeed should be pushed as high as the pilot dares. The model can be heard whistling. Unless a serious misjudgment has been made, it will arrive back at the slope low but fast. All the height lost can be quickly recovered. It must be stressed that in any situation where a glider is in sinking air, **a very high airspeed**, even at the cost of diving steeply to accelerate, and a **straight, fast** flight out of the bad region, is the only salvation.

Waves

Model gliders have very occasionally been soared in genuine lee wave lift, but mostly by accident. The reason such events are rare is probably that pilots do not often go looking for waves, or do not understand what it is they are looking for. Model fliers sometimes speak of 'wave lift' but this usually means they have found a large area of thermal lift over flat ground, a thermal street, which may be used by flying straight into wind, instead of circling. As a rule this dies within a few minutes.

The waves best known to meteorologists and pilots of full-sized gliders, are of the kind shown in Figure 41. When there is a temperature inversion, a wind blowing over a hill or range of mountains will form a wave or series of waves on the lee side. Referring again to the analogy of the river of water, a long series of ripples is often found on the downstream side of a rocky outcrop. The water flows down the steep incline quite

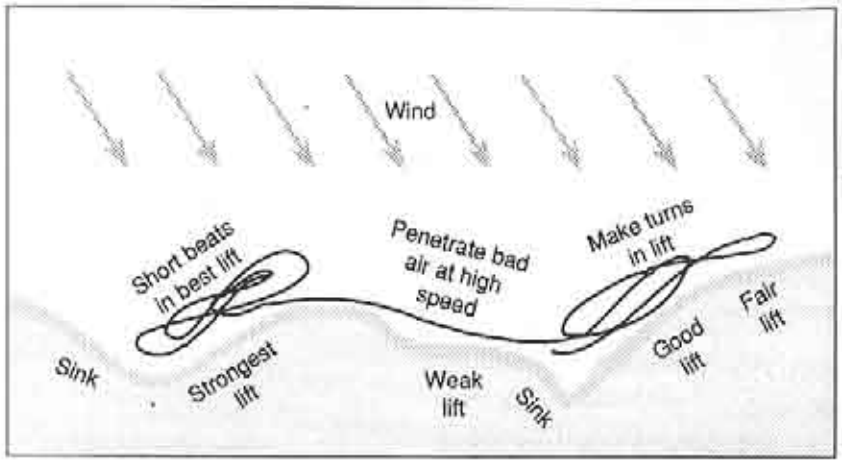


Figure 40 Using the slope lift

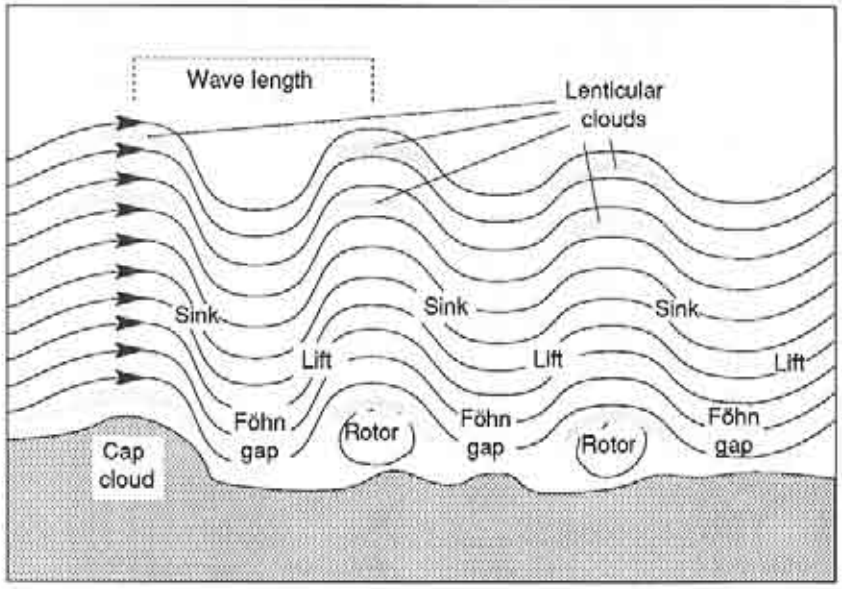


Figure 41 Lee waves

steeply but smoothly, then produces the ripples which stand, or remain in position, with the flow going through them. These are often termed standing waves. Such waves occur in the atmosphere, given the right conditions, on the downwind sides of all mountain regions. The waves form a train which may extend hundreds of miles downwind. When the range acting as trigger is very large the ripple effect extends vertically to the stratosphere. Often, smoothly shaped lenticular clouds like whale backs form at great height, aligned across the wind direction and sometimes resembling vast stacks of inverted dinner plates, one above the other. Lower down there may

be layers of ordinary cloud with 'Föhn gaps' in the wave troughs. Moisture condensing as the air rises on one side of the wave, sweeps up and over through the wave and down, evaporating again as the air descends to lower and warmer levels. The moisture may re-condense in the upward part of the next ripple and so on for a long distance. Characteristically, the cloud constantly forms and reforms in place, not drifting away with the wind. Once the model flier starts looking for these aerial signs, waves will be recognised on many occasions. Like thermals, however, they are often present without any visible clouds.

By flying a sailplane in the upward side of such a wave, very great heights may be reached. The altitude attainable is many times the height of the hills or mountain range producing it. The record for a sailplane, a subject of fierce controversy at the time because it allegedly involved a breach of air traffic control regulations, was attained in February 1986 in wave over California, reaching 49000 ft a.s.l., exceeding a much older officially approved record over 46000 ft done in 1961. The 'long white cloud' above New Zealand's South Island is a well known wave cloud and sailplanes frequently reach heights well over 20000 feet there. There are doubtless hundreds of other places in the world where similar heights could be reached. Waves on this gigantic scale are not likely to be useable by modellers, even if it were possible to see a radio controlled sailplane to control it at 40000 feet. The air in the wave lift is usually perfectly smooth but there are sometimes strong winds and very severe turbulence near the ground. The rotors which form sometimes may be sufficiently violent to destroy full-sized aircraft and at least make for an extremely rough ride when entered.

It is, however, not necessary to have a huge range of mountains. Waves occur on a much smaller scale too. When there is a temperature inversion in the atmosphere, which occurs on most mornings and is especially likely after a cold, clear and frosty night, any 250 ft ridge with a cool wind blowing **down** the slope, can be expected to set off a wave to 2000 ft or more. With a good winch launch or model aero tow there is no question that a model sailplane could reach the upward side of such a wave.

Searching for waves

In the early years of full sized soaring, waves were frequently encountered but not recognised for what they were. Pilots would circle in them, as for thermals, but of course this would swiftly find them drifting through the wave crest into the sink on the wrong side. If wave lift is recognised, it is used in very much the same way as slope lift, by flying a 'beat' to and fro across the wind direction, not allowing the aircraft to drift downwind to the wrong side of the wave, or creep upwind into the trough. The most characteristic thing about wave lift, once entered, is its extraordinary smoothness. The sailplane in wave lift normally requires no control movements whatsoever, but flies with perfect steadiness at its trimmed airspeed and on its present heading. There is not the smallest variation. In the full sized aircraft, the pilot, once settled into the wave and trimmed, can take hands and feet off the controls for long periods. The only actions needed are minor corrections of heading to ensure remaining on the upwind side of the wave. Waves do eventually break up, or shift their wave length rather suddenly, but while they last they provide some extraordinary experiences.

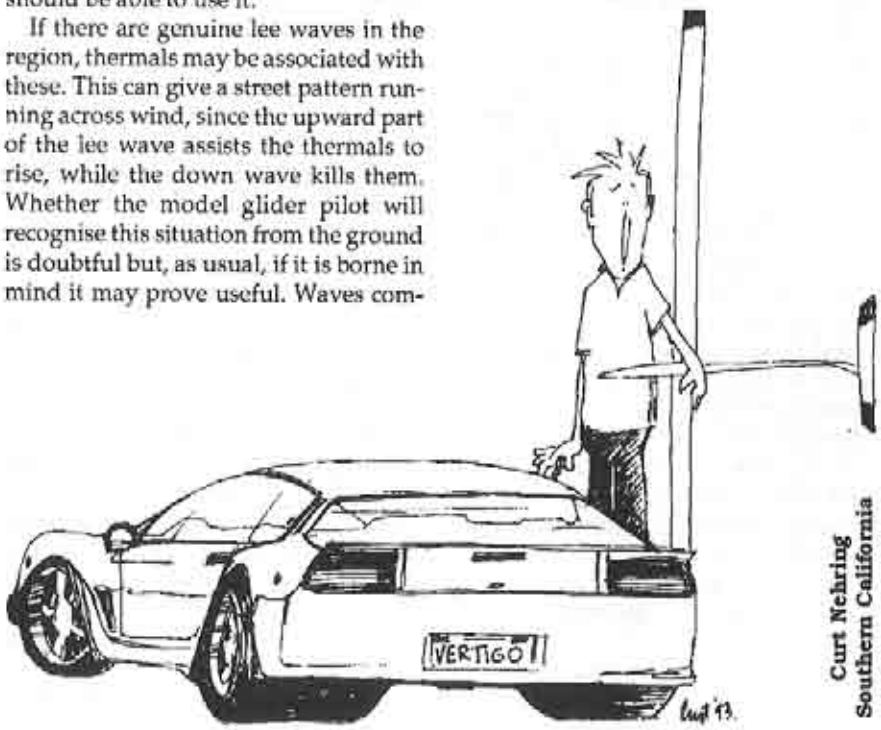
Once established, a lee wave will usually persist for hours, at least until the temperature inversion breaks with ground heating. In the evening, the wave may form again. In winter, waves quite commonly go on working all day and into the night, so long as the wind blows

in the right direction and the hill does not move. These are not rare or merely chance occurrences. Waves are regular and normal features of the atmosphere.

It is up to model fliers to investigate the possibilities for soaring. A particularly useful type of aircraft for this would be a powered sailplane which could tour round, with and without power, exploring the air for an extended period. On an appropriate kind of day the model should fly some distance from the hill **on the lee side**, searching for smooth lift. If not found, the cause may be that the wave length is longer or shorter than supposed, so a shift upwind or downwind may succeed. If an area of turbulence is discovered this may be a rotor, indicating that lift should exist on the upwind side of this area. If a wave has been located, it will certainly form in much the same place on other days with the same or nearly the same weather. Once known, ordinary gliders from winch launches should be able to use it.

If there are genuine lee waves in the region, thermals may be associated with these. This can give a street pattern running across wind, since the upward part of the lee wave assists the thermals to rise, while the down wave kills them. Whether the model glider pilot will recognise this situation from the ground is doubtful but, as usual, if it is borne in mind it may prove useful. Waves combined with thermals were also once thought impossible, but it is well known now that they do sometimes combine in the way described.

At altitudes models do not normally attain, 'thermal waves' occur. A strong thermal pushing up to a height where the wind is stronger, presents an obstruction to the high level airflow. A particularly powerful thermal, or cumulus, will sometimes, so to speak, hit its head against a high level inversion and create a hump in it. The winds above this, rise up and over the thermal, creating a wave. It is sometimes possible to see this happening. A strongly growing cumulus may acquire a 'cap' or 'eyebrow' cloud where the wave rises over it. It also happens without cloud but is, of course, much less easy to detect. Full scale sailplanes can use such thermal waves to climb above the inversion and even, occasionally, high above the cloud tops in perfectly clear air. ■

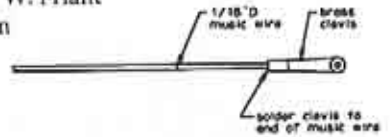


Curt Nehring
Southern California

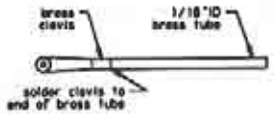
Flap Saver Pushrods - A Necessity

...designed by David W. Friant
Bellevue, Washington

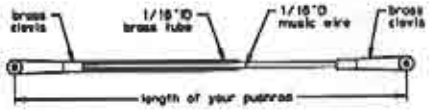
Step 1: Solder clevis to end of music wire.



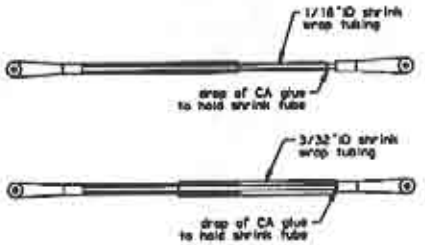
Step 2: Solder clevis to end of brass tube.



Step 3: Push the music wire all the way into the brass tube. Adjust the length of the music wire for your flaps by fitting to your wing.

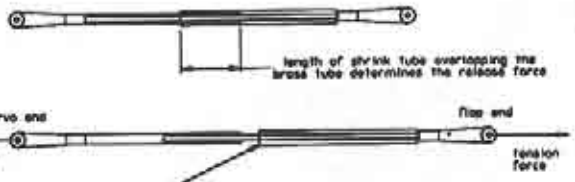


Step 4: The small shrink tubing extends from the music wire clevis to the end of the brass tube. Shrink in place with a heat gun. Place a drop of CA glue at the end nearest the music wire clevis to hold the tubing in place permanently.



Step 5: The larger dia. shrink tube extends from the music wire clevis overlapping the smaller shrink tubing and overlapping the brass tube about 3/4". Shrink in place. Place a drop of CA glue at the end nearest the music wire clevis to hold the tubing in place permanently.

Step 6: Adjust the shrink tube overlap on the brass tube to adjust the grip force.



Step 7: Pull on both clevis to release the pushrod. Install the pushrod when you are satisfied you have the correct grip force.

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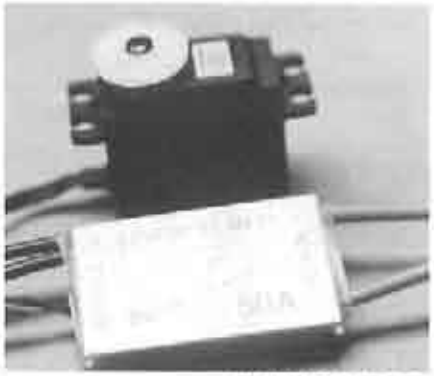
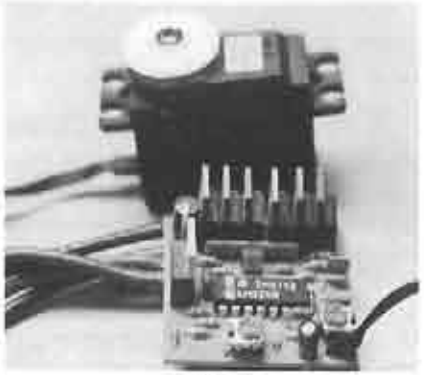
Controllers

One of those necessary items needed in flying electric powered models is a way to turn the motor on or off. This can be done with a proportional speed controller (meaning that the rpm can be varied), or by a simple on/off switch. These on/off switches can be solid state or with a relay. Most controllers or on/off switches have a brake to stop the prop so that the prop can fold back; some controllers have a B.E.C. circuit. The B.E.C. (battery eliminator circuit) lets the receiver share some of the voltage from the motor battery, thus eliminating the added weight of a separate battery for the receiver.

With so many controllers and on/off switches on the market, it gets very confusing as to which is the best. Test results are hard to get and sometimes difficult to understand. So, instead of giving you test results, which I do not have the proper equipment to perform, and to break down those results into terminology which most of us do not understand, I have listed the controllers and on/off switches I have personally tried. The pictures are all taken with an Airtronics 102 standard size servo to give you an idea of the size of the controllers and on/off switches.

