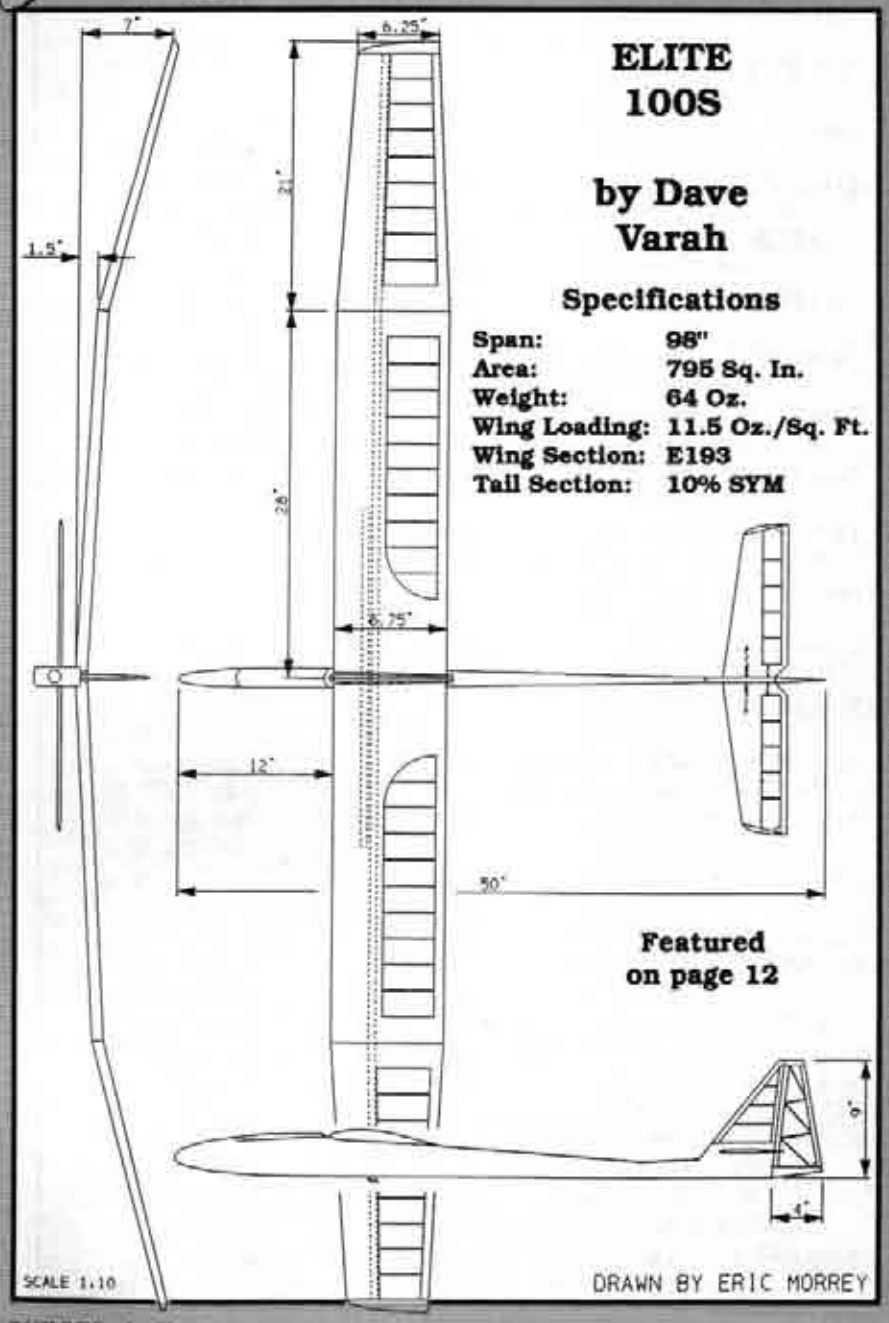
RC Soaring DIGEST

April, 1991
Vol. 8, No. 4

** Special Bonus Issue **
Contains 16 Extra Pages



ELITE 100S

by Dave Varah

Specifications

Span:	98"
Area:	795 Sq. In.
Weight:	64 Oz.
Wing Loading:	11.5 Oz./Sq. Ft.
Wing Section:	E193
Tail Section:	10% SYM

Featured on page 12

Schedule of Special Events

Date	Event	Location	Contact
Apr. 13	Slope Race	Santa Maria, CA	Rich Beardsley (805) 934-3191
Apr. 27-28	2 Meter & Unlimited - Spring Soaring Festival	Pasadena, CA	B. Matsumoto (818) 798-1662
Apr. 27-28	2 Meter & Unlimited	Orlando, FL	C. Baylor (407) 699-8750
May 5	F3b Contest	Denver, CO	Jack Sasson (303) 447-0813
May 24-26	Slope Race Mid Columbia Cup	Richland, WA	Wil Byers (509) 627-5224
May 24-26	2 Meter & Unlimited - Rabble Rally	Ocala, FL	T. Beckman (305) 252-0014
May 25-26	Thermal	Nunica, MI	Cal Posthuma (616) 677-5718
June 1-2	International Slope Race	Santa Maria, CA	Rich Beardsley (805) 934-3191
June 2	Hand Launch 8TH Annual	Riverside, CA (Call after 6:00)	Ian Douglas (714) 621-2522
June 8	Thermal	Maple City, MI	Troy Lawicki (616) 276-9696
June 8-9	Western Soaring Championships	Farmington, CA (209) 878-3462 Day	A. Stonner 878-3078 Eve
June 8-9	Invitational X-Country Great Race XV	Plainfield, IL	Lee Sheets (708) 748-8934
June 9	Summer Sailplane Classic	Tustin, MI	Mike Stump (616) 775-7445
June 22-23	2 Meter & Unlimited	Gainesville, FL	E. Wilding (904) 375-0918
June 29	MASS Nationals Soaring Warm-Up	Memphis, TN	Tony DiGirolamo (901) 756-5528
July 6-7	Unlimited Thermal	Seattle, WA	W. Volhard (206) 774-8840
July 13	Slope Race	L.A. Area, CA	Rich Beardsley (805) 934-3191
July 13-21	AMA NATS	Vincennes, IN	Gil Gauger
July 27-28	Mid-Summer Thermal	Nunica, MI	Cal Posthuma (616) 677-5718
Aug. 10	Slope Race	Davenport, CA	Rich Beardsley (805) 934-3191
Aug. 10-11	Unlimited Thermal	Seattle, WA	S. Pugh (206) 874-2429
Aug. 10-11	2 Meter & Unlimited	Lakeland, FL	F. Strommer (813) 938-6520
Aug. 24-25	2 Meter (Only) Champs - Man-On-Man	Nunica, MI	Cal Posthuma (616) 677-5718
Aug. 30-9/1	2 Meter & Unlimited	Ocala, FL	K. Goodwin (904) 528-3744

About RCSD...

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The Soaring Site

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R/C Soaring Digest
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About This Issue

As most of you know, sometimes it's hard to find information to share on the subject of soaring. But, this month, several readers took time out to send in some articles or information that has generated, in addition to the monthly columns, an additional 16 BONUS pages. We hope you like it. But, it was a real challenge to get the issue out the door on time!

As many of you know, the *R/C Soaring Digest* is prepared in Pagemaker Desktop Publishing format on a MacIntosh.

Future issues will depend on the material received and the final tallied responses to the survey. Approximately 150 out of 1300+ potential have been received in the first two weeks. Keep them coming, and thanks for all the good notes and suggestions! Thanks!

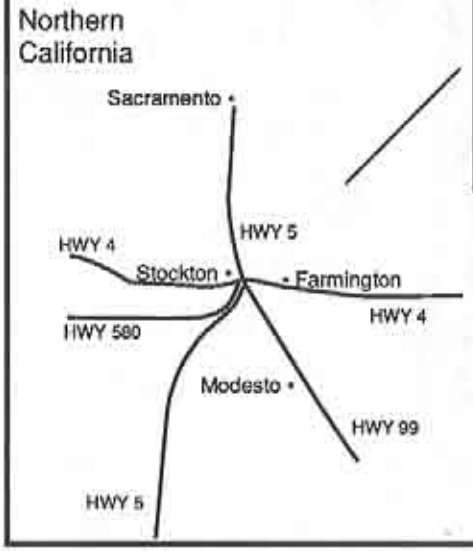
Jerry & Judy

Western States Championships

The Annual Western States R/C Soaring Championships will be held on June 8th and 9th on what we have been told is a beautiful country site in Farmington, California. The contest director, Arlie Stoner, has informed us that preparations are underway for this thermal duration event, and that the applications will be available, soon.

They are extending an invitation to manufacturers to display their wares and, in addition to a MINI-TRADE show, there will be a SWAP meet, as well! A good time to clean out the closets!

Additional information on this event can be obtained from Arlie who can be reached at (209) 878-3462 during the day or (209) 878-3078 in the evening.



!!News Flash!!

Bob McGowan took 1ST place flying A FALCON 880 in the 3RD Annual Masters of Soaring Championships at Covina, California on March 16 - 17. 2ND place went to Joe Wurtz, also flying a FALCON 880. Congratulations!

Jer's Workbench

How to Construct a One-of-a-Kind Fiberglass Fuselage

Do you want a "one-of-a-kind" fiberglass fuselage? Do you want to design your own glider? Looking for a design that will turn the heads of others as you take your creation out of the car when you come out to the flying field? Is there, in the back of your mind, a little hot spot that says, "I-have-to-build-this-one-design, but I don't want to go through the time or effort and the expense to carve a plug and make a mold that I will only use once or maybe twice and then let sit collecting dust in the back of the shop."

Solution

One solution is to construct a "free-form" or "one-off" fiberglass fuselage. All that is required is some foam, fiberglass fabric, epoxy (slow cure) and a few hand tools. (A bandsaw would be nice, but is not required.) And, of course, you need the DESIRE to construct something new.

California Orange

The first model I built I called the "California Orange". It was a V-tail slope racer, which was conceived on the back of a 5X7 index card about 18 years ago. I transferred the 5X7 drawing onto a piece of white foam using a felt pen. I didn't use any numbers. I just started drawing until it looked the way that I wanted it to look. This type of work, not using any full-size drawings or patterns, I call "free form". The plug was cut out using a hacksaw blade. It's a bit rough to do it this way, but that's OK, because the shaping is completed by block sanding with 80 grit sandpaper.

I used a thinner to dissolve the foam, and applied coats of polyester resin. However, polyester resin dissolves foam, so I had to seal and protect the foam from the polyester resin. To do this, I applied two coats of white glue and let it dry. Then, I was able to construct the fiberglass fuselage. Today, I use epoxy resin, as it is much easier to work with.

Raven 3M

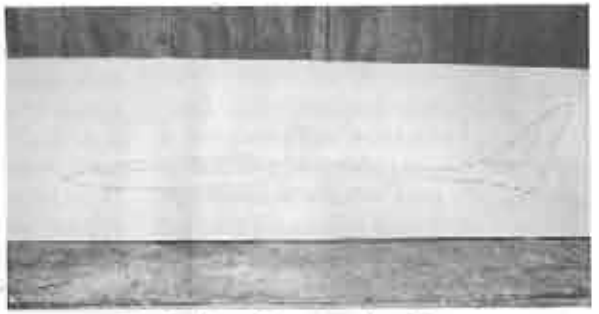
The "Raven 3M" is by Mike Smart Designs of England. Mike's original plans show an all wood built-up fuselage with some very attractive lines. It was because of these lines and curves that I chose this model to show you how I make a "one-off" epoxy fiberglass fuselage.

Everything used in making this "one-off" epoxy fiberglass fuselage can be bought over the counter. The tools used are all hand tools found in most model workrooms or shops.

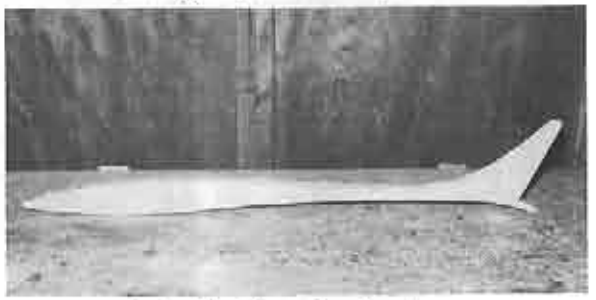
Jer's California Orange

Materials

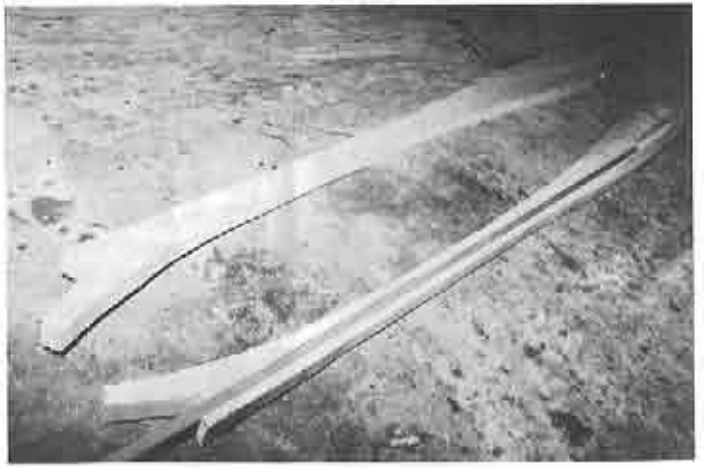
The following materials were used to make the Raven 3M "one—off" epoxy fiberglass fuselage: 2 inch blue foam, Safe-T-Poxy Resin, 5 minute epoxy, fiberglass fabric (2 oz./sq.yd.,4oz./sq.yd.,6 oz./sq.yd.),1.8oz./sq.yd. Kevlar, hacksaw blade, single edge razor blades, large sanding block with 80 grit sandpaper, small sanding block (with 150, 300, 400, and 600 grit sandpaper), 1 inch nylon paint brush, acetone (for clean up), lacquer thinner (to dissolve the foam), and a pair of sharp scissors.