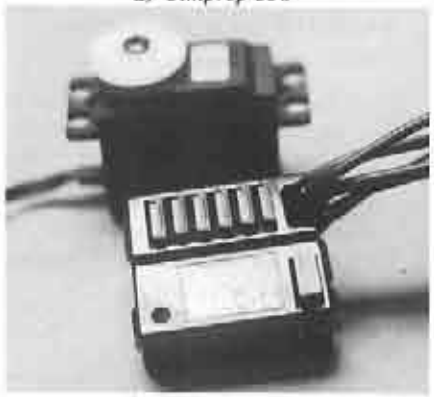


4) STWSP 50 BEC



1) Flightec

2) Simprop S90



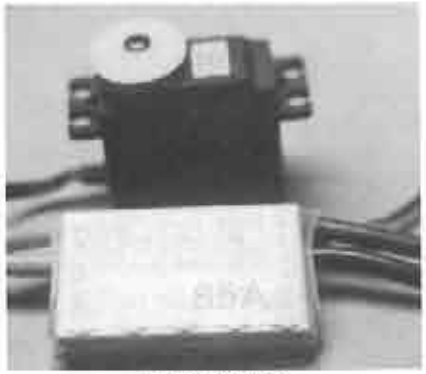
3) Airtronics MA6

1) Flightec - U.S. made. Very good quality and reliability. Readily available with many options such as brake and B.E.C. I would personally recommend protecting the back of the PC board to avoid the possibility of shorting out the unit. By the time you read this, Flightec should have a new surface mount controller on the market.

2) Simprop S90 - Small, light, relatively inexpensive. Good for lower amp application, but I have some problems with the S90 in the higher amp range (above 25 amps).

3) Airtronics MA6 - Readily available. Reliable. Relatively inexpensive, but not for high amp application.

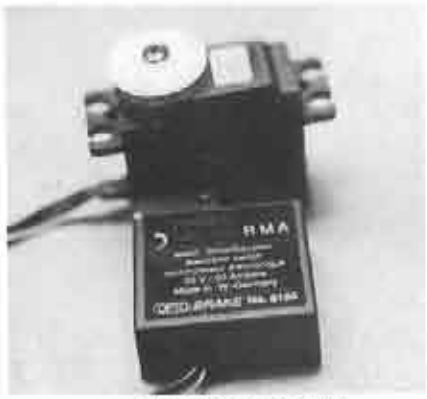
4) STWSP 50 BEC - My favorite for 7 - 10



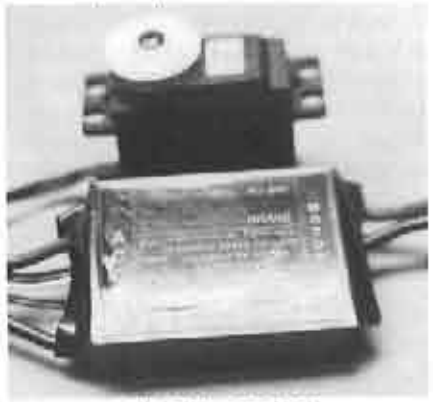
5) STWSP 85A

8) Becker USA

6) Graupner Power MOS 56



9) ROBBE RSC 200



7) Robbe RSC 630

10) Graupner Mini-switch 40

cell where I want a BEC. Very reliable, light weight, flawless performance, but expensive and it can be hard to get.

5) STWSP 85A - My favorite for very high performance and high amp draw application such as F3E. Does not have BEC.

6) Graupner Power MOS 56 - Another good controller for high performance use. Although I have just started using this unit, the MOS 56 seems to be a very high quality unit.

7) Robbe RSC 630 - Although the 630 is a little larger and heavier than some of the other controllers, the performance has been excellent. I have been using this controller for a number of years without a problem. Availability is good and the price is reasonable.

8) Becker USA - Inexpensive. Availability is good. Performance seems OK, but dependability on my own personal units has only been fair.

9) ROBBE RSC 200 - My favorite for an on/off switch without BEC. Very inexpensive. Very reliable. I've used many without a single problem.

10) Graupner Mini-switch 40 - I've just started using this, but it seems to be very reliable and inexpensive. A little smaller than the ROBBE RSC 200.

All of these observations are my own personal observations. They are the results of many hours of use in the air. I have not tried the FX 35 or Steve Neu's line of controllers, but I am sure that they will be very good. If I get a chance to try them, I'll let you know.

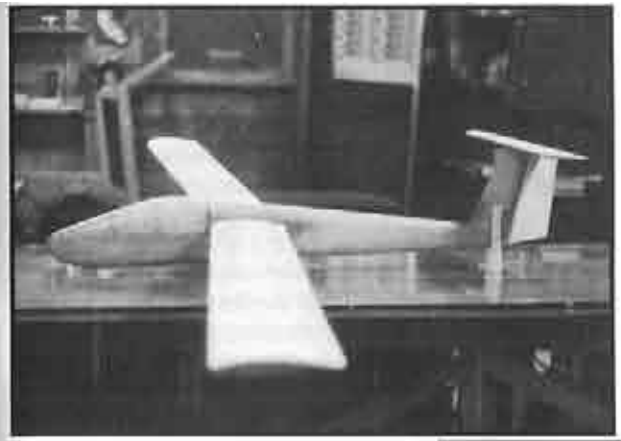
As a side note, I have been getting many phone calls from people who no longer want to use a BEC. Personally, I also do not like to use a BEC and, in most cases, do not recommend it. A small 150ma battery pack is cheap and light insurance. Some people have told me that the receiver pack can also go bad. This is true, but the chances of that happening is a lot less than the motor battery pack going bad, the motor battery pack being subjected to much higher abuse than the receiver pack. Maybe Steve Neu was right when he said, "It's not a BEC, but a PEC (i.e., plane eliminator circuit)."

Good Flying! ■

1993 F3B World Championship Results

Place	Country
1	Germany
2	Austria
3	U.S.A.
4	Great Britain
5	Switzerland

Place	Individual	Country
1	Denis Duchesne	Belgium
2	Joe Wurts	USA
3	Klaus Kowalski	Germany
4	Nic Wright	Great Britain
5	Reinhard Liese	Germany
6	Peter Kowalski	Germany
7	Gunther Aichholzer	Austria
8	Jeroen Smits	Netherlands
9	Thomas Kuebler	Switzerland
10	Randy Spencer	USA
11	David Charles	Great Britain
12	Daryl Perkins	USA
13	Mathias Ebner	Austria
14	Larry Jolly	USA
15	Peter Hoffman	Austria



T-53 sits on workbench ready for paint. Model employs blue foam core wings with obechi skins. Fuselage is glass which was made over a foam plug.

Gene's finished T-53 is waiting to fly. It uses a Quabeck 3.0/10 airfoil.

NASSA News
Building a T-53A from Scratch

...by Gene Cope
Union Gap, Washington

There are many very good scale sailplane kits that meet the AMA requirements for stand off scale. However, for many of us sailplane\soaring enthusiasts, they don't make the grade for style, size, and uniqueness.

For many years now I've been building scale sailplanes, many from scratch. I'm working on a 1/4 scale Kestral 19 at this time, but needed a stand off scale that I could fly from our field. For this I chose to build a Slingsby T-53A in 1/6 scale. The T-53A, with a 113" wing span, was about the right size. It was a design I gleaned from the pages of *RCM* and they gladly provided me with plans for a price.

In the process of scratch building, the use of math is a requirement. I was not very good at it in school, and still lack many of the fine points, however the use of trigonometry is a must when designing and building scale models and is easily learned. First, buy a scientific calculator, because they do all the work for you.

Let me continue explaining the process I used building the T-53A. The fuselage came first with the outline drawn on 4" thick blue foam. After sawing out the outline of the fuselage, a tail fin was added, and shaping commenced with the aid of templates. After final sanding, the wing and canopy locations were drawn on the plug for later reference.

The glass cloth lay-up layers started with a 2 oz. straight grain fabric to stiffen the foam and secure the fin. This was put on in halves, epoxied for ease of application, and sanded between layers. The following layers of 3.6 oz. cloth were alternated between bias and straight grain with the first covering the entire fuselage. The second layer of 3.6 oz. was layed in bias in the opposite direction of the first from the nose to behind the wing trailing edge. The last layer was straight grain and covered the entire fuselage. All seams and surfaces were sanded to insure a good bond between layers.

The fuselage was put aside to cure for about 3 weeks, while the wing templates were made and cores cut. Wings made from foam give you a wide variety of

airfoils available. I chose a QB 3.0/13.5 airfoil, which is a great improvement over the flat bottom airfoil on the plans. I used 1.8 lb. blue foam for the wings, stab, and rudder. The flying surfaces were sheeted with obechi wood and bonded with epoxy; the surfaces were then vacuum bagged. Spars of 1/8 x 1/4 spruce 18" were used in the wing with a carbon sub-spar. The stab used 1/8x1/8 spruce with 1/8 od. brass tubing. The carbon sub-spar was made using a mold of balsa wood with the 3 deg. dihedral and 5 degrees of forward sweep. It took 50 ft. of carbon tow, saturated with epoxy and packed in the mold, then vacuum bagged. After trimming, the sub-spars were pinned together and drilled for alignment pins. The wings now plug together just like its full scale counterparts. The version of the T-53A used a full flying stab and large ailerons and flaps at 22% chord. This works out to 1.5" on the 7" chord wing. To keep some of the engineering simple, the flaps are driven from the fuselage with a servo in each wing for the ailerons. The field assembly is kept simple by having the stab split in the middle and joined on 3/32 steel pins. The wings plug into the fuselage through a rectangular hole and pinned with a 1/16 brass wire.

When it was time to return to the fuselage, there was filling and sanding to get a good surface ready for priming. Now, it's time to melt out the foam core with a solvent suitable to the foam used. Do this in a well ventilated area as this is most hazardous to you. First, score around the canopy but don't cut it completely loose. Start at the tail and melt to the nose; this will keep the fuselage in one piece, allowing the fuselage to firm up after being subjected to the solvent. After the solvent evaporates, cut the canopy loose and sand out the inside of the fuselage. Lay out the 1/8" light ply stiffeners and bulkheads epoxying them inside the fuselage and firmly clamp.

The rudder post holds the two bellcranks that drive the rudder and elevator through plywood plates routed on the sides of the post. A hole is then drilled through the plates to hold the pivot pin. The rudder is driven by a swingy mounted vertically in the rudder post; the stabilizer is driven with a 4-40 rod to a rocket city swivel end that has been drilled for the stab pin. At this time, the 1/16 wire control wire and casing is attached to the bellcranks and the rudder post assembly is epoxied in the fin with a 1/4" recess and clamped after checking alignment. After the rudder post is cured, cut a hard bulsa block for the stab pivot bushing. This is now epoxied into the top of the fin. The stab is routed for the spars and they are epoxied with a brass alignment tube. After they cure, the stab is cut in half with a fine saw, and the center bottom is now relieved to accept the fin. With one half of the stab aligned to the pivot point on the side of the fin, the fin is drilled for a bushing. The wing is now aligned with the incidence marks on the fuselage and marks are made for a spar and incidence pin. A rectangular hole is cut in each side of the fuselage to accept the spar.

It's time to put every thing together. Begin by plugging the wing on the fuselage, plug in the stab through the pivot bushing and align the wing to the stab or vice versa. Note, however, that the stab was aligned square to the fin so the wing must be squared to the stab. If you like what you see, start by epoxying the pivot pin in place, wax the stab pins and assemble the stab together; measure and let cure. Next, set the incidence of the wing and epoxy in the incidence tube on the inside of the fuselage and let cure.

The flaps and ailerons can now be cut free and finished. With the wing free of the flap, put the wings back on the fuselage and mark for the flap drive. A large steering arm is used to drive the flap torque tubes.

All that's left is to finish the hinging of the ailerons and flaps, paint the fuselage, and cover the wing and stab.

I put in a releasable tow hook for aero towing and a belly release so to be able to experience the thrill of aero tow.

On the first flights the center of gravity was off and lead to a not so pretty landing. After repairs were made and the C/G was re-adjusted, the ship flew great with smooth turns and flat glide.

Now I have a ship that is fantastic at thermaling but rather a bit odd looking with the forward swept wings. The ship handles just as well on the slope in moderate to heavy winds. The drawbacks, if any, are that the ship flies faster with the wing reflexed, and landing speed with flaps down is not as slow as I was expecting. Nonetheless, in the overall performance envelope, it's an excellent stand off scale sailplane.

* * *

A NASSA Question

Gregory Vasgerdsian of Concord, California asks, "Has anyone out there built a working dolly for winch launching vintage type gliders that only have skids? Or, has it been found that you are better off just doing an R.O.G. without one? If someone has built a workable dolly, I would be most interested in its details and how it works!" Please send details to NASSA, P.O. Box 4267, W. Richland, WA 99352. ■

"Structural Dimensioning of Radio Guided Aeromodels"

Written by Dr. Ing. Ferdinando Galé
...Book Review by Jim Gray
Payson, Arizona

A new book has just come to hand which represents the best of international cooperation in many respects. Dr. Ing. Ferdinando Galé is certainly no stranger to these pages or to modelers anywhere in the world. "Ferdi", as he prefers to be called, is at heart an aeromodeler while at the same time an accomplished aero engineer and prolific author of aviation books for both modelers and full-size aircraft aficionados. Ferdi lives in Italy but has traveled extensively throughout the world and has taken part in international conferences where he has presented papers dealing with the science of airplane design, engineering, construction and performance. He is also an accomplished and successful aeromodeler.

The "international" part of this particular book lies in the fact that it is published by B^2 Streamlines, a firm also well known and represented in these pages since the inception of *RCSD*. Bill and Bunny Kuhlman have recently made the transition from the publication and sale of aero model plans to the field of book publishing. As you know, they published another book of Ferdi Galé's: "Tailless Tail", which deals with flying wing sailplanes in design and construction, and in historical perspective. Now, once again, we have author and publisher brought together in this new title.

While some of us are engineers with extensive backgrounds in aero engineering, others of us are laymen who have no formal engineering background, but who nevertheless design and build model aircraft. As Ferdi says in his introduction to his new book:

"Radio control allows flying models to execute the most daring maneuvers (not always truly aerobatic) and as a consequence it has increased the chances of structural failures during flight. One never saw so many semi-wings parting company from their fuselages before the introduction of radio control, which is now the largest part of aeromodeling.

"Therefore, it has been recognized as advisable to summarize in this booklet the principles and basic rules which allow the correct dimensioning of aeromodeling structures, so that they can withstand real flight stresses. From a conceptual point of view, such dimensioning is similar to that used for full-size aeroplanes. This booklet, which has been

prepared for model builders without any specific technical preparation, contains several simplifications. Many examples and diagrams allow one to calculate the structure by means of simple arithmetic, without the use of higher mathematics. The reader is recommended to read this book from the beginning, in order to master the basic concepts gradually (and) it is useful to recalculate the examples of the text, using different datum - those regarding one's own models, for instance - whether already built or still on the drawing board."

Ferdi's comments above are to be heeded carefully so that he can lead the modeler through the steps necessary to success and deeper understanding of design procedures required for that result.

Not having much formal engineering background, I approached this book with no little trepidation. One notable lack in my background was a course in the strength of materials - a discipline absolutely necessary for the successful aircraft designer - large or small - model or full-size machine. If you, too, "fly by the seat of your pants" when setting forth a model in the well-known TLAR method (that looks about right) as I do, then both of us NEED this book!

"Structural Dimensioning..." has rendered simple and easy-to-use some of the most abstruse formulas by presenting the information in graphical form whereby one can select what's needed by merely following the curves and lines on the graph. This book contains the following chapters: Materials, Loads, Stresses, Wings, Fuselages, Conversion Table, and Bibliography. The fundamental concepts are shown by a large, black pointing finger that clearly marks the part(s) required, and a large black arrow that indicates the practical formulae and considerations.

Let's say that you want to design a sailplane of about a 100-inch span that is to be used for speed on the slope as well as for the more gentle thermal soaring mode. Just as an example, pretend that you want a built-up and sheeted wing that consists of two panels joined to the fuselage and to each other by a carry-through structure such as steel rods. To go a bit further, pretend that the fuselage will be made from a composite material.

You first look up the mechanical properties of the materials that will be used in a Chapter 1 table, which covers almost all of the materials ever expected to be used, including foam, fiberglass and carbon as well as aluminum and steel. These materials are covered completely and illustrated with stress data: bending, shear and torsion. Next, you determine what loads (in Chapter 2) you expect your sailplane to be subjected to as determined by weight and speed and maneuver. Knowing the material and stresses, you can begin to dimension the parts such as spars, pins, sheet covering, etc., with a safety factor.

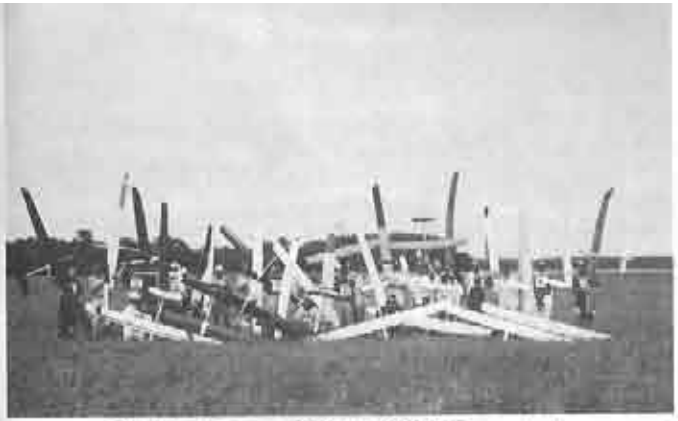
You are led step-by-step through all of these determinations with copious tables, illustrations, sketches, charts, and graphs; each thoroughly explained in "how-to" fashion. The book is comprehensive and requires study, yet it is very straight forward, allowing application of your own ideas to a structure that will do everything required of it.

Knowledge is the key to success, and the greater the knowledge the "easier" the process becomes. Finally, methods of testing are shown so that you can take an already-built structure and test it non-destructively to see how your "rule of thumb" design compares with an "engineered" design.

Don't expect to read this in an evening, or a week. Don't even assign a "deadline" to your reading. Just work through it and let it happen as it will.

I think you will discover, as I did, that maybe a lack of earlier formal engineering education wasn't such a limitation after all. You will be assured of success!

The book is a convenient 8 1/2" x 11" size, in soft cover, contains 106 pages and is available from B^2 Streamlines, P.O. Box 976, Olalla, WA 98359-0976. The price? A modest $18.00 which covers handling and shipping. You can't go wrong with this international teamwork publication. Yes, it is in English, too! ■



Contest Group Photo

European Chronicles

...by Marc Dufresne
© Copyright 1993
Domaine de Belle Croix
17, rue Albert Camus 77330
OZOIR-La-Ferriére, FRANCE
Tel/FAX: +33 1.64.40.12.24

F3J - Thermal Soaring genus Britanicus!

Finally! After four months of slogging, the PULSAR was at point where it could be considered flyable. To get there has been substantially more involved than I had anticipated. First, the airframe shipment got delayed due to some family problems. And then, when time came to ship, the movers had underestimated the weight/volume and consequently had to use an airline other than the one it had originally planned. This airline was a so-called "second-tier" carrier. To make a long story short, the crate left the US, transiting via Asia, got preempted on the way by a shipment of exotic animals, finally making it to Paris a week later.

And no, I'm not making this up. It is not clear to me whether the crate went West all the way around the globe or, first, far to the East and then West, again. But from the looks of the crate on arrival, it was obvious that it had traveled far and wide. Luckily, its contents were not damaged. Wonders will never cease! Then, there was the business of getting the workshop operational. The previous one took me ten years to get to the point where I didn't have to worry about missing something. Here, I started from ground zero. Capital costs aside, the biggest issue is finding the European equivalent of a favourite tool. And then, realizing that I needed the American ver-

Finalist Group Photo

The club house!

sion all along 'cause of the models at hand... I spent a princely sum in a local hardware store, on my last trip to the US fixing THAT problem.

Or to discover that the Europeans do things differently. Not necessarily better nor worse. Just different. Like when I showed them the PULSAR fuselage covered with MONOKOTE. Or to show them that the dihedral is built in the wing and uses a straight wing rod - they do the opposite. Or to notice that the stabilator pivot point on a European glider is always in the front, no further than 25% of root. Any other configuration and the next time you try that banked turn on your big 3M ship at high speed has you going straight, 'cause your servo can't take the aerodynamic pressure, or into the ground because your servo blew a gear.

And I was also working on a deadline: France's first International F3J contest, held at Gisy-les-Nobles, June 20-21st. Gisy is located some 100Km south of Paris, an hour's drive from where I live. The venue was the local aeroclub's field: a wide, open area, surrounded by farmland. The contest used the club's old runway, which was condemned when some poor soul, some time back, overshot it and landed too close to the TGV train line which runs about one Km away. I mentioned earlier that my club had a bar. Well, these guys have a restaurant! With excellent food to boot. The club's set-up with hangars for

We do gliders, too!

How to carry an F3J ship!

Individual Winners (L-R) Jaroslav Imiolek, Tom Mertens, and Francois Henninot

Top Team: Italian

2ND Team: Czech Republic

3RD Team: Holland

power, gliders & helicopters, is pretty typical of any European aeroclub.

For me, this contest was also an ideal way to get back in the air. Except for the hand towing and group rotation, the format was similar to the open class thermal soaring contest in the US. There are some differences.

F3J? The format comes from the British Open Class Thermal Soaring contest. There must be at least five rounds per contest. If more than five rounds are flown, then the final standings are based on your five best rounds. A two round fly-off with the best nine pilots determines the winner.

In each round, pilots fly in groups of at least six, and preferably eight to ten. Pilots are moved from group to group after each round, so that they get to fly with someone different. Each pilot is allowed two planes for the contest. And you must have two frequencies to fly on. This latter requirement is to deal with possible conflicts as you move from group to group.

Each group is given ten minutes for working time to complete its flights during the regular round, and 15 minutes for the fly-off. Each pilot is allowed two flights during working time. The last flight you make is the one that counts. You get points for flight time and precision landing. You lose points for flying over the working time. Over-fly the working time by one minute and you get a zero. Land beyond 75m of your target and you also get a zero. Scores are normalized for each group.

Simple. No fuss. No muss. It's meant to be fun. The format is designed to allow various level of pilot competence and very different gliders to be competitive. Typical British fair play! Also, no high tech launching schemes. All you need is a 150m of monofilamant line with a max pull test of 2kg and a towman. A hand reel is handy to wind up the line after launch. Pulleys are permitted for addi-

tional purchase. Patrick Tax, of the Dutch team showed up with a simple 2-channel polyhedral and the basic hand tow reel. His buddies, Martin Looman and Carl Van Vloten, brought the heavy artillery: a 3.5m ship and a two man tow system (see photo). One of the French teams got the prize for the ultimate system, with a two man, dual pulley set-up. .

Top Junior: Steeve Hansoulle

Hand towing! Vision of the 100m dash... exhaustion... heart attacks... And a glider that barely makes it up to altitude... WRONG! The towman will be lucky to run more than 30-40m. With a pulley, about 20m. There is enough power in the run to rip wings off (That French team did just that.), and also to get a good zoom. Speaking of which, I had a guy on the French team tell me that F3B rules allow for tow launching but that towline is limited to 175m, to even things out with the 200m winch line. "If we could hand tow with a 200m line, we would not bother with the winch," he said. "The tow is much more powerful."

Patrick Tax

OK. So how does it work? When your group is called, you have five minutes to set up, i.e., your tow man or team takes a walk unwinding the lines. Everyone would set up two lines, either as a spare in case of breakage or fast re-launch in case of bad flights. When working time begins, everybody launches as fast as possible. Since there is no max time, one aims to make the most use of the working time. So it's a quick launch and then you fly as long as possible and land as close to the end of the working time AND as close to the pin as possible. Things get real interesting at the end of working time with everyone getting into a landing pattern just about at the same time.

Patrick & Friends

Bad air? Pop-off? Tough. One retry. Only exception is: if a problem occurs that is beyond your control (collision, tangled tow lines), then the whole group gets to re-fly. When this occurs, the best flight time/landing from either the regular flight or the re-fly is kept. This means a re-fly can only improve your points.

French set-up!

When the flying is done, you pick up your equipment and let the next group do its thing.

All right, back to the contest. 50 people showed up: 2 teams from the Czech Republic, Italy and UK, 3 from France, and 1 from Holland. The Belgians were there with 4 teams. Most of the gliders were in the 3.5m range such as the one shown with Jack Sile. Also popular is the Czech PROWLER with a similar construction of a fiberglass fuselage, foam sheeted wing center panel and built-up wing tips. The French, being different, were there with F3B ships. Regular rounds were flown in groups of eight. The fly-off was a group of the 12 best scores. EOLE, the French glider special interest group, organized and ran the contest. As usual, with Mr. Maisse, everything went off like clockwork. The weather was ideal with light winds, warm sun, of course, and lots of thermals.

Czech Buzz Bomb fits in briefcase!

Jack Sile

The PULSAR was full of technical problems. I used cables to control ailerons and flaps and it turned out to be impossible get reliable control, much less to trim it. And I'll pass on the binding. So it's out with the cables and in with micro servos in the wing. I also discovered that the fuselage is not up to par for the kind of wear and tear found in this type of competition. I cartwheeled on landing and broke the nose off in the process. CA glue and aluminum tape quickly remedied that problem, but as I compared it with other gliders, it was obvious I needed

something much more sturdier. After this, the ANTHEM fuselage does not look over-built. These big ships, with their mass and moments, develop a tremendous amount of energy. Do something wrong and the results are not pretty. So, I forsaked the flying and went to help with launching and timing instead.

I got a real kick at seeing a group of eight pilots, about 4-5m apart, get ready to launch all at once. I was used to contests in New England with 3-4 winches, so I expected quite a few collisions, but things went very smoothly on the whole. There where only two re-flys in the regular round. Over the course of the two days, seven regular rounds were flown with Riccardo Biffis, of Italy, finishing first overall, winning 6 out of 7 rounds.

The fly-off was done in perfect weather. Just before launch, a pack of crows came through, riding a thermal. There must have been about a 100 of them. It was the first time I'd ever seen crows soar, much less as a pack. The first round was a real cliff hanger; everyone got off to a very good start and with thermals all over the place, everyone stayed up pretty well 'til the end of the 15 minute working time period. I was lucky to be the timer for Jaroslav Imiolek of the Czech Republic and I was also standing next to Tom Mertens from Belgium. I got a lesson in Thermal Soaring, just watching these two. And precision landing! These guys came in, side by side for landing with less than ten seconds working time left and placed their gliders right on the pin. The final standings were decided on landing. I found having ten planes come in for landing all within 30 seconds of each other, on pins about 5m apart, to be a somewhat nerve wracking. I kept worrying about possible collisions. And I was just the timer!

So, it ended with Tom Mertens (Belgium), Jaroslav Imiolek (Czech Republic) and Francois Henninot (France) getting top individual honors. Francois, by the way, is the 1993 F3B French Champion. The top junior was Steeve Hansoulle, also from Belgium. He finished 18th overall, an excellent performance, and in so doing, won a one year subscription to *RCSD*. In team competition, it was Italy, Czech Republic and Holland. All in all, an excellent contest and weekend. A great time was had by all!

Cultural notes

At the awards ceremony, EVERYONE, from card runner to the top flyer, got a prize in appreciation for his efforts. And after the awards ceremony, we were all treated to a send-off "aperitif", courtesy of the organising committee; this was a wonderful opportunity to relax and chat with fellow contestants, make plans for other contests (Belgium in August, Czech Republic in September). I've added camping equipment to my equipment list. The field was turned into an instant village with its attendant camaraderie, meeting of old and new friends, swap meet and what not! ■

Curt Nehring
Southern California

Sailplane Flight Times as a Function of Launch Methods, Wind Speed and Time of Year

...by Lee Murray
Appleton, Wisconsin

In my earlier article, I commented on differences in flight time for different size models based on my records of about 500 flights. I mentioned in that article that I also recorded factors such as date, wind speed, cloud condition and launch method. This article will deal with flight time differences having to do with different launching methods, wind speed, and time of the year.

First I feel that I should comment on the difficulty in measuring the confidence level or margin or error in the average flight times reported. I would love to claim that these flight time averages have a small margin of error such as ± 10 seconds. I can't do that for several reasons. The variability in flight time is not statistically normal as in the symmetric "bell shaped curve". It is very positively skewed as shown in Figure 1. A similar curve was shown in the previous article but this one has been extended to cover longer flight times with individual bars representing a wider window of flight time. The area under the "positively skewed tail" may be the important factor to RC sailplane pilots. In addition, the maximum variations may be limited by factors outside the technical aspects we are attempting to study. These include such mundane things as someone else waiting for a chance to fly, getting a sore neck, getting bored, etc. I question that classical statistical methods for variables data are appropriate for handling the statistical significance of these distributions. I am going to deal with the basic principles such as averages, modes and probability. Perhaps there is a statistician reading this who will have interest in the subject and be willing jump into the analysis of these data.

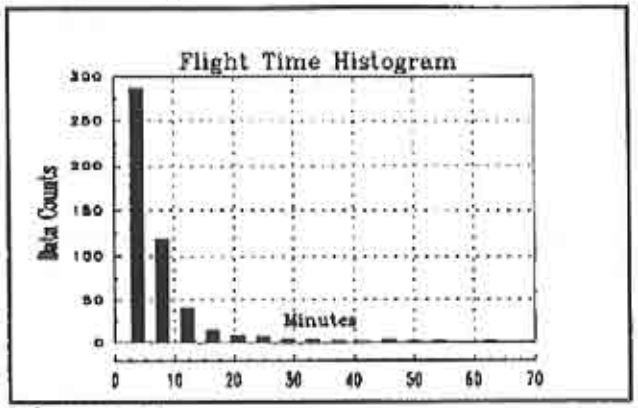


Figure 1

Effect of Launch Method

The launch methods included in this study were electric flight, standard class high-starts, Fab-Tek Sport Winch having a riding lawn mower battery, and classical Ford long shaft starter with 12 volt winding and standard deep cycle battery and later a car battery. The differences demonstrated were in the order of power (on-board electric launch excluded) as shown in Figure 2 and Table 1. The electric flights were from an Airtronics Eclipse using the stock can motor and seven cells. The flight time was started after the first motor run so when you look at the data you must realize that I had one more climb to launch altitude in each flight. As a matter of practical significance, electric flight makes sense with regard the ratio of flying time to time spent on the field. No winch to set up, retrieve and take down. With several flight packs and a charger,

a flyer is set for the day.

If you are really thinking, you might have picked up on a bias and interaction when including all classes of sailplanes in this comparison. Two meter sailplanes, which have shorter flights, are often launched on high-starts while XC models, which have longer flights, are only launched on the strongest winches. However, the conclusions are the same looking at only two meter. The spread is wider as predicted when looking at all classes because of the interaction of model size and launch mode.

Effect of Time of Year

The average flight time by month of the year is also interesting as shown in Table 2. It seems that June and September are better times for me to fly than the hotter July and August. I don't feel I understand the data since the sun is highest in the sky and the greatest solar heating should take place. Some possible theories that I have include:

1. I am flying relatively later in the day in July and August and miss the "noon balloon" when the mixed boundary layer, which includes the thermals and smaller plumes, punches through the inversion and lift is easy to find.
2. Air density and viscosity are lower with higher temperatures and humidity during the hotter months. A model might sink faster in the thinner air and probably won't get as high a launch on a day with little wind. The probable 5 minute flight might become a 3.5 minute flight.
3. This may just be the result of a few bad summers and not enough data to smooth out the normal variability.

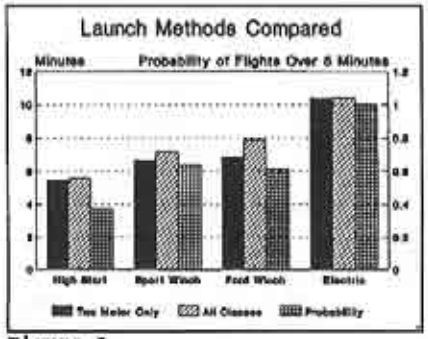


Figure 2

Table 1
Summary of Launching Methods vs Average Flight Times

Launch Method	Two Meter	All Classes	Probability of Flights > 5 min.
Electric	10.39	10.39	0.97
High Start	5.40	5.58	0.34
Sport Winch	6.64	7.15	0.61
Ford Winch	6.83	7.89	0.61

Table 2
Weather Conditions by Month in NE. Wis. (N.O.A.A.[1] data)

Month	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
High, °F	39.4	54.6	65.0	75.3	80.4	79.7	71.5	61.4
Low, oF	23.4	34.7	43.3	53.6	59.3	58.7	50.7	40.6
Wind*	11.0	11.5	10.4	9.3	8.4	8.1	9.1	10.1
% Sun**	52	51	59	63	65	63	55	49
Flight Times***	3.58	7.09	6.04	9.03	7.71	7.75	9.34	7.48

Notes:
* Wind speed in mph is based on a 24 hour average.
** Percent sunshine is based on the amount possible.
*** Average flight times of all classes flown and all launch methods excluding electric flight.