Tracing from plans to make pattern.



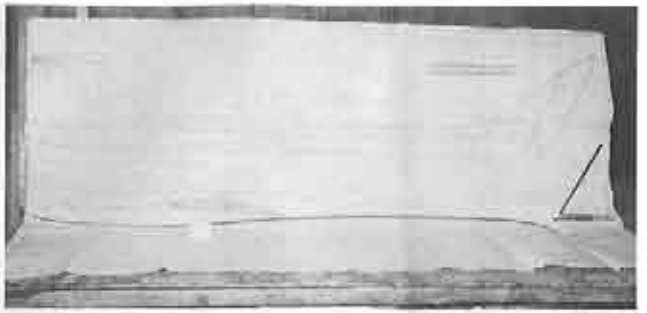
1st cutting for making the plug.



Split fuselage with stiffener and handle.

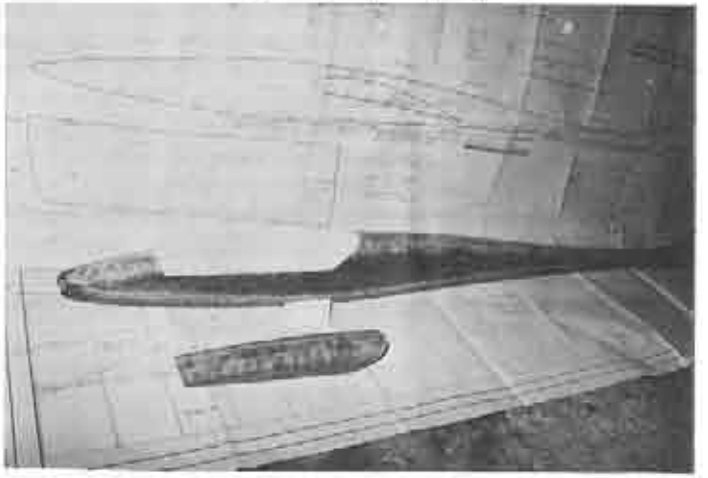
I started the fuselage by taking a tracing off the original drawings to make a pattern. This profile was transferred to the foam block. Using a hacksaw blade, I cut out the profile of the fuselage, which becomes the start of the plug. Since the plug is very flexible at this stage, it must be stiffened a bit to insure that the fuselage is straight when completed.

Having done this before, I'm going to take my hacksaw blade and remove the rudder, because it's only going to be in the way. Just set the rudder aside for now and we will come back to it later. Now, cutting from the top to the bottom, make one long straight cut from the nose to the other end or the tail. It may look like a bunch of foam scraps, but stay with me as it's going to look like something,



Sanded plug with plywood ribs and fin added.

Start of 1st layer of 4 oz. fiberglass.



Hatch removed.

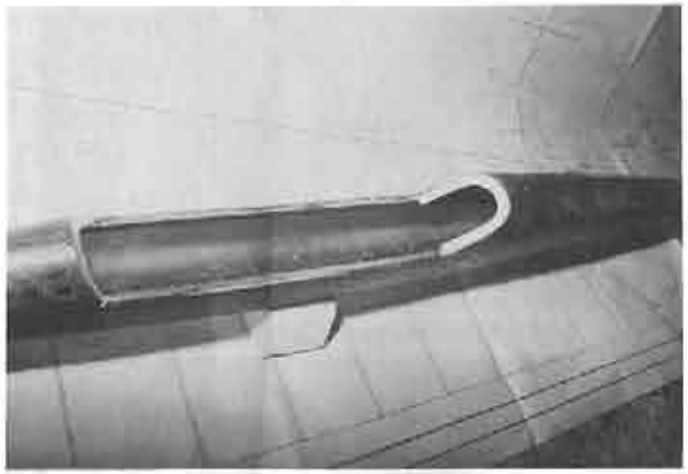
soon. Sand a grove into the center of one half of the fuselage plug and insert a 1/8 X 3/8 inch hardwood stiffener. Using 5 minute epoxy glue the stiffener in place. (Note: Let about 6 inches or so hang out past the rudder. This is your handle. Drill a small hole in the end of the handle and add a wire loop so that the fuselage can be hung up to cure.) Now, glue the two halves together with 5 minute epoxy and set aside to cure.

Back to the rudder

The rudder is cut to a thickness of 3/8 inch. Again, this piece is very flexible and requires a stiffener. 5 minute epoxy and scrap balsa will do, nicely. After this has cured, it can be sanded to its proper shape and set aside.

As you can see in the picture, I have cut a set of 1/8 inch plywood ribs and have inserted them onto the foam plug. These were marked for wing rod position and to insure a flat spot for the wings to fit onto.

Now, we can start the shaping of the plug. There is a little cutting done with the hacksaw blade, but most of the work is done by sanding with the 80 and 150 grit sandpaper. I do all the sanding that I can using a sanding block. As I near the final sanding, the rudder is glued on



Inside fuselage after the foam has been removed.

with 5 minute epoxy and, then, the final sanding is done.

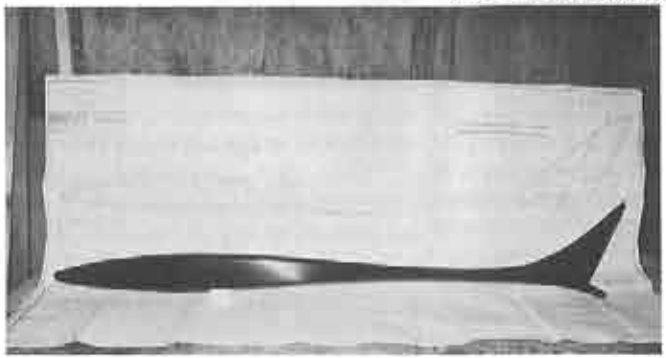
The Nose & Leading Edge

Now its time to start laying up the fiberglass. I know that the nose and the leading edge of the rudder are going to be difficult to work with, so lets cut some strips of 2 oz. fiberglass 1X3 inches will do. Brush on some epoxy around the nose and leading edge of the rudder and apply the 2 oz. fiberglass. The 2 oz. fiberglass will go around this area easily.

The First Layer

If you haven't laid up any fiberglass before you may want to work with some smaller pieces. I'm going to work with a 50 inch piece. With the plug laying on its side, I will brush on some epoxy. We will go around the edges in a few minutes. I lay on the first bit of 4 oz. fiberglass. (Don't cut the fiberglass to fit. Work with an oversized bit of fabric, as it's easier to handle.) With this first bit of fiberglass in place, take the brush and, starting in the middle, brush on the fiberglass, removing any lumps, and work to and around the edges. As I come around the edge, I can start to trim the excess fiberglass. I cut the fiberglass just past center so, when I do the other side, it will overlap. At this point I work with a very light touch because the fiberglass starts coming apart and the loose strings must be removed before the next piece of fiberglass can be applied. After the first half is completed, it is hung up to dry. Did you remember to add the wire loop? And, yes, the resin will run and drip. Don't worry. It will be removed after it cures.

After the resin has cured, additional care is required. Using the large sanding block with 80 grit sandpaper, sand off all the spikes and large deposits of resin that are on the edge of the first layer of fiberglass. Sand only the fiberglass and not the foam. After a bit of sanding, begin scraping with a single edge razor blade. This part of the project is probably the hardest part. Only after the other side has been completed can the plug be vigorously sanded and scraped.



Completed Raven 3M.

The Other Layers

After each layer or part layer of fiberglass has been applied as described above, sand and scrape each edge. Do all your sanding using a sanding block. This may sound like a lot of sanding, but it will be less work in the end.

The number of layers of fiberglass required for each type of fuselage will vary, but for the Raven 3m I applied the following:

Bits of 2 oz. around the nose and leading edge of rudder
1 full layer 4 oz.
1 part layer 6 oz. from the nose to just past the wing
Kevlar strips back half fuselage
1 full layer 6 oz.
1 full layer 4 oz.

After all the fiberglass has been applied and the sanding and scraping has been completed, drill pilot holes for the rods, cut the rudder stiffeners off, and cut out the hatch.

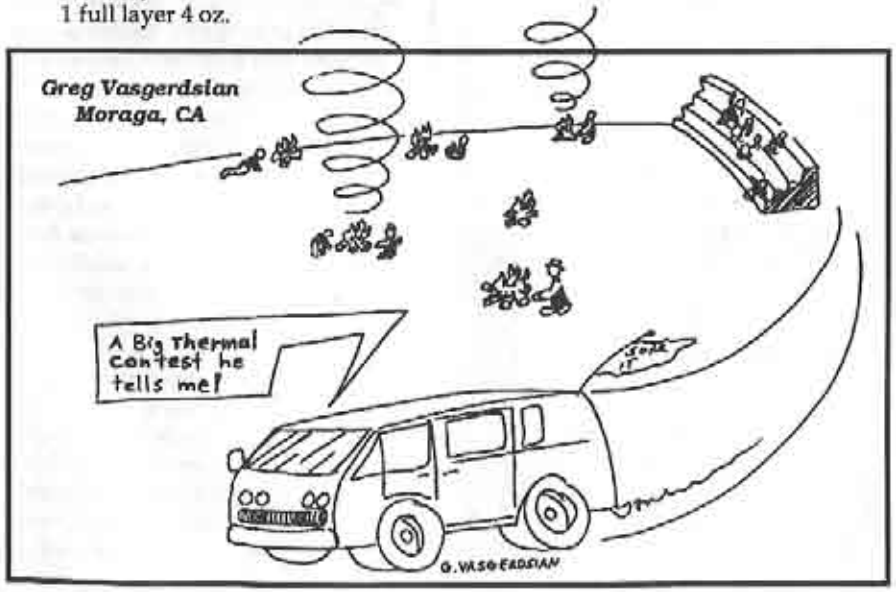
Holding the finished plug over a garbage can, pour a small amount of lacquer thinner into the hatch area and the foam will start to dissolve. After a few minutes pour this mixture out and add more lacquer thinner. Repeat until all the foam has been dissolved.

Final Finish

Now for the finish. The rough spots and pin holes are filled with spot auto putty. It can be found at the local auto paint store. Then, I applied two coats of red oxide lacquer primer followed by two coats of black lacquer.

From the first day that I started shaping the foam for the Raven 3m to the day it was painted, took a total of seven working days. What takes so much time is the time required for the epoxy resin to cure.

You too can make an epoxy fiberglass fuselage. If you have any questions, please give me a call.



On The Wing

...by B^2

FLAPS AND AIRBRAKES FOR VARIOUS TAILLESS DESIGNS

There has always been some resistance to using flaps on tailless designs. Why this is so has always puzzled us, as there are any number of flying wings, both full sized and model, which incorporate them. The YB-49 and its predecessor, the XB-35, both utilized flaps to lower landing speeds. The B-2, the "Stealth Bomber", has full camber changing capability through use of flaps controlled by a triple redundant computer system. In the model realm, it was Gene Dees' Icarosaur that pioneered the use of flaps and used the system to great advantage.

Since questions concerning guidelines for size, location, and use of flaps (and airbrakes, too) are common, this month's column endeavors to provide the answers.

Flaps on plank designs

It is important to realize that a plank design obtains its stability from the reflexed rear portion of the wing, and so any sort of air disturbance over that part of the wing will no doubt influence the stability of the aircraft in some way. (More about this later, when we talk about airbrakes.) For now, keep in mind that a flap placed on the bottom of a reflexed wing will decrease the stability of the wing because the airflow over the lower part of the reflexed section is disturbed. The majority of the stability provided by that portion of the wing will be derived from the airflow over the upper surface alone.

If you are looking to put flaps on a plank design, keep these guidelines in mind: (1) the flap area needs to be only about 5% of the total wing area, (2) the flaps should be mounted as close as possible to the 40% chord point, as this will reduce any pitching tendency to a minimum, (3) flap deflection needs to be only about 40°, as they are very effective, and (4) it is best if the flaps can be kept away from the control surfaces which influence pitch.

Flaps can be used on launch to get a steeper climb, and the effect is significant. Another use, of course, is to slow the 'wing for landing. Flaps should not be used when thermalling! Also, you may need to remember to retract them just before touchdown to prevent stripping the servo gears.

Flaps for swept 'wings

Flaps on swept 'wings are used just as they are on conventional tailed aircraft, and their effects are identical. Flaps can be used to significantly improve launches and slow the 'wing substantially for landing. Depending on the airfoil(s) used, flaps may be used to advantage in various flight regimes as well.