[1] Comparative Climatic Data for the United States Through 1980, National Oceanic and Atmospheric Administration, Environmental Data and Information Service, National Climactic Center, Ashville, NC

Effect of Wind Speed

The last area I will discuss in this article is the effect of wind speed on flight time. The interesting plot of this effect is shown in Figure 3. It should be noted that there is too much variation when I try to break the data down into small ranges of wind speed. However, there may be some support to the general shape of the curve in Figure 3. My estimates of wind speed are subjective and are based on weather reports and observing flags. The average and variability in flight time are lowest when the wind is calm. Theory would say that when the air isn't moving, there won't be any lift (you can't have rising air without horizontal movement somewhere). With higher wind speeds thermals are less organized and blow by faster causing one to leave thermals sooner and fly faster. Based on the same logic a 3-5 mph wind condition is one where the thermals are easy to find and they are available longer. Table 2 showing weather conditions by month indicates that on the average we have about 10 mph wind. I suspect that is a 24 mph average for surface winds and the real daytime average is closer to 15 mph.

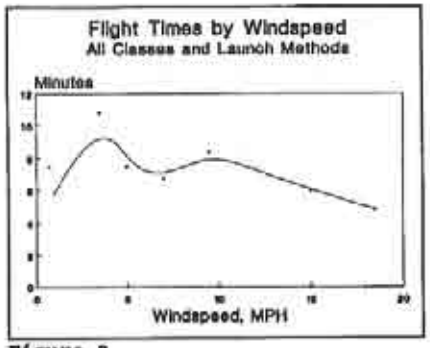


Figure 3

Conclusion

In the two articles presented I have attempted to interpret the flight time data for a six year study with 500 flights at one location and with one pilot, me. The conclusions have some basis in theory and in some cases are intuitive. Despite this, I have not presented compelling statistical evidence that these things are true.

Looking at only flights over 20.0 minutes:

- More occurred in June than in any other month.
- The Cumic Plus unlimited class sailplane was the model most frequently used.
- The average wind speed was 6.5 mph.
- The average flight time was 33.6 minutes.
- The Ford long shaft starter winch was used most of the time.
- The average "maximum altitude" for such a flight, when measured, was 1812 feet.

If you wanted to maximize your change to achieve your next thermal soaring goal while flying with me, this is what will give you the best chance for achieving your goal: Pick a day in June or September with light wind and a clear or partly cloudy sky. Bring the largest ship that you can fly well, and use my Ford long shaft starter winch unless you have something stronger. ■

Forward Swept Flying Wings for the Slope

..by Jef Raskin
8 Gypsy Hill Road
Pacifica CA 94044 USA
Phone: 415-359-8588 / Fax: 415-359-9767

Recently a well-known modeler called me for some recommendations on the aerodynamics of forward-swept wing slope soarers. He had done his homework and had found a well-written article on the subject by John Rapillo serialized in the April and May 1988 issues of *Model Builder* and wanted to know if what it said was correct. The article was gung-ho for forward sweep and presented all the good points but was a bit reticent about the problems. Also, it was based on full-scale practice and hadn't been completely re-thought for model purposes. I wrote the caller a letter and it was suggested that *RCSD's* readers might be interested.

Rapillo starts out by reminding us that tailless aircraft can have sweep forward or backward and be completely stable. While Rapillo favors forward sweep, when it comes to aerobatics (a subject he doesn't consider) it is best to have no sweep, measured at the quarter-chord line, to avoid coupling roll and yaw. My Anabat flying wing is hands-off stable (I made my daughter one which she uses as a *free-flight* glider) and has no sweep or dihedral at all. Sweepback does contribute to tip stalling, and one of the strong points of forward sweep is that the center stalls first, leaving the ailerons in full control. But you can also control tip stall by taper ratio (I avoid washin or washout since if it helps upright flight, it harms inverted flight). I prefer to decrease the taper to solve any tip stalling problems since chord taper does not introduce roll-yaw coupling as does sweep. Even for "floaters," which will never be flown upside down, wing twist works correctly at only one airspeed.

Thinking of free-flight or thermal-style flying, Rapillo recommends washin at the tips of his forward-swept planes: this makes them much like a canard in their flying qualities. Since the tips are heavily loaded in this scheme, the induced drag is higher than for a conventional layout.

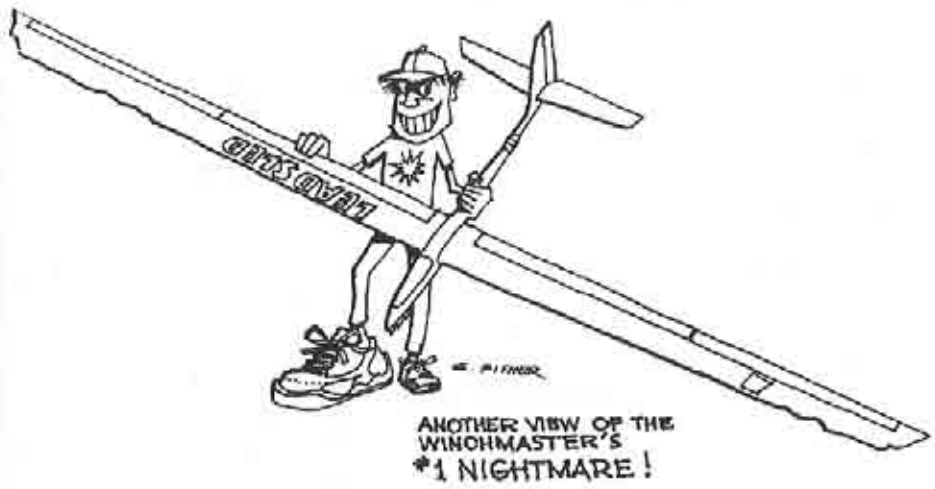
My experience shows that in his statement "A tailless airplane relying singularly on the qualities of a straight wing can be extremely sensitive..." the wiggle-word "can" is important. Straight wings can also be quite insensitive to small changes in c.g. position. Sweep, forward or backward, does make the aircraft longer and therefore, as he says, less sensitive, but if the straight wing is already easy to trim for proper c.g. then we don't need more range of adjustment in this parameter (we don't have varying c.g. in sailplanes during flight). For a full-scale plane c.g. range is a much more important consideration.

In the second article he speaks of using aspect ratios from 6 to 9. My friend Al Morse has a great-flying R/C slope wing with an aspect ratio of 3. Mine are between 4.5 and 5.3. At lower Re, lower aspect ratios are often *more* efficient. I use no dihedral (he recommends 8 to 10 percent of span) again because if it works upright it hurts inverted flight; again, dihedral is fine in a "floater" design though it does lower aileron effectiveness. The 12 percent thickness airfoils Rapillo recommends are too thick except for very large (say, three meters and up) models. The airfoils I use are 8% thick (the WE3008 airfoil). I started with 14%, then went to 12%, then 9%, and they kept on improving. I stopped at 8% for structural reasons. Al's airplane, mentioned above, has a 6% thick airfoil but has enormous chord (remember the aspect ratio) so it comes out almost 2" thick at the root.

As Rapillo says, forward-swept wings are less stable directionally and structurally more difficult to build. In addition to the aerodynamic twisting (structural divergence) effects he correctly describes, forward-swept wings are more readily broken when the narrow tips hit the ground first—a problem he ignores. To me, this last is a superb reason for not using forward sweep. To be as strong as a straight or rear-swept wing, a forward-swept wing must be heavier, thus incurring a penalty before it's off the drawing board. It also requires larger (and therefore heavier and draggier) fins than no sweep or rear sweep designs.

On airfoil sections I must diverge from his recommendations, which are based on full-scale practice. Notice that he says that his figures come from tests done at Re=6,000,000. A big Reno-style RC racing plane can reach Re=3,000,000. But sailplanes rarely exceed Re=500,000 (a 9-inch chord model at 80 mph), where airfoils behave very differently. As Soartech 8's and other tests show, the 63- and 64- series foils are terrible at model Re. They do not give "significant drag reduction" as Rapillo suggests. The four-digit NACA foils are far better. In fact, the still older Clark-Y is better. The symmetrical NACA 0009, the SD8020, and the WE3008 are all excellent for flying wings.

Conclusion: Forward sweep is OK but not superior on a "floater" sailplane that won't be flown inverted and is definitely OK if you just like forward sweep for the way it looks (and hang the aerodynamics, after all, this is a hobby!). However there is no aerodynamic or structural benefit to be obtained from forward sweep that is not balanced or overbalanced by the problems forward sweep introduces. But it sure looks radical! ■



Chuck Fisher
Dallas, Texas

The Care and Feeding of Winch Batteries

...by Bill & Bunny Kuhlman
Olalla, Washington

After five full seasons of use, our winch battery began requiring more frequent additions of water. At the same time, its capacity began to decline. On Fathers' Day of this year the battery pooped out after about a dozen launches, and we decided it was time to purchase a replacement.

Our original winch battery was a Sears DieHard Marine/RV Deep Cycle #96493, and as we were pleased with the performance it had given, we were intent upon replacing it with a like battery.

Winches require batteries capable of handling long periods of discharge, and deep cycle batteries are well suited to this application. Automobile batteries are designed for a short period of discharge immediately followed by recharging, so they are not a good choice for a winch power source.

Lead-acid batteries consist of an external plastic case, lead plates and plastic cell separators, and an electrolyte - a solution of sulfuric acid and distilled water. It is imperative that the electrolyte level is monitored, as severe damage to the battery can result from a too low level. The electrolyte level is maintained by adding distilled water to each cell as needed. Acid is never added to the battery, only distilled water.

The #96493 belongs to battery group size 24M. It can sustain a 25 amp load for 140 minutes at 80°F before dropping below 10.5 volts, and is rated at 90 amp hrs. This battery weighs 44 pounds and is about 11" x 7" x 9 1/2". Sears also offers larger batteries with greater capacity. The largest, #96581, has about 40% more stored energy, and a unique terminal design with two connectors.

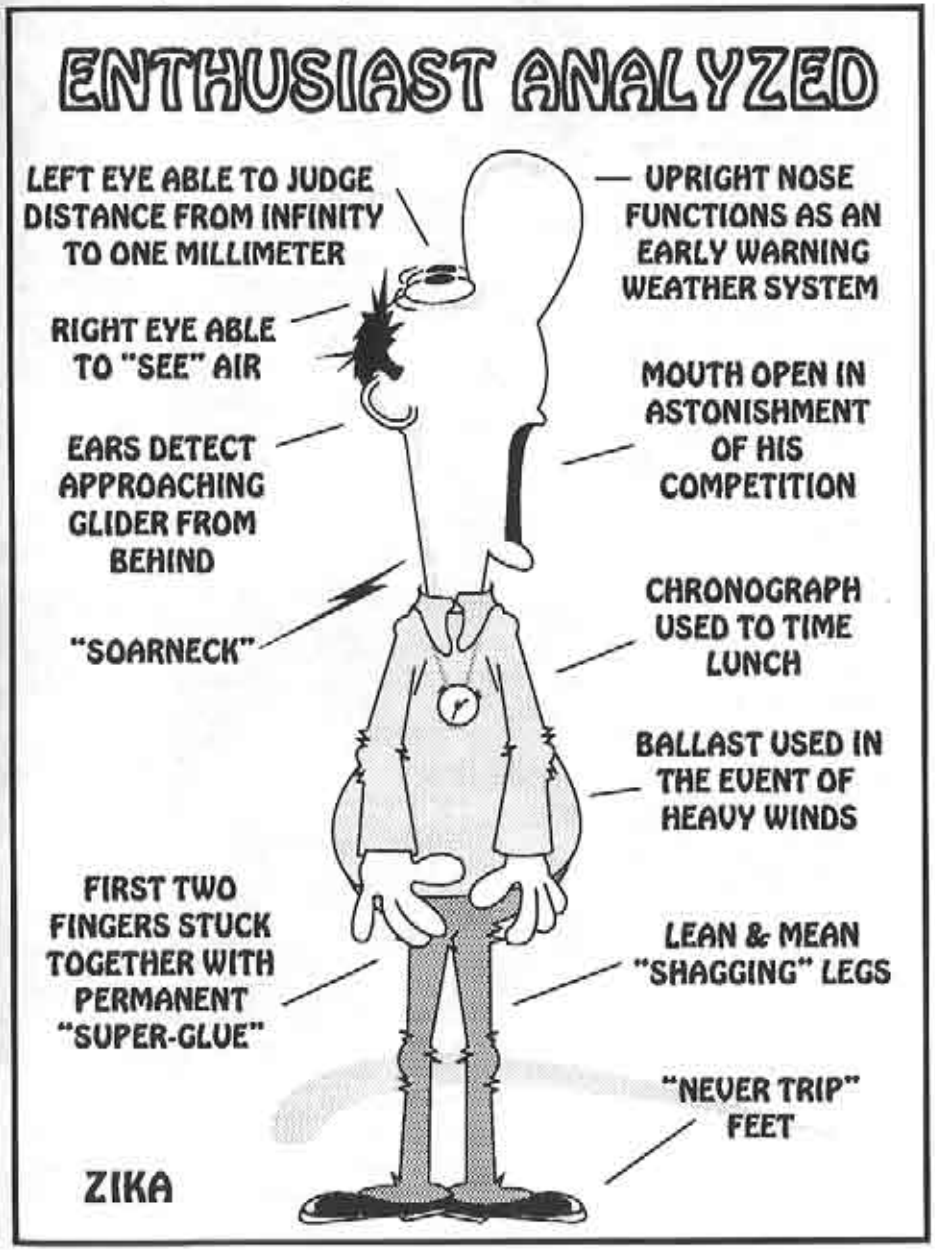
A couple of improvements have been made to the #96493 since our purchase five years ago:

- The handle has been changed from a nylon cord to a more substantial and comfortable molded type.
- A charge indicator has been added. In daylight, the indicator shows green when the battery is over 90% charged, yellow when up to 90% charged, and orange when under 40% charged. The charge indicator shows white when water needs to be added.

While lead-acid batteries are a reliable source of electric power, there are some things you can do to extend their service life. The following points were derived from a brochure which was included with our latest purchase:

- Never drain a battery completely. When the winch battery starts to fail, stop using that battery and install a fresh one.
- Batteries should be recharged immediately after use. Check the electrolyte level first, add water if necessary, then recharge.
- A slight overcharge is OK. Some bubbling is acceptable, but the electrolyte should not be boiling and the battery should not be warm to the touch. Severe overcharging reduces battery life and increases the need for more frequent additions of water.
- Check the electrolyte (water) level on a regular basis, at least several times each year. Older batteries will require water more frequently. Always use distilled water! Containers of water suitable for batteries can be found in convenient sizes in the supermarket.
- During the winter, batteries should be fully charged and the exterior surface washed with a solution of baking soda and water before storage. The battery should then be stored in a cool dry place. Do not store the battery where it will be exposed to temperatures consistently below 32°F. Stored batteries will need a recharge in mid winter.
- Batteries can self-discharge in warm weather and will need an occasional boost if not being used.

There is no reason a well maintained winch battery cannot last many seasons. Following these guidelines will extend battery life, reduce the cost of getting your sailplane into the air, and in general make the flying experience more enjoyable. ■



1993 International Modelers Show

...by Jerilyn Schmidt
Greco Technologies
South Pasadena, California

The 16th annual International Modelers Show (IMS) was held this year the weekend of January 8-10. The show was during California's big rains. However, the rains did not keep the attendance down. In fact there were reports of people having to stand in line, in the rain, to get in. If they came to see sailplanes they were not disappointed. This show, being held in southern California, is the best show for the glider enthusiast. With many main manufacturers as well as the majority of the smaller suppliers and manufacturers located in the area, there was a lot of soaring products to look at. The highlights of the show were the new products the companies were introducing. The photos show a few of the interesting things there were to see.

(More photos of the IMS will be included in the November issue.)

Aerospace Composite Products

This year ACP was demonstrating vacuum bagging techniques every half hour. When they were not giving a demo they were running their *Introduction to Vacuum Bagging Techniques* video on a monitor. Always looking to expand their product line ACP introduced several new products, including an extra thin (.0004 inch thick) unidirectional carbon fiber laminate and an extra light (1.7 oz.) 1 inch Kevlar tape. ACP is just coming out with a new catalog that will include all of their new products, just send them a SASE. Aerospace Composite Products, 14210 Doolittle Dr., San Leandro, CA 94577.

Airtronics Specialty Division

Tim Renaud is holding a show model of the Whisper 2M. By this time the kit should be in full production. The Whisper is a one piece wing with a modified Schuemann planform and a S3021 airfoil. Airtronics Specialty Division, 11 Autry, Irvine, CA 92718; (714) 830-8769.

C.R. Aircraft Models

Charlie Richardson's newest airplane is the Renegade, a 60-inch slope racer designed for 60-inch slope racing. The Renegade uses a S3014 airfoil and the kit comes with foam cores and machined balsa parts. The Renegade's specifications are: wingspan: 60 in; fuselage length: 37 in; wing area: 390 in^2; weight: 25-30 oz. The Contender is also new. This two-meter sailplane uses wingerons, elevator and a full-flying rudder for tremendous aerobatic maneuverability. The wing is made of blue foam with plywood skins and the fuselage is balsa and plywood. The Contender has a wingspan: 78 in; wing area: 420 in; weight: 50 oz. C.R. Aircraft Models, 205 Camille Way, Vista, CA 92083; (619) 630-8775.

American R/C

American R/C introduced many new planes at this show. They are broken down into two classes: the Microlight Series (about 6 ounces) and Standard Series (20-26 ounces). The new Mosquito, Nova and Classic have been added to the Shooting Star to make up the Microlight Series. The new Standard Series comprises of the Norstar, Super Nova, and Volant. Contact American R/C for more information on all of these new models. American R/C, 16691 Gothard St. Unit V, Huntington Beach, CA 92647; (714) 841-4282.

AstroFlight

Herb Semmelmyer is holding the AstroFlight Cobalt 90 motor, for when you want real power! AstroFlight, 13311 Beach Ave., Marina del Ray, CA 90292; (213) 821-0291.

R/C Soaring Resources

Do you hold seminars and workshops? Would you like to be included as a contact to answer questions on soaring sites or contests in your area? If so, please contact *RCSD*. Our address and telephone numbers are on page 1.

Seminars & Workshops

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

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Reference Material

Madison Area Radio ontrol Society (M.A.R.C.S.) *National Sailplane Symposium Proceedings*, 2 day conference, on the subject and direction of soaring. 1983 for $7.00, 1984 for $7.00, 1985 for $8.00, 1986 for $8.00, 1987 for $9.00, 1988 for $9.00, 1989 for $10.00, 1992 for $12.00. Delivery in U.S.A. is $3.00 per copy. Outside U.S.A. is $6.00 per copy. Set of 8 sent UPS in U.S.A. for $75.00, outside U.S.A. for $80.00. Last 4 (1987-1992) in U.S.A. is $45.00, outside is $50.00. Allan Scidmore, 5013 Dorsett Dr., Madison, WI 53711.

BBS

BBS: Slope Tech, Southern California; (310) 866-0924, 8-N-1

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

Contacts & Soaring Groups

Arizona - Southern Arizona Glider Enthusiasts, Burt Kline (contact), 2642 W. Ca Puebla, Tucson, Arizona 85745 U.S.A., (602) 882-4083. SAGE welcomes all level of flyers!

California - California Slope Racers, John Dvorak, 1638 Farringdon Court, San Jose, California 95127 U.S.A., (408) 259-4205.

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

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

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

Kansas - Wichita Area Soaring Association, Pat McCleave (Contact), 11621 Nantucket, Wichita, Kansas 67212 U.S.A., (316) 721-5647.

Maryland - Baltimore Area Soaring Society, Al DeRenzis (President), 5003 Wetheredsville Road, Baltimore, Maryland 21207 U.S.A., (410) 448-0808.

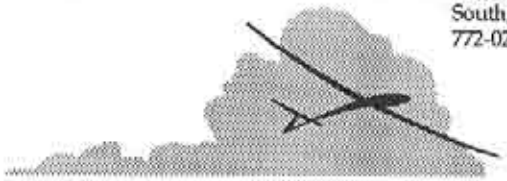
Nevada - Las Vegas Soaring Club, Steven Smith (President), 6978 Starwood Dr., Las Vegas, Nevada 89117 U.S.A., (702) 873-9591.

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

Texas - Texas Soaring Conference (Texas, Oklahoma, New Mexico, Louisiana, Arkansas), Gordon Jones (Contact), 214 Sunflower Drive, Garland, Texas 75041 U.S.A., (214) 840-8116.

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

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



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RC Sailplane Technical Journal

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87 1/2 N. Catalina, Pasadena, CA 91106

LSF

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T.W.I.T.T.

(The Wing Is The Thing)

T.W.I.T.T. is an organization of engineers, scientists, pilots, sailplane enthusiasts, model builders and many other persons having an interest in flying wing/tailless aircraft technology. Write to T.W.I.T.T., P.O. Box 20430, El Cajon, CA 92021 to find out how you can participate.

Send SASE for membership application and flyer: "What is T.W.I.T.T." or, send $2.00 for full information package including one back issue of our newsletter, postpaid. Full membership is $15.00 per year and includes twelve issues of the newsletter. Back issues of newsletter are $.75 each, postpaid.

The Vintage Sailplane Association

VSA is a very dedicated group of soaring enthusiasts who are keeping our gliding history and heritage alive by building, restoring and flying military and civilian gliders from the past, some more than fifty years old. Several vintage glider meets are held each year. Members include modellers, pilot veterans, aviation historians and other aviation enthusiasts from all continents of the world. VSA publishes the quarterly magazine BUNGEE CORD. Sample issue $1.-. Membership $10.- per year. For more information write:

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

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*.

R/C Power Duck

...from TauCom

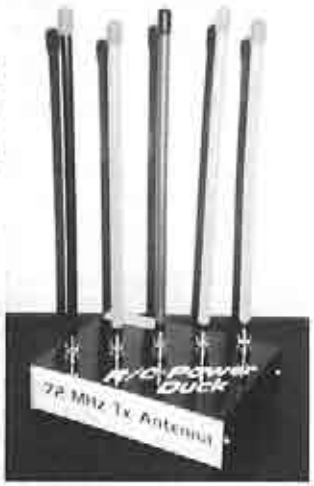
I'm excited to announce the availability of the R/C POWER DUCK. This is a rubber ducky antenna that replaces your existing telescopic antenna on your R/C transmitter. No longer will you have to deal with bent antennas, antenna crowding, and dangerous winch lines. The R/C POWER DUCK quickly disconnects from your transmitter via a BNC mount, allowing ease of transport in a case. What makes these rubber ducky antennas a step above the others, is that each antenna is individually hand-tuned to 72 Mhz to ensure the closest SWR match and highest RF output. A comparison with a competitor's rubber ducky antenna revealed almost twice the RF output with the R/C POWER DUCK, indicating that hand- tuning the antennas surpasses those made through mass production utilizing only formulas.

Some are concerned about the range of the rubber ducks in general, but a recent article by Cal Orr (*Radio Control Modeler*, January 1993) demonstrated that the rubber ducky's antenna radiation pattern was greater than the stock telescopic antenna, when the rubber ducky was pointed at the receiver. Most fliers don't realize that the stock telescopic antenna on their transmitter needs to be perpendicular to the aircraft to get the maximum range. Hence, the R/C POWER DUCK maximizes most fliers natural grip on their transmitters when flying, antenna pointing at the aircraft.

The antennas are approximately 12 inches in height, varying due to the individual tuning each one receives. The R/C POWER DUCK comes in 5 colors: black, blue, red, pink, and yellow. The BNC/chassis mount easily screws into the transmitter's antenna opening, and a pre-mounted wire is screwed to the internal antenna plate. Installation takes about 5 minutes, and currently only mounts for Airtronics radios are offered. Futaba and JR radio adapters will be available soon.

Price is $23.95, CA residents add 7.75% sales tax, $3.00 S&H. For orders or questions, contact Manny Tau at (714) 492-9553, or FAX (714) 586-8508. Also coming this summer: R/C POWER DUCKS for your R/C car transmitters on 27 Mhz and 75 Mhz. Made in California.

TauCom, 2490 S. Ola Vista, #28, San Clemente, CA 92672; (714) 492-9553, FAX (714) 586-8508. ■



Alpha Stability Program V 2.0

...from Scott's Models

The Alpha Stability Program is an aid for anyone concerned with the length of the sailplane tailboom in relation to the size of their horizontal stabilizer. The program takes into account the wing area, average chord, tail boom length, and elevator area. The result is a neutral stability center of gravity expressed in square inch of wing area back from the leading edge of the wing and a stability factor. The program will work with any size model Glider. The program has been applied to indoor hand launch as well as 1/4 scale R/C gliders. The real advantage to some is the ability to take an existing wing and fuselage and design the correct elevator in area and size with a given center of gravity on the wing. The program will either calculate the elevator area or the center of gravity on the wing. The program is meant for those who want a closer center of gravity point other than 1/3 of wing area back from the leading edge. The program is written for IBM 286 or better, and requires a mouse. A math co-processor is not needed. The price is $15.00 which includes mail cost and documentation. For further information, please contact Scott's Models at (805) 822-7994. ■

Just Plane Fun Models

...from Buzz Waltz

Buzz Waltz of Buzz Waltz R/C Designs and Manufacturing is pleased to announce the formation of his new model sailplane distributing company - "Just Plane Fun Models".

"Just Plane Fun Models" will carry the complete line of B.W.R.C. sailplane kits, from a 55 inch hand toss to a 118 inch unlimited class, manufactured and sold direct to hobby shop dealers.

Starting out the new company line will be the return into production of two legendary sailplanes originally designed by Buzz Waltz, "Big Birdy" and "Soar Birdy". Although these two sailplanes are not new to the industry, they are now re-designed and are being manufactured to today's launching and flying standards. Thousands of pilots learned to fly on the "Soar Birdy" and many a contest has been won around the world with the "Big Birdy".

All kits will feature full-size, easy to read instructions and plans, strong spruce I-beamed spar systems, 1/4" hardened steel wing joined rod and ply/balsa fuselage and stab construction.

Other kits to come in the near future will be "Little Birdy", a 55 inch slope, 1/2A duration or hand toss. The "Conquistador" will be a 118" unlimited, and "Predator", a 78" aileron slope trainer.

For further information, pricing, or a complete list of "Just Plane Fun" products, please write to: Just Plane Fun Models, 3390 Paseo Barbara, Palm Springs, CA 92262; (619) 327-1775. ■

ELF & Condor Fuselages

...from Viking Models, U.S.A.

Two new thermal type fuselages are now available from Viking Models, USA: ELF 2m and the 3m Condor. These new fuselages feature a bolt-on wing mount that will accommodate up to and including a 10 inch wing chord, a pull-off nose cone for easy access to your radio, and the rudder is designed in such a way that it will accommodate a conventional or T-mounted stabilizer, plus most standard radio equipment will fit into each fuselage.

3m Condor

2m Elf

The Elf 2m is 44 3/8 inches long and weighs in at approximately 7-7.5 ozs. The 3m Condor is 52 1/4 inches long and weighs in at approximately 10 - 10.5 ozs. The construction of these two new fuselages will have an outside layer of 3.16 oz. satin, crowfoot fiberglass cloth that helps to eliminate most of the pin holes, along with multiple layers of 4 oz. S-fiberglass cloth. The 3m Condor also comes with a one inch strip of unidirectional Kevlar laid in between the multiple layers of 4 oz. S-fiberglass cloth for added strength. Kevlar can also be added to the Elf 2m.

The cost of Elf 2m is $65.00, or the Elf with Kevlar is $70.00. The 3m Condor is $80.00. Shipping cost in the U.S.A. is $10.00. Texas residents please add 7.25% state sales tax. For additional information please contact Viking Models USA, 2 Broadmoor Way, Wylie, Texas 75098; (214) 442-3910, FAX (214) 442-5258. ■

2-meter SPRITE

...from Dodgson Designs

...Bob Dodgson

One of the most innovative features of the Sprite is its new fiberglass fuselage construction. It couples the single seam "MonoSeam" technique that I created for the fiberglass tailbooms in the 1970s Maestro series of multi-channel gliders. These tail booms were laid up as a single partially rolled piece, so they only needed one seam to join the two edges into a continuous cone boom. For the Sprite fuselage, this single seam technique was mated with another of our inventions - the famous "taco shell" fuselage.

We lay up the fuselage in one piece and then put one seam down the turtle deck to complete the tailboom section. The wing saddle and canopy areas are left open, since they are covered by the wing and the canopy. To complete the fuselage, we provide a pre-molded fiberglass nose top-deck that you can easily install yourself with glass tape provided with the kit and resin, or else we will install it for a $10.00 charge for the "nose job".

The wings plug together in the center section via a wing rod and a wing alignment pin. However, when the wing rod and the pin are installed, a brass fitting is slipped onto the rod and fits between the wings. Another fitting is slipped onto the alignment wings. The wing halves are now held tightly together with a rubber-band going between the halves on the wing bottom. The rubber-band is concealed inside the fuselage when the wings are in place. With the wing halves tightly together, the two brass fittings, attached to the wing rod and alignment pin, project down the wing bottom. To install the wings onto the fuselage, the projected fittings from the wing bottom slip into brass tubes mounted vertically along the centerline of the fuselage. The fitting projecting down from the wing that is connected to the wing rod, has a threaded insert in the base. The tow hook mechanism contains a threaded shank that extends upwards through a hole in the bottom of the fuselage and bolts into the fitting connected to the wing rod. When the bolt is tightened up, the tow hook is held firmly in place and is directly connected to the wing rod - yielding an ideal transfer of load directly from the tow hook to the wing spar. For transportation to the field, the wings can be left joined together and then mounted onto the fuselage with a single bolt when you arrive. On the other hand, you can totally and easily slide the two wing halves apart for extremely compact travel. This tiny package is further enhanced with the Sprite's slip off stab halves.

The Sprite's Auto CAD drawn plans show the glider set-up for flapperon control or it can also be set up with the now standard separate flaps and aileron control. The trick with the Sprite flapperon configuration is that the flaps do not go down for landing, they go up to a negative 45 degrees. The negative flapperon position provides excellent glide-path control and rapid altitude loss. With reverse aileron differential set-up, in landing mode on your computer radio, there is still quite good landing directional control in the negative flapperon position. In fact, with a little practice, you can just "pancake" the Sprite onto the spot where it instantly squats and stays put. The trick part is that the negative flapperons do not slow down the speed like positive flaps do, so you must keep your speed down on final and use the negative flaps to control the glide path. Speed-wise, they work much like spoilers. The big payoff in building the Sprite with flapperons is that you only need to put two micro servos in the wings. Even low-cost nylon servos work great with the negative flapperons and do not have the common gear-stripping problem that is common with positive flap landings. The most exciting benefit with flaperons is the several ounce weight savings that eliminating the two heavy metal-geared flap servos, pushrods, electrical leads and plugs produces!

In order to further keep the weight of the Sprite to a minimum, we use a unique adaptation of the tiny 1/32" diameter cable and sleeve pushrod system. The 1/32" diameter cable system is very light-weight and it is more trouble-free than a pull-pull system but normally the cable system has a slop problem when used in serious, tight and finely tuned competition machines. We have eliminated this problem by replacing the cable with a solid core rod of the same diameter. As a result, the elevator and rudder controls on the Sprite are "light and tight" and trouble free.

The Sprite can be flown with any radio, from a simple 4 channel to a full-blown computerized radio.