In looking at a number of swept 'wings with flaps, we find the following similarities: (1) the flaps usually cover about one third of the wingspan, starting at the wing to fuselage junction, (2) the flap chord is about 20% of the wing chord.

In practice we've found flap deflections of about 20° to be very effective during launch. (But make sure that they are retracted for the zoom!) Deflections of 75 to 80 degrees or more can be used for landing, and this really slows the 'wing down. As with conventional tailled sailplanes, lowering the flaps has the tendency to pitch the nose up, so some form of elevator compensation is needed. Also, as with their use on planks, you may need to retract the flaps just before touchdown.

Some miscellaneous notes on flaps

If your plank's design has a centrally located elevator, the elevator servo can be mounted in the fuselage along with that for the rudder. A torque tube system to drive the flaps would need only a single additional fuselage mounted servo. On the other hand, outboard elevons should be driven directly by wing mounted servos. Flaps on a swept 'wing are best driven by separate wing mounted servos as well. We have long argued for the mounting of all wing control surface servos in the wings themselves, if possible and advantageous.

As we mentioned above, lowering the flaps on a swept 'wing will cause the nose to pitch up, and some form of compensation will be needed. The new computerized radios are great for mixing channels and making fine adjustments.

Airbrakes

Planks, with their lack of sweepback, lend themselves well to airbrake installation. An airbrake consists of two blades which push up and out of the wing when deployed: one from the upper surface, one from the lower surface. For a plank type 'wing, the blades must rise clear of the wing surface so that air can flow relatively freely over both the upper and lower surface of the reflexed trailing edge. For a two meter 'wing, a set of 250 mm airbrakes is grossly oversized - better to use a 100 mm size, if you can find them. Airbrakes are, as their name implies, a method for increasing drag and not for increasing lift. Their usefulness, therefore, is limited.

We have seen only one swept 'wing with airbrakes, probably due to the difficulties involved. If the airbrakes are mounted parallel to the quarter chord line, a large vortex forms at the trailing end, but if mounted at 90° to the centerline they take on the arched quality of the airfoil's upper surface. There are no good solutions to the problems of incorporating them into this planform, and it seems that flaps are a far better choice in this application.

* * *

There you have it, the basics of flaps on tailless sailplanes! While some experimentation may be necessary, the benefits to be derived from their use are well worth the effort.

Bill & Bunny Kuhlman
P.O. Box 975
Olalla, WA
98359-0975

Winch Line ...by Gordon Jones

Flying Seat

Does anyone out there remember the flying seat that came into being in the seventies? Well, back then, I saw a couple of these contraptions and they actually worked. For those of you unfamiliar with this gadget, a seat is set up with mechanical linkage to resemble the operation of an aircraft control system. There is a "stick" like in a J-3, rudder pedals, and a throttle control on the left side of the seat to regulate power as in the real cockpit setup. This whole apparatus is fitted with a swivel for the seat to rotate 360 degrees for visibility. All the control linkages go forward to a radio control transmitter which functions in the normal way to control the model. If this sounds strange, it is to a certain degree. It was originally designed to be used for demonstration both static and flying. For those of you who fly full-size aircraft, think of it as an open cockpit without a fuselage.

At any rate, a friend of mine, Andrew Jameison, became intrigued with this idea and, with the help of another friend of his, constructed one. The original plans were based on a Kraft transmitter and he had it built by Martin Tkachyk, a machinist, to the original specifications

(unfortunately). I say unfortunately because he does not own a Kraft and I do. Suffice to say, when he discovered this little problem after constructing this marvel of technology, he was somewhat distraught. But, don't worry. Call Gordon and he will come up with a logical solution. To make a long story short, we tried a couple of transmitters before I thought about what was available in the way of transmitters back in that day. And, I brought over my trusty Kraft 76 and found a perfect match. Well, since I had the radio, it was "decided" that I ought to fly this beast too. He flies Mode I and I fly Mode II, so there would be that added bit of excitement if we set it up with Mode I. Plus, I did have one decided advantage, having flown numerous full-size aircraft over the years. I guess that made as much sense as anything in this undertaking.

I decided that since I was stuck with "piloting" this project that I would make it as painless as possible. I had one of the original Oly IIs gathering dust in the attic and figured that this one would be easy to install a radio in; and, secondly, would be very forgiving if I got a case of the "stupids" during the flying phase (a wise decision). So, I put together the Oly and we met on a Saturday morning to try it out. The first flight was interesting to say the least; Kirk Phillips took care of the launch portion of the task and Andrew acted as co-pilot. (He turned the seat to face the plane in the air: tough job.) The launch went fairly well with the Oly climbing out straight and with enough altitude to give me a chance to get the feel of the seat (I thought). I started by trying to just point into the wind and get the feel of the stick on the seat; this proved to be most interesting as suddenly I was all over the sky. I over-controlled like it was

my first flight. I lost altitude at an alarming rate and suddenly realized that the stick didn't return to center unless you let go of it completely. This didn't increase my confidence, needless to say. I started to get ahead of the airplane finally, and just in time as I was nearing the ground. I landed a short distance away (read within the field boundaries) without breaking the airplane, which was quite an accomplishment.

After I recovered from the initial flight, we tried for the second flight of this trip into fantasy land. This flight went considerably better as I had talked to Kirk and Andrew about their observations and gained a couple of views on what I was doing wrong. I had shortened my hold on the stick and decided to let it center itself more often to use more neutral and let the plane fly itself some to assist in control. (I'm glad that I decided to get out the Oly.) This worked out very well and, by the middle of the flight, I was into some thermals and doing reasonably well. All in all this flight was much better from a control and a time standpoint. Plus, I even got pretty close on the landing which was a vast improvement.

The third flight, I gained more control and with it more confidence. I was now anticipating more which provided some good thermals and a decent landing. Plus, by this time, I was getting more comfortable with "flying by the seat of my pants". The last flight was the best of the lot as I had good control from launch to landing, which even included the use of spoilers activated from the throttle control on the seat. I got some good air and was able to move around much better. I even gained enough altitude to be able to move from thermal to thermal, which was quite an improvement over previous flight.

I figure that after a couple of weeks of flying this contraption that it would provide some really fun flights and be totally enjoyable. But, it does take some getting used to and a bit of work in the learning process. I'm sure that we will be out again, when Andrew is back in town, and take another trip into "Seat Land".

Gordon Jones
214 Sunflower Drive
Garland, Texas 75041
(214) 840-8116

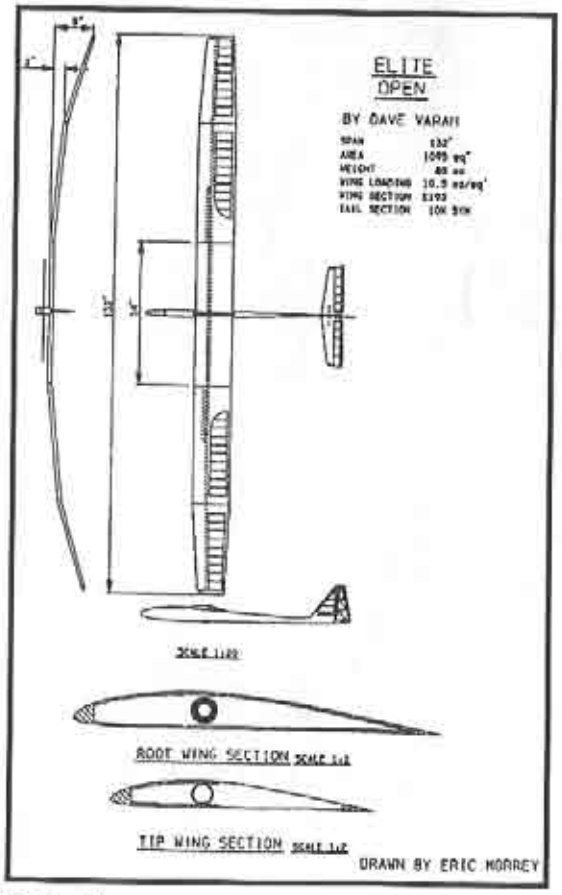
ELITE

Dave Varah's Simple Rugged Soarer

"This model was used by Dave to win Radio Glide and take second place at Interglide. Both F3J events (BARCS) in 1990. Dave is a member of the Soar Valley Soarers. The drawings first appeared in our club mag. in November, 1990." Derek Lucas, Editor of Verbals

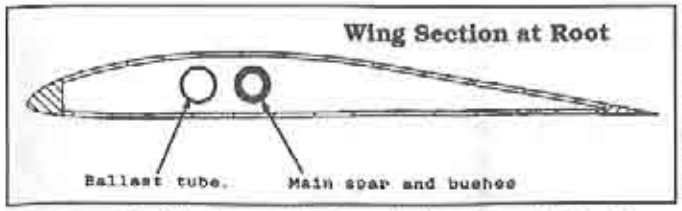
This was built in the spring of 1987 to satisfy the prevailing rules for 100S competition (i.e., 800 sq. inch wing area and controls on rudder and elevator only). Its stable mate was the "Bird of Time" and the rubber band wing mounting was adopted from that. Providing that the wing seating is rubber-faced and the bands are very tight, the system is trouble-free in normal use but offers useful crash insurance. Two 1/2 by 6 inch rubber bands (SLEC) are used in such a way that eight strands pass over the wings to secure it. Very fast and high launches are possible.

The wing section is Eppler 193 and these are built with the usual sheeted leading edge around high tensile aluminium tube spars. A single 1/2 inch tube extends from root to tip with an additional parallel tube extending 13 inches out from the root. These are linked with strategically placed 3/16 thick laminated ply plates and hardwood polyhedral joiners are incorporated. The latest central joiner is 5/16 hardened and tempered silver steel fitted into bushes in the main tube. This means that on assembly the centre joint has to be bound with wide adhesive tape before being strapped to the fuselage.



Covered in Solarfilm, the complete wing with joiner weighs 26 oz., but is very strong and does not twist or flutter. 16 oz. of ballast in the form of 7/16 steel bar can be carried in the auxiliary wing tube. More ballast of this length was earlier found to spoil the handling.

In poor lift conditions the 100S wing loses out against the larger span open models and to counter this an additional flat centre panel was made. This has a span of 34 inches, is fully sheeted and built around an alloy spar of concentric 1/2 inch and 5/8 inch tubes. A second joiner identical to the other one brings the wing up to eleven foot span and the weight increases by a further 16 oz.. The tip dihedral is increased from 7 to 9 inches, whilst the wing loading drops from 11.5 to 10.5 oz. per square foot.



The fuselage is basically 1/16 ply sides and bottom with 1/8 square spruce in the corners. The rear top is 1/4 balsa reinforced with ply at the cut out for the wing fixings. Only two formers are used at the leading and trailing edge of the wings. These are of 3/8 hard balsa sandwiched between 1/16 ply at the top where the wing fixing dowels pass through. At the front, the sides generously overlap the noseblock and external ply doublers extend back to just behind the wing seat with 1/16 balsa back to the fin. Balsa sheet of graduated thickness and hardness under the nose, together with a balsa hatch cover enable a degree of shaping to be applied to improve the appearance. The low fin strake is largely spruce to correct an earlier weakness.

The tail surfaces are built up conventionally. A 12g pivot wire and 16g drive pin are used for the tailplane. The rudder is operated by a closed loop from a servo mounted under the wing and the elevator control is via a "snake".

♣ ♣ ♣

Dear Readers, In writing to Dave about the ELITE, we received the following additional information from his Dad, Ray Varah:

"As I was the author of the original article and chief structural adviser, he (Dave) has asked me to add any notes I can. In truth, there is little to add. Perhaps the most important point not made clear on Eric's drawings is that the D-box on the wings is completed by the use of 3/16 wide balsa webbing glued to top and bottom of the spar tubes between the ribs, grain along the spar. Care was taken to curve the surface next to the tube to ensure a good fit there. The front sheeting was glued to the forward 1/8 of the webbing leaving the rear 1/16 to provide additional support for the 1/4 wide rib cap strips. The webbing pieces were graded in hardness and are essential to the torsional stiffness and strength of the wing."

"The two servos are mounted side-by-side in the fuselage in front of the wing. They sit on the floor of the compartment and are secured by servo tape to pads glued to the fuselage sides. A balsa packing between the servos compresses the thin foam of the servo tape and provides a surprisingly firm fixing with the so useful crash insurance. I have used this system before in gliders and have even cut off the mounting lugs of servos when space is at a premium."

Dave & Ray Varah
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England

Understanding Thermal Soaring Sailplanes

Part 4

...by Martin Simons

Variable geometry?

The option of telescopic wings, as used by Rolf Decker in 1985 for the *Tele F* sailplane for F3B contests, is also very promising for thermal soarers, although the complications are great and, again, the wing area must be calculated with the wings fully extended. Nonetheless, a high aspect ratio for soaring, and a small span, small area wing for penetration, is aerodynamically ideal, whatever practical difficulties arise in building such a model. (Neither the *Tele F* nor the full-sized telescopic winged *FS 29*, have so far made their marks in regular competitions flying against more ordinary types.)

Turbulators

A good deal of experimental work, in wind tunnels and on aircraft in flight, has been done with turbulators. These are usually thin strips of tape, or fine threads, glued spanwise along the wing at some chordwise position, or even ahead of the wing on small outriggers. A zig-zag or serrated tape may sometimes be more effective than a straight strip turbulator (Figure 36), though the authors of Soartech 8 found no such difference. On full-sized sailplanes, pneumatic turbulators are also used, these being rows of fine holes, pin-prick sized, through which air under pressure from a carefully placed intake is blown continuously. The single Princeton test with this type of turbulator was inconclusive. Pneumatic turbulators do seem to work on full-sized wings but perhaps are no better than the simple strips. The turbulator, whatever its type, is intended to prevent or at least to control the formation of boundary layer separation bubbles (Figure 37). A full explanation of this will not be attempted here.

The effects of turbulators may be judged directly from the wind tunnel tests. A turbulator which is correct for

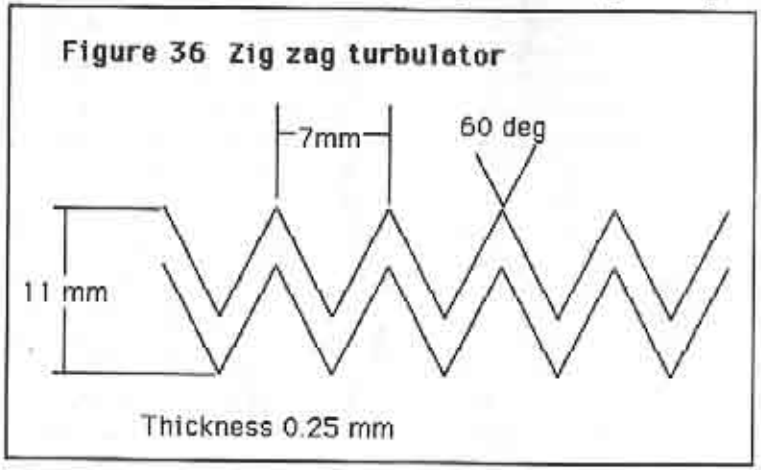

Figure 36 Zig zag turbulator

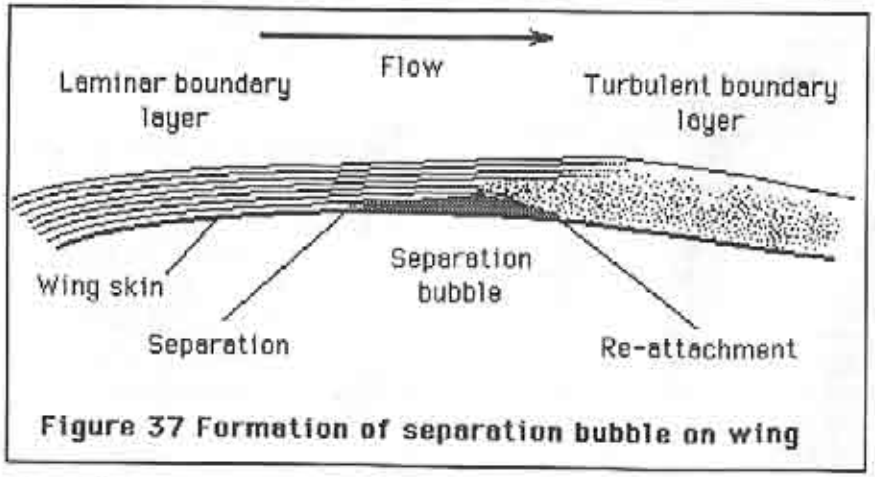

Figure 37 Formation of separation bubble on wing

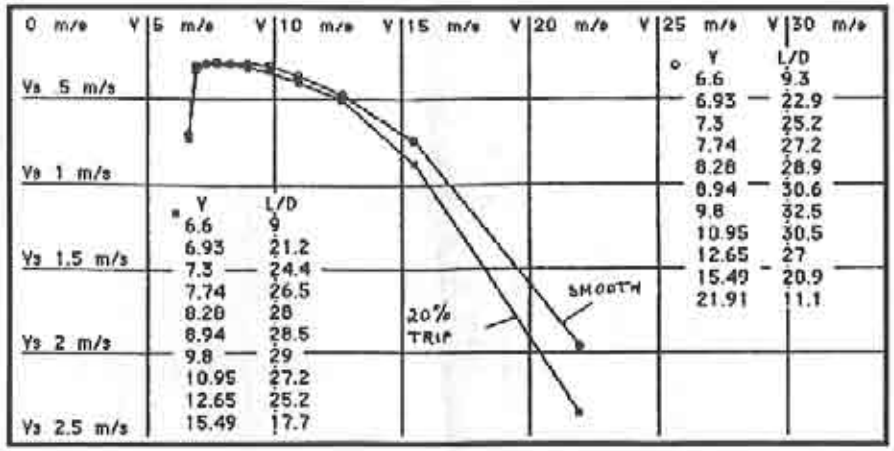

Figure 38 Performance Polar for Wing

	SD 8000 Smooth		SD 8000 Trip 20%	
Velocity Metres/Sec	Sink M/Sec	L/D Ratio	Sink M/Sec	L/D Ratio
21.92	1.960	11.18	2.358	9.30
15.50	0.739	20.98	0.873	17.76
12.65	0.468	27.06	0.502	25.21
10.96	0.359	30.53	0.402	27.26
9.80	0.301	32.53 MAX	0.337	28.08 MAX
8.95	0.292	30.69	0.313	28.56
8.28	0.286	28.97	0.295	28.06
7.75	0.285 MIN	27.22	0.292 MIN	26.58
7.31	0.290	25.23	0.299	24.45
6.93	0.302	22.94	0.326	21.28
6.61	0.710	9.30	0.732	9.03

Selig Donovan 8000

Wing Loading = 3.00 kg/Sq. M. Span = 4.50 Metres
Aspect Ratio = 15 Root Chord = 35.00 cm.
Mid Chord = 33.00 cm. Taper Ratio = 0.50

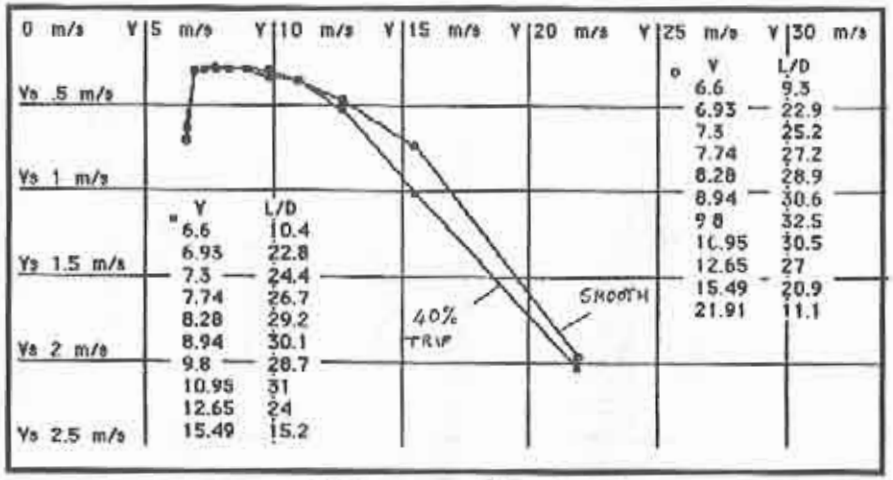

Figure 39 Performance Polar for Wing

	SD 8000 Smooth		SD 8000 Trip 40%	
Velocity Metres/Sec	Sink M/Sec	L/D Ratio	Sink M/Sec	L/D Ratio
21.92	1.960	11.18	2.032	10.79
15.50	0.739	20.98	1.014	15.28
12.65	0.468	27.06	0.527	24.02
10.96	0.359	30.53	0.353	31.02 MAX
9.80	0.301	32.53 MAX	0.341	28.76
8.95	0.292	30.69	0.297	30.16
8.28	0.286	28.97	0.284 MIN	29.21
7.75	0.285 MIN	27.22	0.290	26.72
7.31	0.290	25.23	0.298	24.49
6.93	0.302	22.94	0.304	22.83
6.61	0.710	9.30	0.630	10.49

one trim and flight speed may be wrong for another. Turbulators usually improve the performance of a model wing section at low flight speeds but increase drag at high speeds. Since it is important for thermal soaring sailplanes to fly both fast, for penetration, and slowly, for soaring, turbulators may be more of a handicap than an asset and each wing profile responds differently.

SD 8000 and Eppler 214 with turbulators

The SD 8000 profile was tested at Princeton with a trip in three different positions. The turbulator was a strip of tape 0.17% of the wing chord in thickness, and 1.0% of the wing in width. (0.17% of a 350 mm chord wing, is 0.6 mm or = .02 ins.) This 'trip strip' was positioned for one test series at 20% of the chord on the upper side of the wing, then moved for another test to 40% and finally to 70%. In Figure 38, 39 and 40, using all the same dimensions and methods as previously, the effects of these trip strips are compared with the performance of the plain SD 8000 wing.

With this profile there is evidently little or nothing to be gained by using turbulators on a large thermal soarer. The 20 and 40% trips spoil the high speed part of the polar without any noticeable

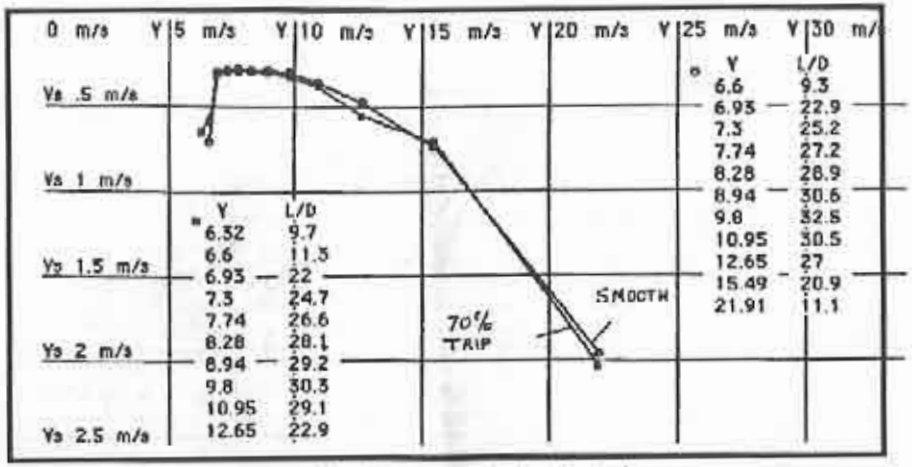

Figure 40 Performance Polar for Wing

	SD 8000 Smooth		SD 8000 Trip 70%	
Velocity Metres/Sec	Sink M/Sec	L/D Ratio	Sink M/Sec	L/D Ratio
21.92	1.960	11.18	2.031	10.79
15.50	0.739	20.98	0.706	21.95
12.65	0.468	27.06	0.550	22.99
10.96	0.359	30.53	0.376	29.18
9.80	0.301	32.53 MAX	0.323	30.37 MAX
8.95	0.292	30.69	0.306	29.25
8.28	0.286	28.97	0.295	28.11
7.75	0.285 MIN	27.22	0.290 MIN	26.68
7.31	0.290	25.23	0.295	24.76
6.93	0.302	22.94	0.314	22.09
6.61	0.710	9.30	0.584	11.32
			0.650	9.73

improvement at low speed. The 70% trip has little effect. At this location it is probably behind the separation point, and so has no effect on the flow ahead of the bubble at all.

This negative result should not be assumed to apply to all profiles. Figure 41 shows the effect of adding a turbulator at 20% of the chord to the upper surface of an Eppler 214 wing which, as previously mentioned, proved disappointing in its smooth form against the Clark Y. With this modification the E214 shows a worthwhile improvement at low speeds: a low rate of sink and low stalling speed. The high speed polar still falls below the Clark Y at moderate and higher speeds, as shown.

Generalising from such limited data is risky but if a model proves disappointing, especially at low flight speeds, it may be worth experimenting with simple turbulators in different positions, to discover if an improvement results.

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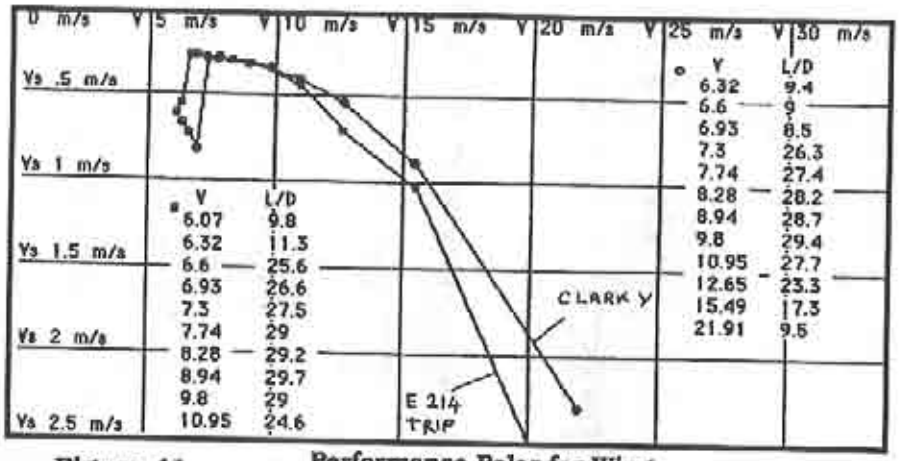

Figure 41 **Performance Polar for Wing**

Velocity Metres/Sec	Clark-Y-PT Sink M/Sec	Clark-Y-PT L/D Ratio	Eppler 214C TURB Sink M/Sec	Eppler 214C TURB L/D Ratio
21.92	2.301	9.53	3.130	7.00
15.50	0.891	17.39	1.023	15.15
12.65	0.543	23.31	0.706	17.91
10.96	0.395	27.71	0.445	24.63
9.80	0.333	29.41 MAX	0.338	29.03
8.95	0.311	28.79	0.301	29.74 MAX
8.28	0.293	28.25	0.283	29.28
7.75	0.282	27.48	0.267	29.01
7.31	0.278 MIN	26.30	0.265	27.52
6.93	0.815	8.50	0.260	26.67
6.61	0.734	9.00	0.258 MIN	25.62
6.33	0.670	9.44	0.558	11.33
			0.618	9.84

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Soaring Kids

...by Chuck Mc Calment

After spending time with preteens who were learning to fly R/C sailplanes, several things come to mind.