Prices:

Sprite Deluxe Kit	$155.00
Sprite Deluxe Kit with "Nose Job"	$165.00
Sprite Fiberglass Fuselage, Canopy & Nose Top-deck	$60.00
Sprite Fiberglass Fuselage with "Nose Job" & Canopy	$60.00
Shipping charge within the US for Sprite kit or fuselage	$8.00
Shipping charge to Canada for Sprite kit or fuselage	$18.00

Specifications

Wing Span	78"
Wing Area	585 in^2
Airfoil	SD7037
Wing Sheeting	Obechi
Wing Core	Precision Cut White Foam
Stab & Rudder	Built-up Construction
Flying Weight	37 oz.
Aspect Ratio	10.4 to 1
Sheeting	Obechi
Wing Loading	9 oz./sq. ft.
Fuselage Length	44" w/o Rudder
Hardware	Complete

Monocoam rolled fiberglass fuselage, canopy & nose top-deck. Fuselage cross section - sleek but roomy. Controls: elevator, rudder and a new, integrated flapperon directional, camber and reflex landing control. Only two wing servos needed. Separate flaps & ailerons are optional, for 6 servo system.

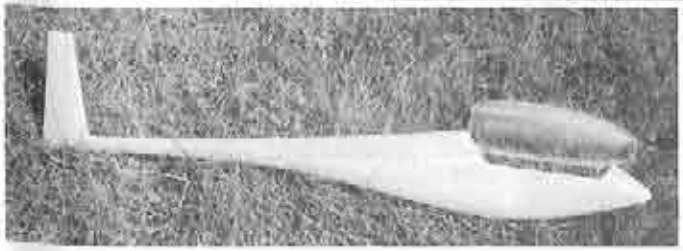
The Sprite fuselage with its top wing mounting, is an ideal fiberglass fuselage for most 2-meter wings. It can accommodate bolt-on wings or split wings. The full-sized Sprite fuselage plan sheet is included at no charge with each Sprite fuselage so that you can utilize the Sprite information on your own concoction. The Sprite wing has a 9" chord, however 8" to 9.5" root-chord wings would work great, too. The fuselage is strong and light weight, weighing under 6 oz. It has a slot in the fiberglass for the fin of your choice and shape. Without a pre-built fin, it is an ideal fuselage for a "V" tail configuration glider.

Dodgson Designs, 21230 Damson Road, Bothell, WA 98021; (206) 776-8067. We accept Visa and Mastercard. ■

ASW-19 Semi-scale Fuselage

...from ICARE Sailplanes

ICARE Sailplanes, specialized in manufacturing a full line of scale sailplane fuselages and kits, is pleased to offer this little 1:7.5 scale fuselage for the scratch builder. Made up from fiberglass reinforced epoxy, it can be optionally white gelcoated. No wing fairings are molded to the side of the fuselage, leaving it to the builder to select an airfoil. At scale, the wing span is 2m. A fiberglass canopy tray, clear canopy and building plan are included. Fuselage length is 37", recommended wing span is 80", weight= 44 oz. The regular fuselage is $65.00 and a white one is $80.00 plus S&H.



Salto H 101 Semi-scale Fuselage

ICARE Sailplanes is pleased to offer the Salto H 101, which is specifically designed for the slope from very light to medium strong winds. It is very handy and fully aerobatic; it turns four point rolls just on a pin. Using the GOE 795 airfoil, it can be flown very fast. The ailerons, which can be used as flaperons, are actuated through an easily disconnected torsion bar. The fiberglass reinforced epoxy fuselage has a high gloss white gelcoat. The canopy is made from clear PVC. On the ARF models, the wings are obechi sheeted foam, with fiberglass reinforcements. Leading edge, tip and root are glued on and sanded; wing joiner and aileron cable are installed; aileron is pre-routed. The built-up wing comes with all ribs pre-cut. The V-Tail is made from 3/16 balsa stock. The kit comes complete with all hardware, building plan, instructions and a parts list. Wing span: 53"; wing area: 210 sq. in.; weight: 26 oz.; wing loading: 12 oz./sq. ft.; built up wing kit is $89.00, ARF kit is $129.00. For a full catalog of all products, send $1.00 to ICARE Sailplanes, 381 Joseph-Huet, Boucherville, Québec, Canada, J4B2C5; (514) 449-9094 5:00 PM - 10:00 PM EST. ■

Voltz Servos

...from Greco Technologies

There is an increasing demand for small yet strong servos for todays sailplanes. Many sailplanes have very thin wing profiles and hand-launches and other small planes can only use the micro servos. The Germans have recognized this problem and use Volz servos. We have contacted Volz Modelbau and are importing these servos for our customers.

The Mini-Star II and the Micro-Star II servos, with their all metal gears, withstand even the hardest use. High quality components such as five pole motors, first class potentiometers, top quality amplifiers and ball bearings on the output shaft all combine to make extremely reliable servos. Volz also offers a five year warranty on the all metal gear train of the Star-Servos.

The Micro-Star II is a very popular servo widely used in Europe. It comes with high quality potentiometers with four sliders. This design offers high reliability. This servo also features a narrow profile which helps satisfy installation requirements of aircraft with thin wings and fuselages. With a torque of 1.8 kg/cm, the Micro-Star II has the ability to perform well in almost any application, even under the high stresses of F3B. Peter and Klaus Kowalski used Micro-Star IIs in their 'Spark' designs, including Klaus's model which broke the world speed record at 149 mph. The fastest lap was at speeds in excess of 180 mph, where these servos were definitely put to the test. Nick Wright who has been on several British F3B teams also uses them for his F3B models.

Mini-Star II is the slightly larger and very powerful version of this compact servo. With its compact size, the Mini-Star II can be used in small models, although its strong torque of 3.1 kg/cm makes it strong enough to work even in larger size models.

The McMini and McMicro servos are also built with the same attention to detail. The main difference is they have all metal gears with a plastic final gear.

The striking blue cover of Volz servos not only looks nice but is strong and functional as well. The covers are impregnated with fiberglass for added strength. They also come with additional mountings for horizontal fitting. These additional fixtures are placed at the center of the servo so they can be used from both sides. This feature makes them perfect

for mounting the servos in the wings. Special mounting trays can be purchased for both the Micro and Mini sizes of the servos, for even easier mounting and removal.

For more information about Volz servos or any of Greco's other products please write to P.O. Box 10, South Pasadena, CA 91031; call (213) 680-2070, from 8:30 am to 5:30 pm M-F PST; or fax (213) 344-8166 any time. ■

Saturn 2.9T Improvements

...from Layne/Urwyler

Since we introduced the Saturn 2.9T in October of 1992 it has far exceeded our design goals for a different type of Open Class sailplane. With its distinctive T-Tail and European looks it has caught on nicely. This is evidenced by the thermal contest wins that have been garnered by Saturn owners during the past year.

During this time period we have not rested on our laurels, but have taken some of the ideas from flyers and mixed them with some of our own to put together a redesigned Saturn. We retain the same high quality, light weight epoxy/glass/kevlar fuselage; but with some changes in the stabilizer design. The Saturn will still sport a bolt-on stabilizer, but with a conventional elevator instead of the full flying stabilizer. This change provides a more positive pitch control and with less elevator/servo throw required.

Now for the really good news; because of the reduced manufacturing costs we have decided to pass this reduction along to the buyer by lowering the price of the Saturn. Effective immediately the standard kit will be $199.00, and the pre-sheeted obeche version will cost $299.00. Such a deal! Layne/Urwyler, 1808 Applegate Dr., Modesto, CA 95350; (209) 529-8457, FAX (209) 549-1642. ■

Schedule of Special Events

Date	Event	Location	Contact
Oct. 9	Team Thermal Duration Contest - T.O.S.S. - First Annual	Paramount Ranch, CA	Mike Reagan (805) 529-5513
Oct. 9-10	5th Annual MASS Fall Soaring Tournament	Memphis, TN	Bob Sowder (901) 757-5536
Oct. 10	Annual Dual Elimination	Dallas, TX	Jim Truitt (214) 348-2929
Oct. 16	Open	San Antonio, TX	Jerry Caldwell (210) 438-4077
Oct. 16	TULSOAR 12th Last Fling of Summer	Tulsa, OK	Sandy Hay (918) 665-8069
Oct. 16-17	2M & Unlimited Pelicans	Morriston, FL	Bob Wargo (813) 938-6582
Oct. 16-17	Fall Speed Festival Hosted by Torrey Pines Park - C.S.R. Unlimited/TPG 60" class	Southern CA	Steve Condon (619) 565-4361
Oct. 17	TULSOAR 2M & Unlimited	Tulsa, OK	Perry Gilstrap (918) 455-5490
Oct. 24	TULSOAR Fun Fly	Tulsa, OK	Mike Stephenson (918) 445-3002
Oct. 31	G/Lady Special Buzzards	Orlando, FL	Ed White (407) 321-1863
Nov. 7	610, 612 DEAF Dallas Electric Aircraft Flyers	Dallas, TX	Jack Hamilton (214) 348-4669
Nov. 13	TPG 60" CL Slope Race	Southern CA	Charlie Richardson (619) 630-8775
Nov. 14	Task T6 Triathalon	Dallas, TX	Chuck Fisher (214) 270 2634
Nov. 28	TULSOAR Fun Fly	Tulsa, OK	Doug Drullinger (918) 838-0282
Nov. 20	2M, Open	San Antonio, TX	Gene Warner (210) 732-3101
Nov. 20	New England R/C Soaring Convention	Portland, ME	Steve Savoie (207) 929-6639
Nov. 20/24	Slope & Thermal Scale Fun Fly	Southern CA	Scott Condon (619) 471-2453
Nov. 21	5th Annual MASS Turkey Shoot	Memphis, TN	Mike Kelly (901) 756-9410
Nov. 26-28	Variety Buzzards	Orlando, FL	Cy Baylor (407) 699-8750
Nov. 29/Dec. 1	Tangerine Soaring Championships 2m, Unlimited, Scale	Orlando, FL	Jim Smith (407) 851-0679
Dec. 26	TULSOAR Fun Fly	Tulsa, OK	Corey Gilstrap (918) 455-5490
May 28-June 5	World Soaring Jamboree	Richland, WA	Wil Byers (509) 627-5224
June 24-26	Mid-South Soaring Championships	Memphis, TN	Bob Sowder (901) 757-5536

** For more information about the Inland Empire Soaring Society, contact Al Lies, 1321 S. Rotchford Rd., Veradale, WA 99037.

***Additional information on the contests listed in Europe is available from *SOARER*, a British publication. Jack Sile, Editor, telephone 0449-675190 Suffolk, England.

Press Release

New England R/C Soaring Convention

The DownEast Soaring Club is pleased to announce the establishment of the first **New England R/C Soaring Convention**. This special event will take place **Saturday, November 20th at the Sheraton Tara Hotel, Portland, Maine**. The cost for this one day event is just $20, which includes a luncheon buffet. The day will conclude with the awarding of the door prizes donated by our many sponsors. Don't forget to bring a plane because on Sunday we'll get together for a hearty breakfast and spend the day flying. Slope or thermal, we'll let the weather decide. We believe our choice of speakers will satisfy most everyone's interest.

Paul Cousins - New England Weather Patterns And Their Effects On Thermal Generation

David Garwood - An Introduction To Slope Soaring

Rick Roelke - Hand Launch Glider Construction And Flying Techniques

Stan Eames - The R/C Soaring Industry, Behind The Scenes Of Distribution And Kit Development At N.S.P.

Dennis Phelan - Why Everyone Should Try F3B

Terry Sweeney - Mirco HLG, Construction Of A 4 oz. R/C Hand Launch Glider

Airtronics - The Parallel Evolution Of Computer Radios And Modern R/C Gliders

This event is co-sponsored by N.S.P., Airtronics, DownEast Soaring Club, and The Maine Model Club Association.

Come join us for this special event. Portland is only 2 hours from Boston and 20 minutes away from Freeport, Maine. Freeport is the home of over 121 discount shopping outlets, including the famous L.L. Bean. The Maine Mall, across the street from the Sheraton is fully enclosed and offers 134 stores and outlets. So, why not bring a friend and do some Christmas Shopping. An information packet (including details on discount overnight accommodations) can be forwarded upon request. So don't wait, seating is limited and reservations are required by November 8th. To make your reservations **now**, send a Check or Money Order (payable to "DownEast Soaring Club") to: Steve Savoie, RR#3 Box 569, Gorham, ME 04038; 207-929-6639. Or, Jim Armstrong, RR#1 Box 27, Topsham, ME 04086; 207-725-5758.

Steve Savoie,

Secretary DownEast Soaring Club

Press Release

The Third Annual Mid-South Soaring Championships

The Third Annual Mid-South Soaring Championships will be expanded to a **THREE DAY EVENT** and will be held in Memphis, Tennessee beginning Friday, **June 24, 1994**, with **Hand Launch Glider** and a **Cross Country Race!** Two days of **soaring duration events** are scheduled for Saturday and Sunday, June 25th and 26th.

R/C Soaring Digest will, for the third consecutive year, co-sponsor the event and set up an on-site trade show. The trade show features well known manufacturers, vendors and suppliers and is an extremely popular feature of the Mid-South Soaring Championships.

The Memphis Area Soaring Society (MASS) and the North Alabama Silent Flyers (NASF) will again combine resources to sponsor the largest three day soaring championship contest east of the Mississippi River in 1994.

Cross Country racing on Friday, June 24, will be just across the state border in Mississippi on flat delta land. The course will be set up for those in need of the LSF Level V goal and return, although it will most likely exceed 10K in total length.

Hand Launch glider will be held early Friday afternoon at the MASS soaring site. Sport flying will be open on Friday to anyone who does not have a frequency conflict with the Hand Launch contestants.

Saturday and Sunday will be separate events with awards presented on both days to the top Junior, Novice, Sportsman and Expert flyers. Announcements and flyers will be mailed in April, 1994 to all previous contestants.

The 1993 Mid-South Championships held in Huntsville, Alabama drew approximately 100 contestants from 19 states. We anticipate the 1994 event to grow significantly when it returns to Memphis in June, 1994!

Bob Sowder, Memphis Area Soaring Society
(901) 757-5536 - FAX (901) 758-1842

Poker Soaring

...by Al Sugar
Carrollton, Texas

Poker Soaring is a small soaring club's elimination type contest that employs an open line for launching, with a strong desire to participate willingly (i.e., sandbagging can get you into trouble)!

Frequency control is the same as for sport flying with a marker pin; the pilot must pick up before he can turn on. If the pilot is not timely, he must go back to the end of the launch line.

Launch equipment shall be the 100 meter system. (Suggest having 2 or 3 systems set up; they are quite manageable because of their shortness.)

Playing cards can be used for drawing up the first flight order. (The short one minute task will handle any small delay due to frequency conflict during the first flights.) If the contest is larger than 12 fliers, hearts and diamonds can be used to decide which hand the pilots will be playing (i.e., hearts are for the flying group, and diamonds are for the timing group for the first "hand"). Obviously on the second "hand", the roles are reversed. By using all suits, up to 52 pilots of 4 playing hands can be used; however, this is really bigger than the scope that I am trying to present.

This is an elimination match where 2 consecutive flights that have not accomplished the task causes the flier to drop out of the hand that he is in; those left go on to larger tasks.

The first task is a one minute duration. The first pilot that has successfully completed 3 flights of that time without having 2 failures in a row now has the timing option to change the task to 1 and 1/2 minutes before his next flight. His next flight has a mandatory 1 and 1/2 minute task, and he will invoke this task on all the other pilots in the "hand" regardless of their status. This means that they could be in the air halfway through their 1 minute task, only have one flight in and, when the blast horn sounds, they have just had 30 seconds added onto their task. The next flier to accomplish 3 each of 1-1/2 minute flights can utilize the same timing option to change the task to 2 minutes. This goes on until the last pilot eliminates himself by increasing his task until the inevitable 2 failures occur. The winner is... the flier with the most max's, which may not be the last survivor.