A two-meter hits the ground with less energy than larger planes but, more importantly, they are of a scale that does not intimidate these young builder/flyers. Morning flying when the kids are fresh and the wind is light seems to provide the best environment for learning and the most happy faces. If the flying is going well it is easy to extend into the more dynamic air of mid-day. Sometimes the young flyer is uncomfortable with one aspect of flight or another. For instance, one student was uneasy with the plane at full launch height. The solution was for a seasoned pilot (not necessarily an adult) to launch via hi-start as normal, establish a stable glide while talking the learner through a few laps of an imaginary oval circuit whose long axis was at right angles to the launch path. During the descent, anytime the young flyer feels comfortable, they can assume control and continue the flight. The secret appears to be repetition, establishing a normal pattern of flight by example. At about four wing spans above the ground the plane should intercept the landing pattern entry gate. At that time the plane should be turned ninety degrees left (downwind if flying in wind), get the wings level and then make a one hundred-eighty degree left turn. The turn is made with the student at the center, control-line style. As the plane goes by, level the wings and let it land itself, no control reversal problems. A confidence builder and lots of fun if you keep adult directives out and an encouraging smile in.

When building that first ship, it should be stressed that it is a tool to be used to learn to fly. We have tried to soften the blow of that first crash by conferring great status on the best "beater 2-meter" at the field. The young people seem to realize that the patches and repairs are lessons learned and skills acquired. The real pretty planes belong to the "new kids" at the field. In soaring, we have the level playing field that allows the boys and girls to participate on equal terms.

Kids at the field are willing and helpful once the basics have been explained. The Pits are the place planes are protected from those that walk with their head in the clouds and their feet on the ground. Know who is flying on your channel and share the flying time with them. If you launch once, next time it's your turn to retrieve the parachute. Asking a pilot about to launch to wiggle the rudder from side to side proving radio control is not demeaning but really polite. Bringing a garbage bag to clean up after flying is not only a nice way to treat your site but a great way to increase your treasure of misc. R/C paraphernalia. When looking up, wear sunglasses and use a little suntan lotion to protect yourself. A pre-flight check of the plane can save many hours of late night rebuilding. Check all your connectors after a hard landing. People are MUCH more important than planes. We need to think clearly about the safety of all those around us and to teach that attitude to all those that fly R/C. If we teach the up coming flyers to live by rules that make sense then, maybe, they will remind us when we forget.

Flying can be a learning tool for the youngsters as well as a motivational tool for the adult. Direct cause and effect relationships are evident in all aspects of flying. Not only can R/C provide a medium for quality time with the kids but also a means of escaping the dreaded Saturday "Honey due List".

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Ridge Writer

...by Wil Byers

Whether you are new to slope soaring or a veteran to the hobby, you will inevitably face the task of deciding what glider to buy for your next project.

You'll ask yourself questions such as, "Should it be an aerobatic model? Or a scale ship. Or a racer? Or a relaxing Sunday flyer?" Probably, other questions will arise, such as, "How much will it cost? Should it be fast or slow? Should it be big or small?" And, of course, "What kind of airfoil will it need?" You might even want to consider the total all up flying weight and the type of construction. As well, one will want to decide whether to paint or cover it with film. Another very important consideration is, how your radio gear will fit into this new ship. One should also ask themselves, "Does the model I'm considering fit my skill level or my personality?" And, finally, you will want to know where to buy either the model or the materials to build your new creation.

All of these considerations are important if one wants to enjoy the new model and the hobby. Often times, an individual will become so excited about slope soaring, and for good reason, that their buying haste may interfere with a good decision making process. Then, unfortunately, after making what at the time seemed like a great choice, they become unhappy with the model and its individual characteristics. Unhappy because the new sloper lacks some of the qualities they knew were important but, unfortunately, overlooked. Many a good modeler has been disillusioned with glider flying because they bought the wrong model for their needs. They then left the hobby, as a result of their choice being less than satisfactory. These individuals got robbed of the fun they should have experienced. We in the slope soaring community do not want a like situation to occur for you. Rather, we want you to pick a model that suits you and your conditions.

A good starting point, in the decision making process of picking a new model, is deciding the types of flying you wish to pursue. These are areas such as scale, aerobatics, racing, cross country, power slope models, or the relaxing Sunday flyer. The manufactures support these niches well for the slope soaring community. Therefore, a modeler should have little or no trouble finding a subject that fits their flying style, taste, skill, and slope conditions. This is one of the great things about sloping; you can fly just about any model type, provided the lift suits the model. So, let your taste drive you in an interesting direction. However, remember the model's survivability depends on many other parameters once it becomes remotely piloted.

Without a doubt most, if not all, new model projects are chosen primarily on personal taste. Unfortunately, all too often, other important factors will take a back seat in the decision making process. Yes, personal taste should be one consideration. But, weigh it along with other factors that, often times, are more pertinent to an appropriate pick than just how well the model appeals to you. Because, appeal may have its foundation built around paradigms and they are frequently misleading.

However, since any decision is taste dependent, pick a ship that fits both your personality and flying style. This is to say, the model must do what you want it to do in terms of maneuvers, and still have its wings and fuselage in tact afterwards. Therefore, if you like to perform aerobatics, buy a model that turns you on and still performs aerobatics well. On the other hand, if you want to fly scale models, remember they often are not designed to accept the stresses that a slope racer will encounter. Also, realize this often times means compromising on your model choice. Note, there are some gray areas, where a model may be able to perform outside its intended designed envelope and survive quite nicely. Also, you will be able to find models that cross over from one category into another, such as the power slope scale niche. So, take your time and study a design to determine its performance and limits.

As you would imagine, many of us will most assuredly have different tastes in models. However, we will often times fly at the same sites under the same conditions. So, we will inevitably pick models that are of similar style, performance, and construction. Therefore, one of the most important factors, when picking a new sloper, is where the model will be flown and how survivable it is in that environment.

FLASH: Sites eat airplanes!

This is especially true if the model is not designed for the site where it is to be flown. This is so intuitively obvious, I hesitate to elaborate, but it happens all too often. A modeler will build a beautiful new model and then rush to the slope for the maiden flight. Within minutes the model suffers damage or is destroyed. It was damaged or destroyed because it's design was inappropriate for the site or the conditions. Don't let this happen to you. When making your decision think about the site you typically fly and the air and environment associated with it. A site that is large, open, and sports a grassy face with a fantastic landing zone, is more forgiving than others. On the other hand, if your slope condition is rugged, has turbulent air, and not much in the way of a landing zone, you best pick a model which fits that condition.

There are many designs marketed for slope soaring today. Note, however, that most of the designs being produced are designed around the needs of a particular designer and most likely the slope they associate with. As I stated, you the buyer of these designs must determine how a particular model will function at your site. Sometimes picking such a model can be difficult and may mean the model will need some modification. The modification could be as simple as the addition of an extra piece of plywood or a bit of Kevlar in the right place. But that engineering change would most likely result in more fun and less damage. So, if you like a design but feel it might not survive your flying environment, don't give up. Analyze whether the model could be re-engineered to yield the model you really want. If so, buy it. If not, skip it and put your money into another model.

Costs of model gliders today can range anywhere from $29.95 to $1199.95. As you can see, in terms of cost, the sky is the limit. In terms of fun, a slope enthusiast can have as much fun with the $29.95 "wonder sloper" as with the super expensive model. The fun being decided by your needs. For example, if you buy a $1000 dollar model and rarely have the conditions to fly it, without fear of damaging it or worse, maybe buying a second less expensive model for the majority of your flying practice is advisable. Additionally, that less expensive second ship can provide you piece of mind. (The expensive model can ride along in the car to keep it company.) Seriously, if you plan to buy an expensive model or to build a ship which will require a great deal of building time, consider some kind of practice glider. Having it will maintain and enhance your flying skills just by virtue of practice. Also, flying a practice model will help you recognize the conditions that exist at your hill, which might be detrimental to your prize model. Flying the practice model will certainly pay for itself in the long run.

A question which seems to plague many a modeler, even those with lots of experience, is, "How big of a model should it be?" This is a difficult question

to answer. Many slopers today seem to be drawn towards large models. Some of these soaring machines have a wing span in excess of 22 feet. Again, you need to ask yourself the questions: "Does this model fit me personally, and will it be survivable flying at the hill I soar?" One should be aware that, in most instances, the large models are heavier, which means their wing loadings will also be higher. Therefore, they will fly faster and require more air space and landing area. Additionally, large models will not be as agile as their smaller counter parts. So, if you want your airplane to perform snappy rolls and do aerobatics, you probably should choose the smaller ship. On the other hand, if you want your craft to roam the slope looking for every rising molecule of air, the large, long, skinny-winged model is going to have aspect ratio on its side. And, because it does, it most likely will outperform the lower aspect ratio airplane in terms of L/D. A number of other aerodynamic considerations pertain to whether the model should be big or small, but I won't deal with them this month.

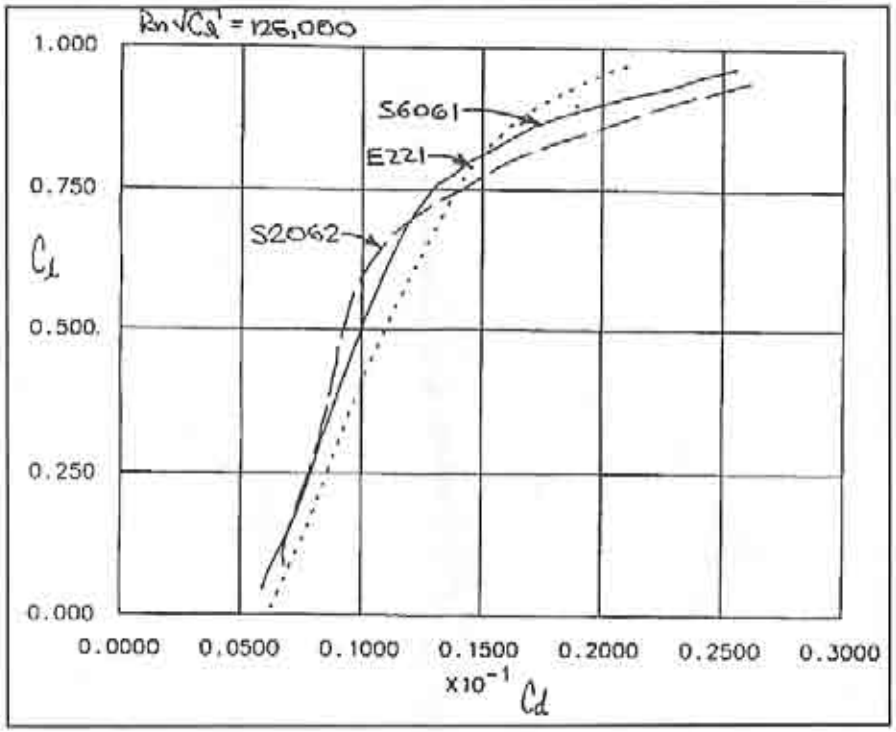
Selig 2062

The Selig 2062 was designed by Michael Selig a couple of years back. It has remained relatively unknown because he designed it primarily for slope racers; of which there aren't many. The section is used by a few avid racing enthusiasts in California, I understand. It is relatively thin, 8.18% and has a nice looking drag polar. I've provided the polar for your inspection. As you can see, it should be a real screamer down the straights, although the polar bends over a bit at the higher coefficients of lift and, of course, drag increases. Try it on your new racer and come win the Mid-Columbia Cup.

S2062 8%		0.00140	0.00366
1.00000	0.00000	0.00025	-0.00148
0.99677	0.00039	0.00474	-0.00622
0.98732	0.00167	0.01429	-0.01106
0.97218	0.00391	0.02866	-0.01543
0.95180	0.00696	0.04787	-0.01906
0.92650	0.01060	0.07189	-0.02189
0.89659	0.01474	0.10060	-0.02393
0.86250	0.01932	0.13377	-0.02522
0.82470	0.02419	0.17111	-0.02581
0.78368	0.02920	0.21228	-0.02580
0.73994	0.03412	0.25684	-0.02525
0.69391	0.03877	0.30430	-0.02428
0.64602	0.04304	0.35412	-0.02295
0.59676	0.04684	0.40572	-0.02133
0.54664	0.05008	0.45852	-0.01951
0.49618	0.05267	0.51187	-0.01753
0.44589	0.05455	0.56516	-0.01544
0.39627	0.05568	0.61773	-0.01324
0.34783	0.05600	0.66901	-0.01091
0.30104	0.05550	0.71854	-0.00842
0.25639	0.05415	0.76589	-0.00595
0.21429	0.05196	0.81048	-0.00375
0.17516	0.04893	0.85169	-0.00194
0.13934	0.04507	0.88888	-0.00059
0.10714	0.04043	0.92150	0.00027
0.07882	0.03511	0.94903	0.00068
0.05459	0.02921	0.97099	0.00069
0.03462	0.02288	0.98699	0.00045
0.01903	0.01630	0.99673	0.00014
0.00791	0.00977	1.00000	0.00000

Slope soarers, this is your column, too. So, if you have information that you wish to share with the rest of the sloping community, please send it to me and I will try and put it into the column. Thanks!

Hoping for Wind, Wil Byers
RT. 4 Box 9544
W. Richland, WA 99352
(509) 627-5224 (7:00 PM - 10:00 PM weekdays, after 9:00 AM weekends)



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Pull-Pull Cable Systems

...by Bob Champine

It has been some time since I wrote you about the development of the stretched Gemini and using that design to finish my second LSF Level V.

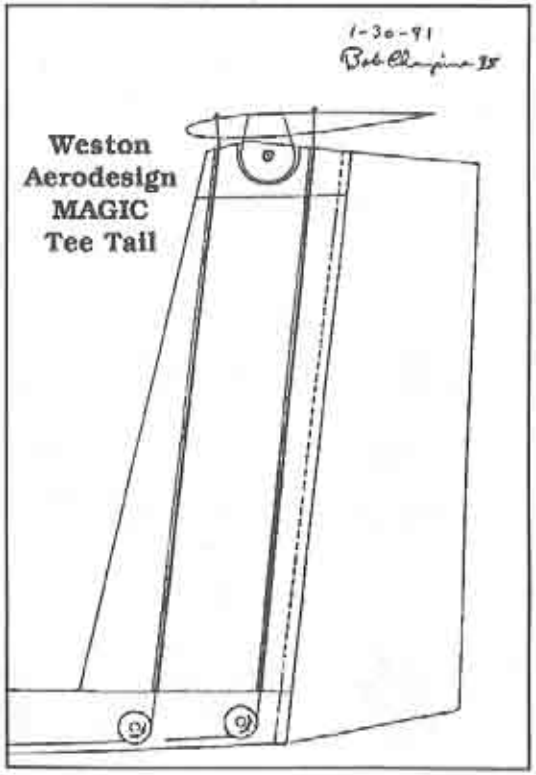
That design and others using polyhedral for simple 3-channel controls are great because of positive spiral stability and ease of control. But the modern or more sophisticated designs are far more challenging and allow for greater control over flight path and performance. Also, these types of models are more capable of handling higher wind speeds because of cleaner design and variable wing camber from flaps and ailerons. Anyway, I've been building, flying, and in some small way attempting to make some improvements to these "flat-wingers".

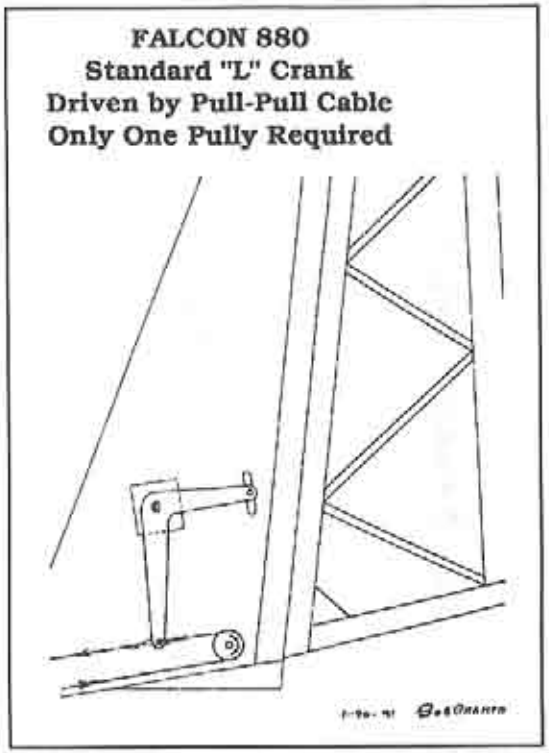
The basics of "pull-pull cable" systems used for elevator and rudder control offer several advantages such as lightweight, low friction, and very rigid or tight control if designed correctly. The three pull-pull designs work very well. The mid-stabilizer position, about 2-1/2" up on the fin, and labeled the Teeter Bar System, is the design I'm using on my Falcon 880, and the T-Tail design is what I'm flying on my Frank Weston "Magic" model. The other drawing for the mid-position of the stabilizer is called "L" Crank design and should operate equally well and may be a little more simple. These designs result in a very rigid type of control and eliminate most of the free play or looseness.

Notice that the cables are attached equal distance from the stabilizer pivot point and then descend parallel to the bottom of the fuselage where they go around separate pulleys. A convenient radius is one inch (two inches between cables), which will work good on most designs. The design for the "L" Crank drawing may be a little lighter and simpler as only one pulley is used and the "L" Crank is attached to the cable as shown.

It was necessary to move the pivot point for the stab rearward 1/2 inch on the Frank Weston "T" Tail Magic and drill two new holes in the foam in the fin and locate the pulleys for the cables in the lower part of the fuselage.

Notice that the pulleys are mounted very close to the bottom of the fuselage so the cable will be trapped in the groove. I ordered 1/2 inch pulleys from Small Parts, Inc. located in Miami, Fla. These could be hand made from 1/2 inch diameter nylon rod using a drill press. Even plywood pulleys would work quite well.

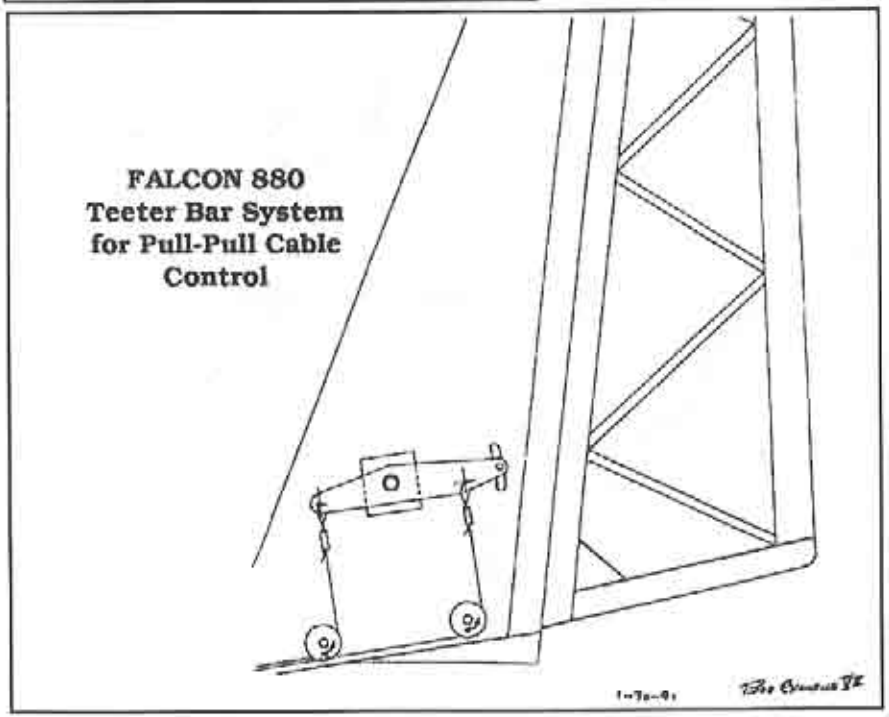


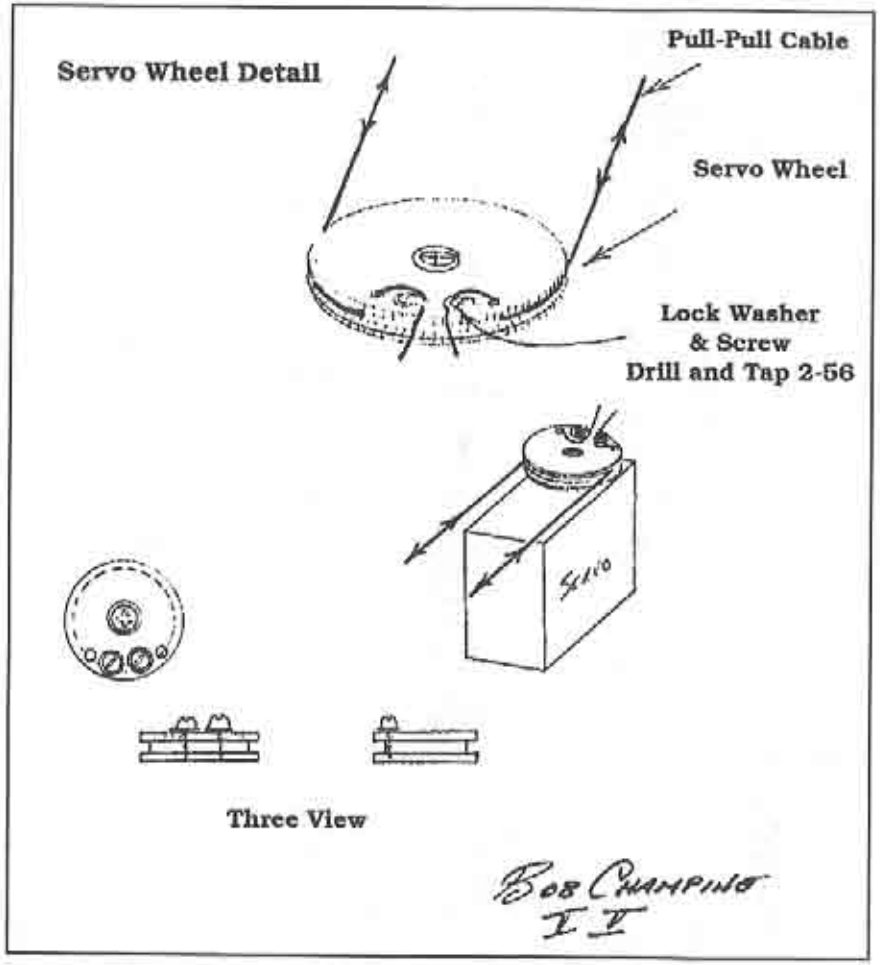


The best type of servos for pull-pull systems are those with ball-bearing output shafts. The cable tension required is really pretty low so standard servos should work OK. The servo arms have been replaced with servo wheels that Have top and bottom plates added to make a sort of pulley. Screws and lock washers are used to attach the cable yet allow for tension adjustment.

Bob Champine
205 Tipton Road
Newport News, VA 23606

Bob's servo wheel detail is shown on the next page!





Building the DUCK

...by Mike Stump

With some preparation and the proper building equipment the 2 Meter and Standard DUCKS are among the fastest building and strongest sailplane kits available.

A vacuum bag or press system is highly recommended to use in assembly of all flying surfaces for strength and accuracy. Epoxy is the recommended adhesive for attaching the sheeted surfaces. With proper application we've found that minimum weight is added while a superior bond is consistently attained. Use UFO to bond any parts to the foam cores (transfer tape may be used to attach the completed spars to the main panel cores) as it speeds up wing construction. All wood parts may be attached to the epoxy/glass fuselage with C/A. This also speeds construction and provides an excellent bond. To our knowledge no wood to glass bonds have failed in DUCK fuselages to date. If you follow the recommended construction procedures and applications to follow you will have a very strong, full-bore contest sailplane that is easy and fun to fly.

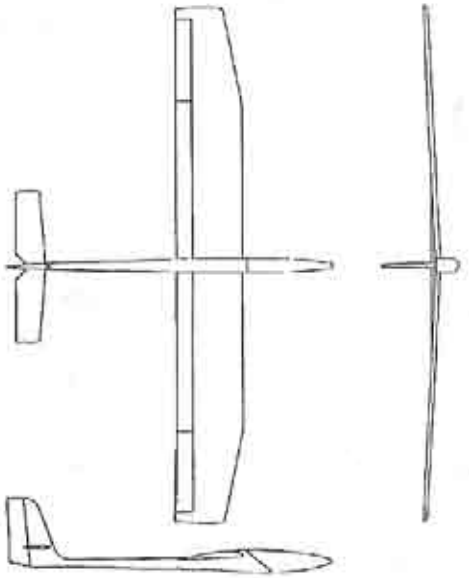
We strongly recommend the use of a fully programmable radio such as the AIRTRONICS VISION to extract the full performance potential of the DUCK. Trimming and set-up of the DUCK is much faster and more accurate with this type of system. The metal geared micro servo (141) is recommended for use in the wing, although the standard series (102s) will fit for the flaps and the mini series (831s) will work for ailerons. If you use servos without a metal output gear on the flap our practice has been to use a servo saver of the RC car variety.