For clarity, when 3 tasks have been successfully accomplished by any one flier, the next task will be 30 seconds of increased duration. The flier that has accomplished that set of flights has a time period before his next launch to inform everyone that their "max" task has been increased again by 30 seconds whether in the air attempting to complete the old task, or on the ground. He can use this to his advantage, otherwise the next flier to get the 3 tasks done will be the one with the advantage opportunity. The scoring will be 3 or less of each task time. Example: 4 each 2 minute flights equals 3 each 2 minute flights, and one failure of the new required 2 and 1/2 minute task by flying only 2 minutes. Ties will be broken by subtracting failures to max from the scores. ■

12TH Annual
LAST FLING OF SUMMER
October 16 & 17
Blue Springs Sod Farm
(160 Beautiful Acres!)
SE of Broken Arrow, Oklahoma
Expert & Sportsman
2 Meter & Unlimited
AMA License/Gold Stickers Req.
Rahm 12 Volt Winches & E-Z Mechanical Retrievers
Awards, Raffle, & Prizes
BBQ Sat. Nite Included in Entry Fee
Restrooms on Site
Entry Fee: $25.00
For both classes both days
Contact: Sandy Hay (C.D.)
(918) 665-8069 Home
(918) 838-9961 Work
Please try to pre-register by October 11 to avoid any contest delay!

NASSA Scale Soaring T-Shirts

Printed in black, violet and teal blue on white 50/50 short sleeve T-shirt with pocket.
Front has NASSA logo on pocket.
Back has design shown above!
Join NASSA with order ($10.00/year) and get membership discount!

Order Form

Membership (Optional)	$10.00	
Member - Cost/Shirt	$11.00	
Non-member Cost/Shirt	$13.00	
XXL Additional Cost/EA	$1.50	
Shipping (See Chart)		
Total (Check of M.O. US Funds)		

Please indicate # & size of T-Shirts
___M ___L ___XL ___XXL

Name _____
Address _____
_____

Shipping Chart (Each)

U.S. (1st class)	$3.00
Canada/Mexico (Air)	$3.00
Overseas:	
Europe (Air)	$6.00
Africa/Pacific Rim (Air)	$7.00
or Registered Airmail	
Overseas	$8.50
or Surface Overseas	$3.00

(Please allow 3-4 months delivery by surface)

Please return to: NASSA, P.O. Box 4267, W. Richland, WA 99352

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105 N.E. 61st #12
Portland, OR 97213
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Classified Advertising Policy

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

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.

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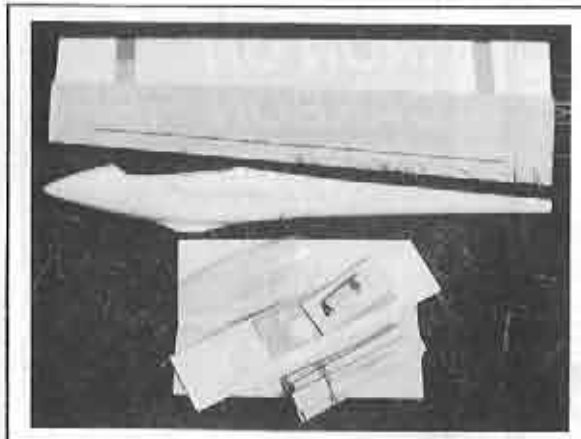

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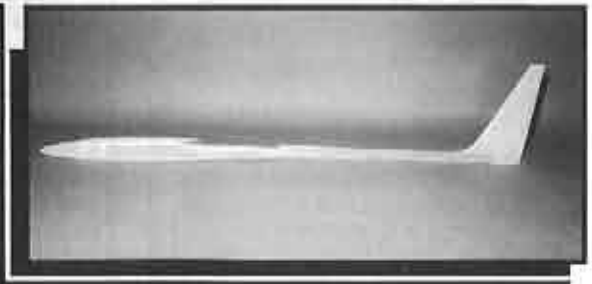

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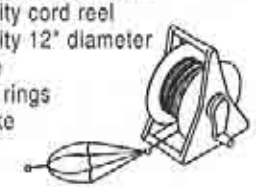

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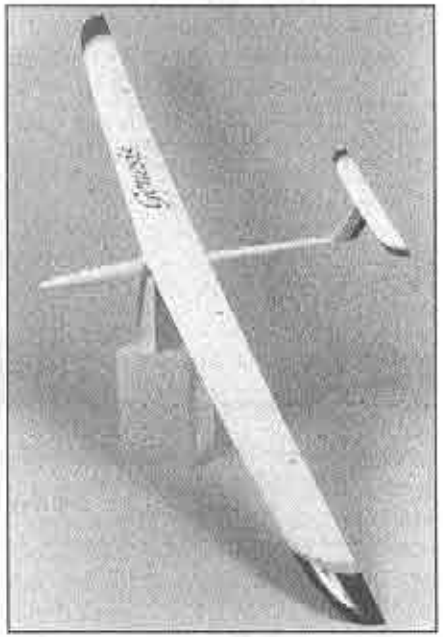

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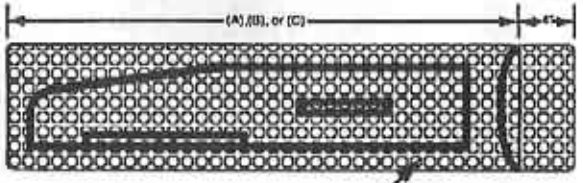

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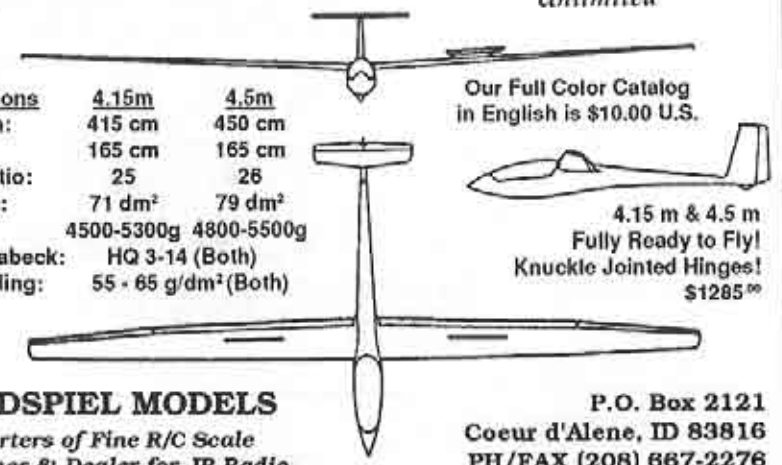

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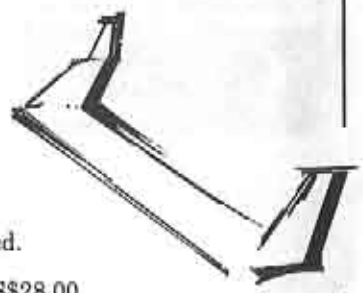

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WING SPAN	55 3/8 inches
LENGTH O.A.	33 inches
WING AREA	311 sq. inches
WEIGHT RTF	24 to 27 ounces
WING LOADING	11.1 TO 12.5 oz./sq. ft.
AIRFOILS	MOD. SD8000/SD7003
PRICE	$300.00

The ULTRA GP is an advanced aerobatic slope soarer. It is outstanding in speed and roll rate. The molded wings ensure consistency and repeatability of performance. The wings are driven directly without drive pins running in fuselage slots. Larger than normal throw volume is available to the pilot. The Ultra GP tracks smoothly and has gentle stall characteristics. The airframe has been engineered to survive the rigors of slope flying. The Ultra GP is an exceptionally durable performer.

OAKLAND MODEL ACADEMY
650 E.17 St. #14
Oakland, CA 94606
(510) 839-0436

BANSHEE **A No-Compromise Competition 2 Meter from Agnew Model Products!**

LSF NATS WINNER!

1st Place 2-Meter, 1st Place Standard
3rd Place Unlimited, Best Overall Performance
Highest Point Score Any Class

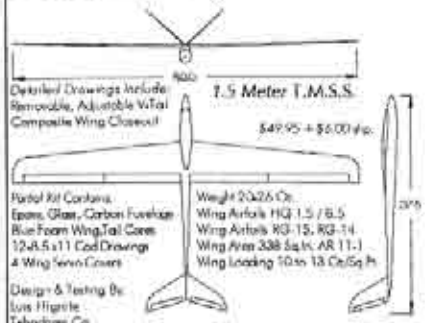
Kit: $275.00 + $12.50 S&H

Banshee is a clean, stable 2M design capable of excelling in all conditions. Uses the E387 for excellent dead air performance complimented by the ability to carry ballast in heavy winds. Banshee is a very forgiving design equally at home in the hands of the intermediate or advanced soaring pilot.

Kit Features - Pre-sheeted wings w/polyhedral pressed into each panel, pre-sheeted stabs, high quality fiberglass fuse & canopy, all hardware, detailed building and flying instructions, root rib pre-glued, ailerons and flaps pre-cut, robust 9/32" Dave Squires' rods for zoom launching. 80% complete out of box.

Agnew Model Products, 166C Springwood Circle, Longwood, FL 32750; (407) 260-6223

Sailplanes from.....The Scott's Models Hanger



1.5 Meter T.M.S.S.

Detailed Drawings Include Removable, Adjustable V-Tail Composite Wing Closeout

$49.95 + $6.00 shp.

Partial Kit Contains: Epoxy, Glass, Carbon Fuselage Blue Foam Wing,Tail Cores 12-8.5 x11 Cad Drawings 4 Wing Servo Covers

Weight 20-26 Oz. Wing Airfoils HQ 1.5 / 8.5 Wing Airfoils RG-15, RG-14 Wing Area 338 Sq.In. AR 11-1 Wing Loading 10 to 13 Oz/Sq.Ft.

Design & Testing By: Luis Higuera Tehachapi,Ca.

1.5 Meter HL T.M.S.S

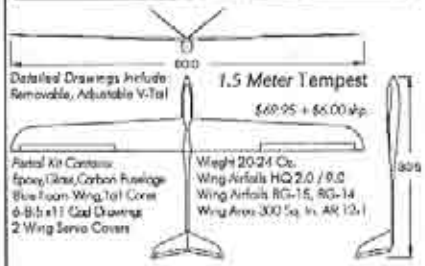
Detailed Drawings Include Removable, Adjustable V-Tail Composite Wing Closeout

$59.95 + $6.00 shp.

Partial Kit Contains: Epoxy, Glass, Carbon Fuselage Blue Foam, Wing, Tail, Cores 12-8.5 x11 Cad Drawings

Weight 16-22 Oz. Wing Airfoil SD 7037 Wing Loading 7-10 Oz./Sq.Ft. Wing Area 342 Sq.In. AR 10.5-1

All fuselages are designed to fit a standard "AA" battery pack and seven channel receiver



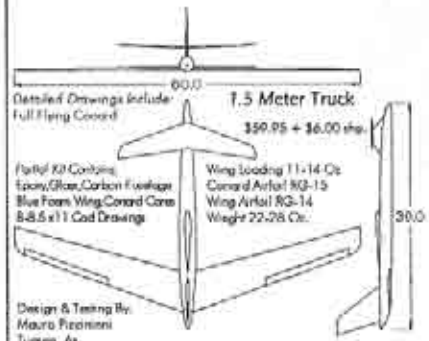
1.5 Meter Tempest

Detailed Drawings Include Removable, Adjustable V-Tail

$69.95 + $6.00 shp.

Partial Kit Contains: Epoxy,Glass,Carbon Fuselage Blue Foam Wing,Tail Cores 6-8.5 x11 Cad Drawings 2 Wing Servo Covers

Weight 20-24 Oz. Wing Airfoils HQ 2.0 / 9.0 Wing Airfoils RG-15, RG-14 Wing Area 300 Sq. In. AR 10-1



1.5 Meter Truck

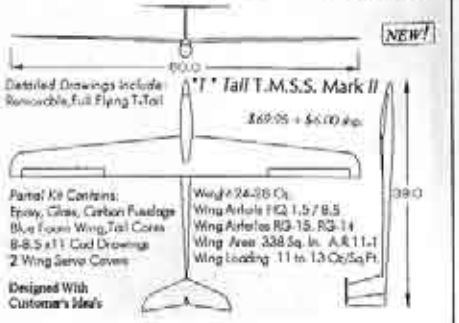
Detailed Drawings Include Full Flying Canard

$59.95 + $6.00 shp.

Partial Kit Contains: Epoxy,Glass,Carbon Fuselage Blue Foam Wing,Canard Cores 8-8.5 x11 Cad Drawings

Wing Loading 11-14 Oz Canard Airfoil RG-15 Wing Airfoil RG-14 Weight 22-28 Oz.

Design & Testing By: Mauro Piccinini Tucson, Az.



NEW!

"T" Tail T.M.S.S. Mark II

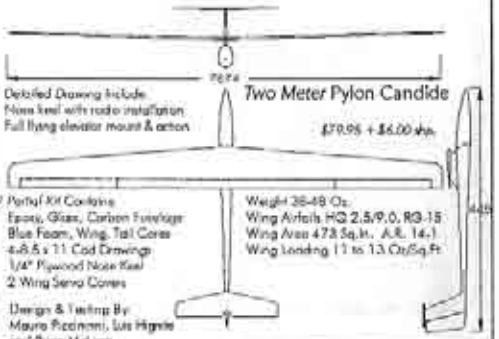
Detailed Drawings Include Removable,Full Flying T-Tail

$69.95 + $6.00 shp.

Partial Kit Contains: Epoxy, Glass, Carbon Fuselage Blue Foam Wing,Tail Cores 8-8.5 x11 Cad Drawings 2 Wing Servo Covers

Designed With Customer's Ideas

Weight 24-28 Oz. Wing Airfoils HQ 1.5 / 8.5 Wing Airfoils RG-15, RG-14 Wing Area 338 Sq. In. A.R 11-1 Wing Loading 11 to 13 Oz/Sq.Ft.



Two Meter Pylon Candide

Detailed Drawing Include Nose keel with radio installation Full flying elevator mount & action

$79.95 + $6.00 shp.

Partial Kit Contains: Epoxy, Glass, Carbon Fuselage Blue Foam, Wing, Tail Cores 6-8.5 x 11 Cad Drawings 1/4" Plywood Nose Keel 2 Wing Servo Covers

Weight 38-48 Oz. Wing Airfoils HQ 2.5/9.0, RG-15 Wing Area 473 Sq.In. A.R. 14-1 Wing Loading 11 to 13 Oz/Sq.Ft.

Design & Testing By: Mauro Piccinini, Luis Higuera and Brian McLean

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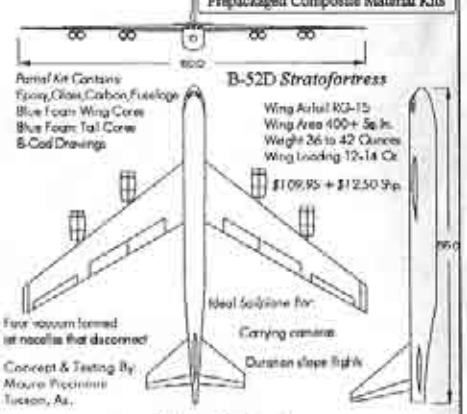

B-52D *Stratofortress*

Partial Kit Contains: Epoxy,Glass,Carbon,Fuselage Blue Foam Wing Cores Blue Foam Tail Cores 8-Cad Drawings

Wing Airfoil RG-15 Wing Area 400+ Sq.In. Weight 36 to 42 Ounces Wing Loading 12-14 Oz

$109.95 + $12.50 Shp.

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Concept & Testing By: Mauro Piccinini Tucson, Az.