Many parts in this kit have been prefabricated in subtle ways for your ease of construction. The root end of the foam wing cores have been jig sanded to fit the fuselage wing saddle and all fuselage openings have been pre-drilled or marked including the tow-hook location.

Wing

Begin wing construction by locating the wing parts bag. Enclosed in this package you will find: pre-cut balsa spar fillers, 1/8 by 3/8 spruce top and bottom spar caps (the 2 Meter uses a shorter length bottom spar cap and balsa spar filler), kevlar thread, carbon fiber, ply root and tip ribs, 1/16 ply inboard shear webs, 1/16 balsa outboard shear webs, balsa alignment pin support blocks, and pre-cut glass TE and servo box reinforcement.

Assembly begins with construction of the spar. Glue the balsa spar filler to the bottom spruce spar first leaving 4.25" of spar at the root end for the joiner box. Before installing the top spruce spar, trial fit the spar unit into the core cut-out with the top spar laid in place to assure proper height. Very little sanding, if any, should be needed on the balsa spar filler to get the spar height to match the core. Once proper spar thickness is assured, glue on the top spruce piece, leaving 4.25" on the inboard end to make the joiner box. Cut a piece of scrap 3/8" balsa to the height of the filler and tack glue between the spruce pieces at the root to



DUCK Specifications

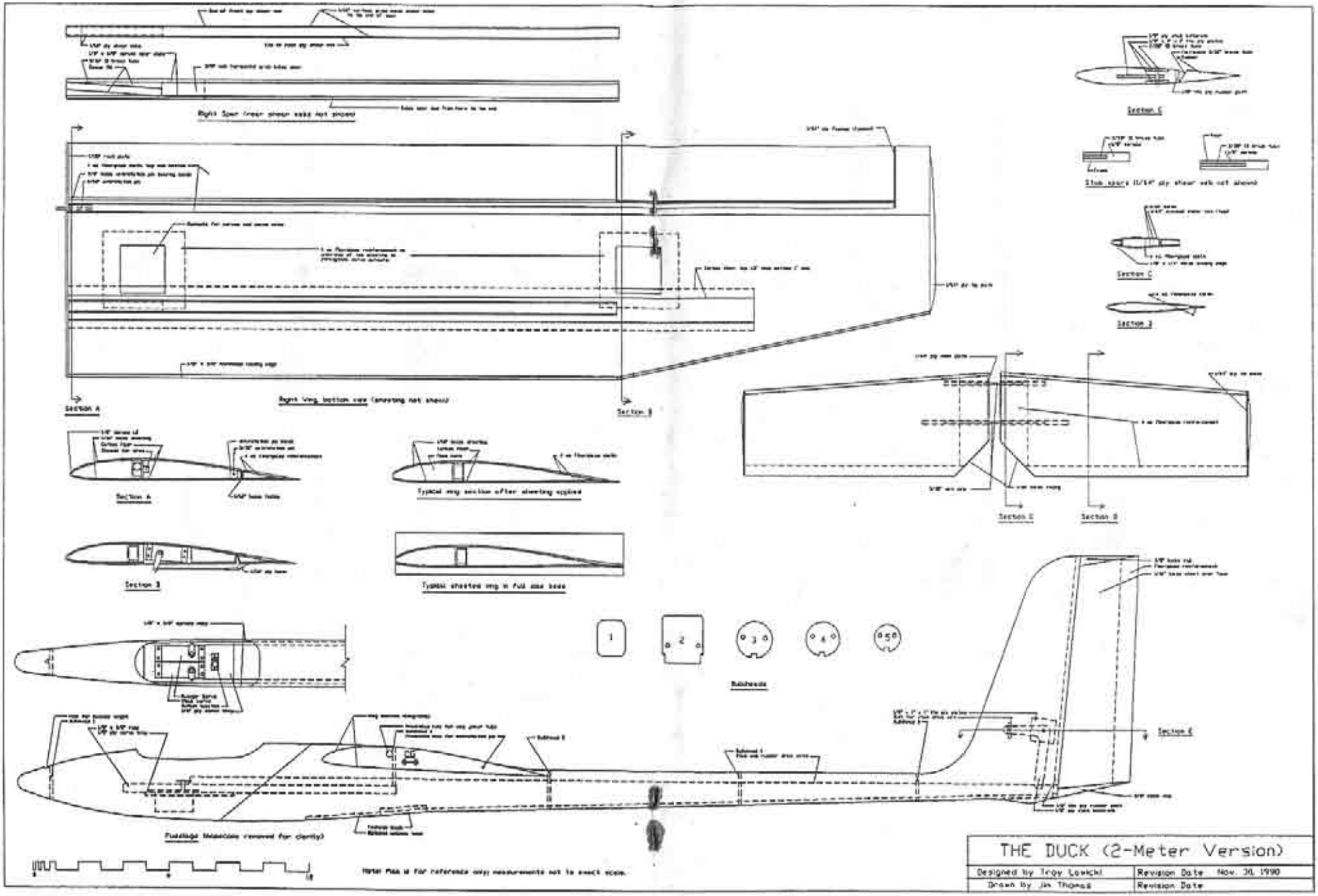
	2 Meter	Standard
Wingspan	78.75"	100"
Root Chord	10.5"	10.5"
Tip Chord	7.5"	7.5"
Wing Area	740 sq."	965 sq."
Airfoil	Selig 3021	Selig 3021
Optional airfoil for both kits is 7032		
Fuselage Length	49"	49"
Weight	51-55 oz.	63-67 oz.
Wing Loading	10 oz. sq.'	10 oz. sq.'
Stab Airfoil	SD 8020	SD 8020
Stab Volume	12%	12%

maintain the proper distance between spars while the ply root shear webs are glued to the spar body. Install and glue the ply shear webs as per the plans, and continue with the balsa shear webs to the end of the spar. After all shear webs are installed, wrap the root and outboard ends of the joiner boxes neatly with the kevlar thread provided and soak the thread with C/A. This yields a strong and almost bullet-proof joiner box. The spar unit can now be installed into the main panel core. It can be attached to the core with UFO, epoxy, or transfer tape.

Use masking tape to attach the tip core beds to the main panel beds. When attaching the core beds, use a long metal straight edge along the TE of the beds to make sure of perfect alignment. Now lay the main panel with the spar installed back into its full size bed and, with UFO, carefully align and glue the tip core to the main panel. A light rubdown of the top and bottom of the complete cores will remove any residue from cutting, and the cores are now ready to be sheeted.

The following sheeting method is the one we have used for vacuum bagging. The sheeting that comes in the kit has been weighed and given a value which is written on each piece of sheeting. There will be a selection of sheeting in the proper length for the wingspan that you are building. As you lay the sheeting out, select the heavier wood toward the leading edge with the heaviest sheet on the top LE. Check and make sure the edges of the sheeting are straight and that they lay together with no gaps. Tape the sheeting together with masking tape and trim to the shape of the wing, trial fitting to the cores you want the sheeting flush with, the LE and 1/8" exposed for the bottom sheeting and 1/4" for the top sheeting exposed behind the core beds. The sheeting should be even with the root and tip edges of the cores.

Once the sheeting is ready for preparation, mark the servo cutout areas where 4 oz. glass cloth will reinforce the top sheeting. Glass cloth will also be used along the TE and under the sheeting at any end-grain splices. These cloth reinforcements are laid on the sheeting and wetted after a thin layer of slow cure epoxy has been spread onto the inside of the sheeting. It is important to have the cloth areas accurately marked on the sheeting before wetting the sheeting. After the glass has been applied and lightly saturated, lay the carbon fiber over the spar to a point past where the tip joins the main panel, and wet this out with enough saturation to assure a good bond to the core. Lay the appropriate sheeting on this side of the core, place in its bed and repeat applying the carbon fiber to the other side of the wing panel. Once the sheeting has been applied to all wing sides, stack the full-size core beds with the sheeted cores carefully placed in their vacuum bags and weight the cores while the vacuum is applied. Allow plenty of time for your epoxy to cure before removing your weight or vacuum. The full-size beds that accompany your cores will form the proper shape at the TE so that, when sanded to a knife edge, the correct airfoil shape is maintained in this area while yielding a sharp, tough,


Right Spar (rear shear webs not shown)
Section A
Section B
Right Wing bottom side (servos not shown)
Section A
Typical wing section after sheeting applied
Section B
Typical sheeted wing in full size base
Section C
Section B
Section E
Section E
Section C
Stab spars (1/64" ply shear web not shown)
Section B
Fuselage (Hatches removed for clarity)
Hatches
THE DUCK (2-Meter Version)
Designed by Troy Lovicki
Revision Date Nov. 30, 1990
Drawn by Jim Thomas
Revision Date

glass TE.

The rest of the wing construction is typical for a sheeted wing. Glue the 1/8 by 3/8" spruce leading edges onto the wing with UFO. Plane and, then, sand the leading edge to shape. Be especially careful with the leading edge shape.

From the hardware bag find the wing receiver tubes (5/16 ID for the 2 meter & 11/32 ID for the Standard), and sand the outside surface. With the 3021, airfoil alignment of the tube in the joiner box is a simple operation. Plug or tape the outboard end of the tube to prevent epoxy from flowing up the tube. Mix some epoxy and, while standing the wing on it's tip, fill the joiner box approximately 1/3rd of the way with epoxy. Insert the joiner tube into the box angled so the outboard end is against the bottom spar and the root end contacts the top spar. In the two meter, make sure the tube is contacting the rear shear web. Use the wing rod for leverage to achieve this angle being careful not to let any epoxy into the tube. Any that does get in will have to be drilled out later. Fill the rest of the box to the top with epoxy, and let the panel stand on it's tip until the epoxy is completely cured. The wing assemblies can now be set aside until needed during the fuselage assembly. Set wings aside to finish after fuselage assembly.

Fuselage

The DUCK fuselage is all molded epoxy-glass with a slide on nose cone. It is extremely durable using kevlar reinforcement in the boom along with three ply formers between the wing and the fin. All wood parts can be glued to the fuselage using C/A. A neat installation tool for placing the formers in the fuselage can easily be made. You need an aluminum arrow shaft or long 3/8" dowel with a small sharp pointed wood screw attached to the end and secured with C/A. By turning this screw into the formers, you have a long finger with which to place them into the tail boom.

Open the wood fuselage parts bag and start with the smallest round pre-notched former. Place onto the screw of your former placing finger and push the former back into the boom until a snug fit is achieved. Make sure the drive wire notches are to each side and the antenna tube notch is on the bottom. Drill a small hole (1/16) in the fuselage shell next to the former and wick C/A all around the former to hold it in place. Repeat with the two larger tail boom formers making sure to keep the notches in line.

Install the wing saddle former next with the tool. You should have gluing access for this part through the canopy opening and the wing rod holes. Install the nose weight retaining bulkhead next using the same technique as used in the boom area. The 1/8 by 3/8" servo tray supports are next in the canopy area as well as the tow hook block. Thick C/A is used for all of these installations.

Glue the stab pivot tube supports next using the stab pivot tube as a guide for alignment. Be careful not to glue the tube to the supports at this time. Find the stab drive wire (the one with the Z-bend and attach to the stab bellcrank. Feed the drive wire through the notches on the left side of the fuselage formers, and mount the bellcrank into the fin by installing the pivot tube through the support blocks and bellcrank. Don't glue yet. The fin post is the final piece installed in the fin. Take extra care here as, when this post is glued in, it locks the fin into alignment. MAKE SURE YOU HAVE IT STRAIGHT. After tack gluing fin post into proper alignment, drill a small hole at top of fin and wick C/A along front side of post. Cut a small notch at the bottom of the fin post for the rudder drive wire, and feed it through the notches on the right side of the fuselage. The rudder drive wire uses a simple 90 degree bend to attach to the rudder.

Next, install the wing rod tube in front of the wing saddle former. The hole is pre-drilled in the fuselage, but it is necessary to check the alignment between the top of your wing and the top of the fuselage before securing the tube. Make any adjustments to the rod placement with a small file. Once the tube is properly aligned and tack glued, mix a small amount of epoxy and chopped glass and pack around tube and fuse joints. Your fuselage is now ready to be prepared for finishing and painting.

Scrape all seams flat with a single edge razor blade and sand the entire fuselage with 220 grit wet. Fill any pin holes and sand again. The fuselage is ready for priming and painting. We have found HOBBY-POXY STUFF to be an excellent filler as it fills well, dries quickly, and is compatible with most any primer or paint.

Finishing the Wings

Install ply root rib with epoxy and microballoons making sure to have a flush fit with fuselage side. Measure 38 1/8" from root for 2 meter and 49 1/8" for the standard. Trim end of wing to this length square with the TE. Bevel toward bottom 20 degrees, and attach ply tip rib with UFO. Finish sanding the wing being careful to maintain a sharp, straight trailing edge.

Draw a line 1/16" to both sides of the hinge line for the flap and aileron. Cut this 1/8" wide section out. Bevel the leading edge of the aileron 30 degrees to allow for down travel as the aileron will be hinged on top. Bevel toward the top leading edge of the flap 5 degrees for reflex. Face the control surface leading edges and the mating wing surfaces with 1/16" balsa attached with UFO.