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Vacuum formed Wing Servo Covers w/Drawing.....*$3.00*

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- Airfoil -SD7037.
- Flying wt - 37 oz.
- Sheeting - Obechi.
- Wg Loading - 9 oz/in²
- Groundbreaking ***MonoSeam*** rolled fiberglass fuselage.
- New, integrated-flapperon directional, camber and reflex landing control 4 servo glider!
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"The AVION"

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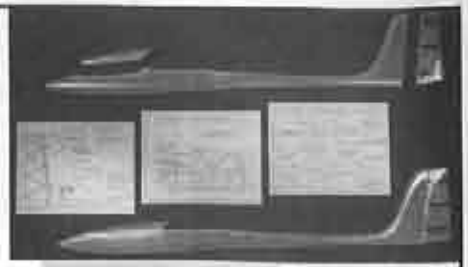

*The **AVION** is a small lightweight epoxy glass sailplane fuselage. The **AVION** is reinforced full length both sides with 1.7 oz. kevlar. The **AVION** can be used as an optional glass fuselage for a number of popular built-up fuselages, outdated glass fuselages or your own new handlaunch or slope sailplane design.*

***Specifications:** Length w/ rudder: 35.5"; Width at widest point: 1.3"; Weight: 3.5 oz.. The AVION features a molded fin and is designed with a pull-pull rudder system. The AVION accomodates bolt-on wings with a 7"-8" root chord between 59"-72" length.*

***Capacity:** Up to 4 micro servos; micro receiver; up to 600 mah battery; switch harness.*

Some of the small sailplane wings that the AVION glass fuselage will accomodate include the: Orbiter, Skeeter, Dove, Sparrow, Gnome, Vertigo, Chuparosa, Thermal Grabber.

*Price is **$65.00** US. Price includes a fiberglass canopy and CAD drawings showing the emmpanage and fuselage construction and the electro-mechanical control system.*

OPTIONS:
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FANTASQUE

SD-3016 ROOT SYMMETRICAL TIP

C.A.L. LOADING		SPAN	115
4 LBS.	8.20 OZ.SQ.FT.	LENGTH	67.2 INCHS
5 LBS.	10.25 OZ.SQ.FT.	HIGTH	15.2 IN.
6 LBS.	12.30 OZ.SQ.FT.	TOTAL AERA	9.91 SQ.FT.
7 LBS.	14.36 OZ.SQ.FT.	C.A.L.	7.8 SQ.FT.

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- Vacuum Bagged Composite Wings Featuring Blue Foam Cores Fully Sheeted With Carbon Fiber And Glass Cloth
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The Renegade is the new "Bad Boy" on the Slopes of California, sporting a blatant disregard for anything in its way. This Rock n' Roll plane is designed to win slope races (and does!) in the new 60" span racing class. The RG-15 airfoil gives the Renegade a blistering speed range and the ability to carry a massive ballast load if needed. Its flaperon system cranks the plane through high-G pylon turns with little energy loss. Don't let Renegade's bad attitude scare you off because it is very stable at all speeds and has remarkable flight tilt flying ability. This rugged plane gives you big plane speed at a small plane price.

Fly with an attitude, fly a Renegade.

Specifications

- Airfoil: RG-15
- Wing Area: 420 sq. in.
- Wing Loading 13.0-22.0 oz. per sq.ft.
- Two Channel: Flaperon / Elevator

Designed by Charlie Richardson © 1993
Distributed by C.R. Aircraft Models

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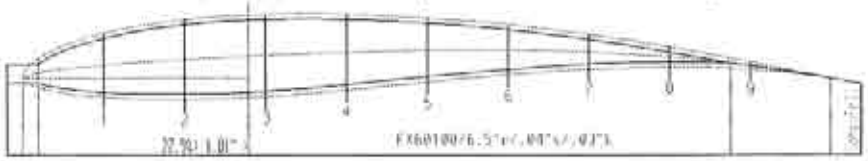

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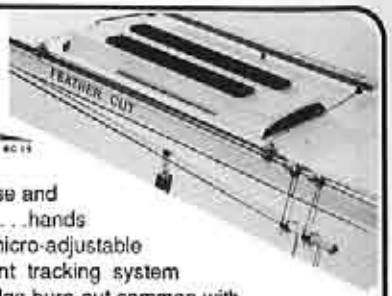

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VECTOR
FROM...McLean's Models

The Vector is an all composite 2 Meter sailplane designed for high performance slope soaring and slope racing. The use of pivot wing technology, a streamlined fuselage, full flying stabilizer, and rudder results in an extremely fast and efficient sailplane. The Vector is also available with 90" wings for unlimited slope racing and light lift cruising. The Vector finished 2nd place at the Miguelito Canyon CSR race on March 2, 1993 in the 2 Meter division. The Vector took two firsts and a second in three heats.

Vector Deluxe Kit includes:

• Vacuum bagged wings with 100% carbon fiber wing skins, fiberglass outer layers, kevlar leading edge, PRB blue foam cores • Fiberglass fuselage with uni-S-glass and kevlar reinforcement, glass canopy, airfoil shaped vertical fin • Deluxe hardware kit containing 3/8" steel wing rod, heavy duty wing drive assembly, pre-cut 1/4" plywood for wing roots and servo tray, wing pivot hardware, 5/32" steel wing drive pins and misc. wood, brass tubes, wires, etc. • PRB blue foam SD 8020 stabilizer cores or optional composite stabs • Full size drawings and construction manual.

Specifications		Prices	
Wing span	2 M - 90"	2 Meter Kit	$219.95
Wing area	450 - 560 Sq. In.	90" Kit	$229.95
Wing airfoil	SD-7003 or S-6062	Partial Kit	$89.95
Wing loading	14 - 16 Oz./Sq. Ft.	Hardware Kit	$29.95
Wing aspect ratio	13.5 - 14.0 to 1	Composite Stabs	$19.95 (w/kit)
Fuselage length	45 inches		
Stabilizer area	65 - 72 Sq. In.		

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MICRO STAR II

All precision metal gear and ball bearing. Powerful, lightweight solves installation problems in narrow wings. With a torque of 1.8 kg/cm @ 4.8v it has the ability to perform well in almost any application. Weighs 18 grams with a transit time of .17 sec/45°.

Retail: $91.00
Special: $55.12

MINI STAR II

All precision metal gear and ball bearing. Offers up a powerful 3.1 kg cm @ 4.8v. Weighs 32 grams with a transit time of .10 sec/45°.

Retail: $76.00
Special: $44.25

The Micro-Star II is a very popular servo and widely used in Europe. It comes with a high quality potentiometer with four sliders. This design offers high reliability. This servo also features a narrow profile which helps satisfy installation requirements of aircraft with thin wings and fuselages. Peter and Klaus Kowalski used Micro-Star IIs in their 'Spark' designs, including Klaus's model which broke the world speed record at 149 mph. The fastest lap was at speeds in excess of 180 mph, where these servos were definitely put to the test. Nick Wright, who has been on several British F3B teams, also uses them.

The striking blue cover of these servos not only looks nice but they are strong and functional as well. The covers are impregnated with fiberglass for added strength and have additional fixtures at the center of the servos so they can be used from both sides.

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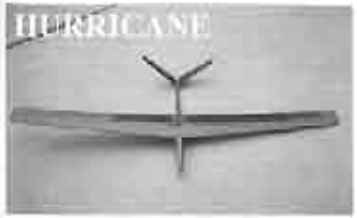

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Javelin Hand-launch Kit	$150.00	$135.00
Hurricane 60" Slope Racer	$ 80.00	NAP
F-18 Hornet Slope Glider	$420.00	$375.00
2 Meter Glider	$350.00	NAP
Greco F3B Winch	$1,500.00	$1,500.00
Greco F3B Winch Stand	$350.00	$350.00
Aluminum Belcrank w/Precision Bearing	$ 30.00	$ 25.50
Standard Towhook	$ 6.50	$ 5.53
Standard Towhook for Ballast	$ 6.75	$ 5.74
F3B Towhook	$ 7.50	$ 6.38
F3B Towhook for Ballast	$ 7.75	$ 6.59
48" long Music Wire Push-Rod	$ 5.00	$ 4.25
14mm Carbon Fiber Wing Joiner, 5 Degrees	$ 55.00	$ 46.75
1/2" Carbon Fiber Wing Joiner Rod, 0 Degrees	$ 30.00	$ 25.50
11/32" Heat Treated Steel Wing Joiner Rod	$ 17.00	$ 8.50
Hinge Tape, 10ft Roll	$ 9.00	$ 7.65
Gap Seal Tape, 10ft Roll	$ 10.00	$ 8.50
Introduction to Vacuum Bagging Wings Video	$ 30.00	$ 30.00
Mini-Star II, All Metal Gears	$ 76.00	$ 44.25
Micro-Star II, All Metal Gears	$ 91.00	$ 55.12
Mounting Tray for Micro Servos	$ 10.00	$ 9.00
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GENESIS
High Performance Thermal Sailplane

Designed by
Rich Spicer

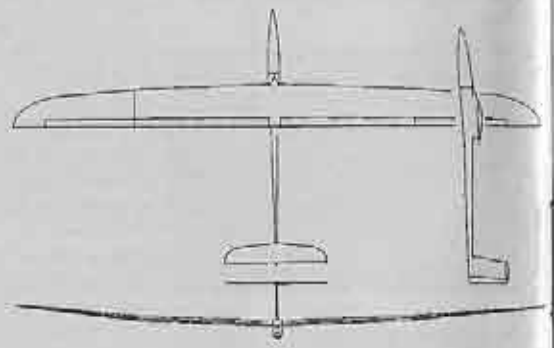
GENESIS
Features & Facts

- ★ Epoxy glass fuselage
- ★ Slip on nose cone
- ★ Molded in color, no painting required
- ★ Three piece wing
- ★ Interlocking wing panels
- ★ Integrated skin hinged ailerons
- ★ Carbon fiber composite spar
- ★ Rectangle carbon wing joiners
- ★ Servo wiring installed
- ★ Hollow core sandwich wing - high strength and low weight
- ★ Parabolic wing planform
- ★ Fast building time

The GENESIS is an all composite, high performance thermal sailplane designed for everyone from the serious contest pilot to the average sport flyer. The Genesis' design and SD-7037 airfoil give it a wide performance envelope with the ability to core the smallest thermals and max the landings! All molded parts are pre-colored. All flying surfaces are hollow sandwich construction. The fuselage features a slip on nose cone and the *RnR* exclusive molded in radio tray.

GENESIS
Specifications

Wing	
Planform:	True Parabolic
Airfoil:	SD-7037
Span:	113 In.
Area:	855 Sq. In.
Wing Loading:	11.7 Oz./Sq. Ft.
Aspect Ratio:	14.2:1
	Stab
Airfoil:	SD-8020
Span:	23 In.
Area:	84 Sq. In.



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AURA 2

2 M F3E for 10 - 27 Cells

- ★ Kevlar and Carbon Fiber Fuselage
- ★ All-Moulded Hollow Core Fiberglass Wings
- ★ Composite Stabs
- ★ SD7003 Airfoil

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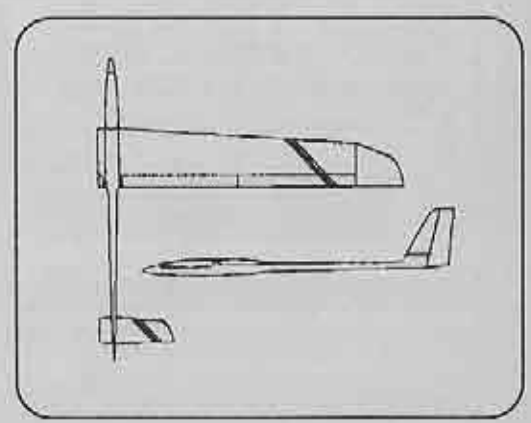
Airtronics

FALCON 880

The Falcon 880 is the most sucessful contest ship of the '90s. Beautiful handling and versitility make the Falcon a perfect plane for the pilot who wants to move up from floater type designs.



SPECIFICATIONS	
WING SPAN:	112.5 IN.
WING AREA:	860 SQ. IN.
AIRFOIL:	S3021
A/R:	14.7 TO 1
LOADING:	10.55 OZ.
WEIGHT:	63 OZ.

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Authorized **SANYO** Distributor

STANDARD	SIZE	CAPACITY (mAh)	DIA	HT	WEIGHT (oz.)	PRICE
N-50AAA	1/3AAA	50	.394	.591	0.12	$ 1.65
N-110AA	1/3AA	110	.551	.650	0.28	$ 1.50
N-150N	N	150	.453	1.122	0.32	$ 1.50
N-200AAA	AAA	200	.394	1.720	0.35	$ 1.75
N-270AA	2/3AA	270	.551	1.161	0.50	$ 1.50
N-600AA	AA	600	.543	1.945	0.92	$ 1.50
N-650SC	1/2SUBC	650	.866	1.016	1.02	$ 3.00
KR-1300SC	SUBC	1300	.866	1.654	1.70	$ 2.00
KR-1500SC	SUBC	1500	.866	1.654	1.66	$ 3.00
KR-2000C	C	2000	.992	1.929	2.47	$ 4.00
KR-4400D	D	4400	1.272	2.362	5.30	$ 7.00
KR-7000F	F	7000	1.272	3.543	8.13	$13.00
HIGH CAPACITY						
N225AE	1/3A	225	.650	.842	0.42	$ 3.00
KR600AE	2/3A	600	.650	1.654	0.77	$ 2.00
KR800AAE	AA	800	.543	1.949	0.85	$ 3.50
KR1000AE	4/5A	1000	.650	1.654	1.09	$ 2.95
KR1100AAE	7/5AA	1100	.543	2.530	1.06	$ 3.25
KR1200AE	A	1200	.650	1.909	1.06	$ 2.95
KR1400AE	A	1400	.650	1.909	1.09	$ 3.95
KR1700AE	4/3A	1700	.650	2.598	1.48	$ 4.95
KR1800SCE	SUBC	1800	.866	1.654	1.65	$ 3.50
KR2800CE	C	2800	.992	1.929	2.75	$ 5.95
KR5000DEL	D	5000	1.272	2.299	5.28	$ 8.95
FAST CHARGE						
N600SCR	1/2SUBC	600	.866	1.016	1.02	$ 3.25
N800SCR	A	800	.650	1.909	1.16	$ 3.00
N1000SCR	2/3SUBC	1000	.866	1.299	1.44	$ 3.50
N1400SCR	SUBC	1400	.866	1.654	1.87	$ 3.50
N1700SCRC	SUBC	1700	.866	1.654	1.90	$ 4.50

Specify Solder Tabs *FREE* of Charge

4 CELL RECEIVER PACKS (Flat or Square)

4N-50AAA	$ 8.95	4N-800AR	$11.95	4KR-1300SC	$11.95
4N-110AA	$ 7.95	4KR1000AE	$12.95	4KR-1500SC	$13.95
4N-150N	$ 8.95	4KR1100AAE	$17.95	4KR-1800SCE	$18.00
4N-200AAA	$ 8.95	4KR1200AE	$13.95	4N-1400SCR	$16.00
4N-225AE	$12.95	4KR-1400AE	$16.95	4N-1700SCRC	$19.95
4N-270AA	$ 7.95	4KR-1700AE	$19.95	4KR2000C	$20.00
4N-600AA	$ 8.95	4N-650SC	$13.95	4KR4400D	$34.00
4KR-800AAE	$11.95	4N-600SCR	$13.95	4KR5000DEL	$42.00
4KR-600AE	$10.95	4N-1000SCR	$15.95		

5 CELL RECEIVER PACKS

To make a 6 volt Battery Pack add the cost of a single cell to the 4 Cell Battery Pack.

CONNECTORS

FUTABA	J	$4.00	AIRTRONICS		$4.00
FUTABA	G	$4.00	JR/HITEC		$4.00

TRANSMITTER PACKS

8N600AA 8KR800AAE	1 row of 8 AA	$15.95 $20.00	8N800AA 8KR800AAE	2 sticks of 3 1 stick of 2	$15.95 $20.00
8N600AA 8KR800AAE	4 sticks of 2 square	$15.95 $20.00	9N600AA 9KR800AAE	3 sticks of 3 10.8 volt	$18.00 $22.00

GELL CELLS

6 volt	1.2 AH	$12.00	12 volt	7.0 AH	$15.00

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★ Strong, ultra light, easy building T-tailt;

★ One of the strongest and lightest airframes available in its class, producing maximum altitude on winch launches;

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SATURN 2.9T

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Modesto, CA 95350
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FAX (209) 549-1642

SPECIFICATIONS:	2.9T	2.5T
Wing Span:	113"	99"
Wing Area:	938 Sq. In.	825 Sq. In.
Airfoil:	HQ 2.0/9 - 2.0/8	Same
Weight:	65 - 72 Oz.	57 - 65 Oz.
Wing Loading:	10.0 - 11.0 Oz./Sq. Ft.	Same