Tail Surfaces

Construction of the stabs and rudder are pretty straightforward. Both use a foam core sheeted with 1/16" balsa. The receiving tubes in the stabs are installed in spruce alignment blocks that are pre-cut to fit the core depth very well. The trailing edges are glassed in a manner similar to the wing. The rudder trailing edge is also glass reinforced so sharp trailing edges should not be a problem to maintain. Full-size beds for the cores are provided for all tail surfaces.

Final Assembly

After locating the servo bays in each wing panel bottom, trim away the sheeting and foam to give enough room for installation. Connectors and wire for wing mounted servos are included with the kit. 4 or 6 pin connectors both work well for this application.

Install the flap and aileron control horns in the bottom of each surface being careful to align it with the servo output arm. This can be done before or after covering depending on your preference. The method of holding servos in the wing we are using is by a small metal strap over the servo attached to wood blocks glued to the top sheeting in the bay. If you are more comfortable with another method feel free, but we have found this system to be very reliable.

The flaps and ailerons are hinged using the classic MONOKOTE style hinge. This hinge is an integral part of the covering with the top covering hinging the aileron and the bottom of the flaps. This has proven to be very flutter resistant and easy to do.

Measure and cut openings for the rudder and elevator servos in the servo tray and install and glue the tray to the supports and fuselage side. The on-off switch should also be mounted on this tray. Install your receiver and batteries between the tray and nose weight bulkhead.

Connect all electronics and get all throws in the proper direction. If this is your first experience using a programmable radio, this will take some time to get it all right, but the versatility is more than worth the frustration and time involved. Take extra care to make sure that your flap throws are symmetrical.

Setting the DUCK up for Flight

Suggested control surface throws are as follows: STABS-1/4 to 3/8" up and down at LE, RUDDER - 30 degrees, AILERONS - 1/2" or more up and 1/8 to 1/4" down, FLAP - 80 TO 90 degrees down at full

throw. No reflex is needed with the 3021.

The launch preset uses 1/4" to 3/8" flap and 1/16" aileron for full-span camber. No additional up elevator should be needed in the launch pre-set. The rudder mix when coupled is approximately 60% of the available throw.

The balance point for initial flights should be 3.75" from the wing LE. Stab incidence is 2 degrees from the wing. The tow hook location should be approximately 3 9/16" behind the wing leading edge. With the hook at this location, the DUCK rotates to a near vertical climb-out immediately after release. The tow hooks angle relative to the wing allows you to climb this steeply early in the launch without popping off the line. The climb-out after release can be nothing short of awesome. (PRACTICE, PRACTICE, PRACTICE.)

Flying

Initial hand launches, as with most new planes, should result in a smooth flat glide before putting it up on a winch. On the winch you will find the DUCK to be very well behaved. Plenty of line tension before release and keeping the line speed up will make it track straight and launch high. Don't be afraid to use lots of winch power. If you've followed our instruction guidelines for the wings, they'll stand up to most anything you can put them through. Release styles with the prototypes have varied from throwing the plane straight out to throwing upward at 30 - 40 degree. Both methods seem to work well. As you approach the turn-around at the top of the launch, switch from launch mode, drop the nose slightly, and stand on the winch pedal to build up speed. Try to avoid over-rotating after release and maintain a 40 - 50 degree climb. With practice, the DUCKS will out-launch any sailplane you have flown.

In flight, the DUCK can go pretty much where-ever you want it to. It has the ability to cover amazing amounts of territory, while the large wing area allows it to be buoyant at low to moderate speeds. Without ballast, the wing loading is around 10 ozs. per sq. ft. The DUCK penetrates very well at this weight (53 oz. 2 Meter and 65 oz. standard). The 2 Meters have carried as much as 17 ozs. of ballast very effectively. With this additional weight, the loading is just over 13 oz. per sq. ft. In high winds, penetration is excellent and the plane flies much smoother in turbulence.

Landing the DUCK takes some adjustment as the flaps are more effective than most other designs. With down elevator programmed for pitch compensation, 90 degrees of flap can stop a DUCK flying 30 - 40 mph in a matter of feet. You need to be careful with the flaps as you can actually make the plane fall out of the sky at low speeds. This has brought about a new landing technique for some contest fliers. They fly the plane 3 - 4 feet from the center of the circle, at 4 ft. altitude, and drop full flaps with crow and fall to the spot. One of the design goals of the DUCK was to be able to survive this type of punishment without the need for constant field repairs. I've been more comfortable in setting up for a landing higher and flying down to the spot using 60 - 70 degrees of flap. The landing thresh-hold for my VISION is set to introduce crow at 40 degrees of flap.

Use the full span camber available on your radio for thermalling, as well. This will take some time to learn but, in certain situations, the DUCK will thermal much better with camber added to the wings.

As was said at the start, the DUCK is a no nonsense, full-bore contest sailplane. Once you are familiar with it's abilities, it is also a comfortable and delightful plane to fly while you enjoy the performance. It will go where you aim it and can also be very aerobatic. In Michigan, it's not uncommon to see DUCKS burning off altitude at the end of a MAX with a high speed inverted pass or multiple axial rolls.

Mike Stump
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More on the International Modeler Show

...by Pete Marshall

Originally, my intention had been to simply attend the I.M.S as a spectator, gawk at all the sailplanes, and ask dumb questions. " Hey Mister, where's the engine on that Mustang?" Then, my friend Ken Stuhr of VS Sailplanes heard about my plans and said, "Hey, how'd you like to sell sailplanes at my booth, I could really use some help?" Then, Wil Byers said, "Why don't you write a report on the slope soaring planes for RC*SD*?" Whew! Suddenly, the trip became a working holiday!

Sensory Overload

As a first timer, I went into SENSORY OVERLOAD as soon as I entered the main hall. There was just SO MUCH STUFF! Luckily, my wife put me on a very strict budget. Otherwise, it could have been "THE GREAT CREDIT CARD BINGE OF THE DECADE". What we'll do here, is browse through the booths, giving you a look through my eyes, at all the SLOPE SOARERS at the show. At the end of the comments will be an Index of Companies along with the sailplanes offered.

Sig Manufacturing

Kicking off with SIG, one of the largest companies in the industry, Mike Pratt continues to promote slope with the very successful NINJA. This mid-sized ridge runner has foam core, E374 (10%) wings, with a conventional built-up ply/balsa fuse. Elevators and ailerons control this simply constructed, good, all-round sloper which is imminently suitable for advanced aileron training.

Mike showed me his new prototype sloper that MAY be produced by SIG as the "SAMURAI". (Yeah, I think Mike likes those Japanese names!) This airplane has similar construction to the NINJA, but sports a fixed VEE-TAIL, and PITCHERON control (wings only, move) for both pitch & roll.

Mike Pratt of Sig Manufacturing holding new SAMURAI. NINJA in background.

Bob Martin RC Models

Bob Martin from Lake Havasu, Arizona, produces sleek, tough slopers made of DURALENE (almost unbreakable polyethylene). Bob's COYOTE and SR 7, have been around long enough to establish a baseline standard by which other slopers may be measured.

The COYOTE is a low wing, elev/aileron ship with white foam cores, skinned with tough 1/64 " plywood. This is a big airplane with ample span and lots of area for light lift, still carrying enough weight to be fast in medium to heavy lift. COYOTES are fun to fly inverted, roll well, and they last forever. I flew one on Maui for a while, and when I handed the radio back to the owner to land it, he simply flew it into a bush!!! (The normal method, I was assured!)

The SR7 has a shorter span for increased roll rate, a bit longer and sleeker than the Coyote, for medium to heavy lift. The DURALENE fuse sports a shoulder mounted wing with no dihedral. This airplane is not for the beginner!

Bob Martin with SR-7.

Bob still offers two sailplanes in conventional built-up fuselages, the BOBCAT, a polyhedral aileron trainer/thermal type ship, and the TALON, a sleek, little, light lift aerobat.

NEW & EXCITING in the Bob Martin line-up, is a totally redesigned KATIE II. Named after Bob's wife, the new KATIE II is sleek and curvacious, very different than the original square fuselage of yesteryear. The new DURALENE fuse looks a bit like the old Graupner Cirrus, but has a full length, rounded chine, running along the waterline on each side. This rounded moulding acts as an external stiffener, as well as taking up any possible slack in mold mis-alignment, and provides a convenient area for trimming off mold flash. The tapered 72" wing, has a broad, pleasing planform, featuring balsa sheeting over white foam cores, with ailerons. This sailplane, with its long moment, dihedral, and generous tail surfaces, will be a fantastic aileron trainer. Bob is hoping for a production date of April 1991. The approximate retail price of $85.00 is targeted.

HOBIE HAWK Reborn?

Missing from the Bob Martin stables is the HOBIE HAWK! Bob finally sold the tooling for this legendary ARF sailplane to Ron Ross of ROSS MODELS INC. Initial production of the HOBIE HAWK will be available only from ROSS MODELS at a price of $350.00 ready to fly, with box.

Larry Hargrave Enterprises

Remember the JAGUAR sloper of the early eighties? While at the IMS, Katie Martin introduced me to the designer, Larry Hargraves. I told Larry that my ancient JAGUAR fuselage is turning into polyethylene dust after being accordioned too many times. After crying on his shoulder about flying on my fourth set of wings and second fuselage, he told me that once in a while he still does limited runs on this kit!!

The JAGUAR Power Scale Sailplane, (PSS) does resemble the SEPECAT JAGUAR used by many nations as a low-level ground attack bomber. The slope version fuselage, in DURALENE, has been stretched to increase the moment arms, thinned to reduce drag, and the wing area increased for light lift. The JAGUAR is a big sailplane, elev/ailerons, fast, aerobatic, and looks different than most because of considerable sweepback. Should anyone wish to revive an ancient JAGUAR, or simply build a totally new one, please contact LARRY HARGRAVE. Larry is planning on a production run of JAGUARS, to be ready by April/91.

Cheetah Models

Before leaving polyethylene fuselages, I shall turn to Bob and Larry Pettyjohn, of CHEETAH MODELS. This father and son team have developed the ultimate inexpensive sloper with their combat ship the SUPER CHEETAH. The cross-linked polyethylene fuselage on this bird is tough enough to stand-in for a Little League Baseball Bat!! Maneuverability is ensured by large strip ailerons, driven

by torque-rods from a single servo. The wings, stab, and fin are all cut from white foam and covered with a very tough, unique type of plastic-coated cardboard, called CROMEKOAT. Two wing profiles are offered: a thickened E374 (13.5%), for beginners, and/or light lift, or a stock E374 (10.9%) for faster flying, and heavier lift. The SUPER CHEETAH is a medium-sized sloper spanning 64" with 496 square inches. Listing for $52.95 the CHEETAH, is a deal and a half! Featuring knock-off wings (rubber bands) the SUPER CHEETAH could be the ULTIMATE BEATER, the plane you dare to toss-off where Angels fear to tread! It was made to survive. I ordered mine with a RED fuselage!

Absent this year, and now discontinued, the original CHEETAH, which was a smaller combat ship also had a "poly" fuselage. Larry told me that demand had dropped below the break-even point on production costs.

Enter, the LYNX

This little rocketship features aileron servos embedded in the white foam cores, driving broad-chord, and short-span ailerons. The bottom of the breakaway wing is clean except for the servo leads exiting into the fuselage center-section. The fuse is conventional balsa/ply with nylon wing bolts and Dubro wing hold-downs. Larry's demo had split stabs, each driven by its own servo, acting as elevons in concert with the ailerons for roll, and actuating in unison for pitch. Larry said that 400% per second roll rate is possible with the four servo set-up!! The LYNX is a small sloper, spanning only 50" with 388 square inches of area, flying at 12 oz. per sq. in., unballasted.

Slope Scale

Brian Laird of SLOPE SCALE really covered the WORLD WAR II Power Scale Sailplanes this year. Speaking from first-hand experience, I can tell you that these are very good quality kits, and well-designed slopers. All the kits are similar, in that they feature tough, light, polyester glass fuselages, high density blue foam cores with core beds for skinning, and your choice of wing sheeting. The kits are rounded out with pre-cut tail surfaces, and good plans and instructions.

These little Warbirds are fast, aerobatic, stand-off scale slopers designed for the experienced flier. Capable of flying in light lift, they really shine in medium and heavy lift and are very durable in the combat and landing environment.

I built the Mark IV Spitfire intentionally heavy (26 oz./ sq. in.) and it flies just great in medium and heavy lift. The Spit has the most benign stall characteristics I have ever seen on a model, with full up elevator, it just nods its head about 2 cycles per second, and just mushes along, never dropping a wing! My Spitfire looks so darn cute, I keep it hanging in the bedroom! All the SLOPE SCALE kits span 46 inches with wing areas of about 300 sq. in., or 2 sq. ft. A thinned E374 (about 8%) supplies the go-fast lift, with wing loadings of 12 - 18 oz. sq. ft. Most of the kits retail out about $120.00. Brian Laird will also custom build and paint your Warbird for you ($350).

Brain Laird with P-38 — Not a kit.

Ken Stuhr of VS Sailplanes with XINGU-100.

VS Sailplanes

Ken Stuhr, from Seattle, definitely covered the HIGH TECH side of the show! Back in the early 80's, Ken began producing XINGU, XICA, (SHEEKA) and then XINGU 100 (2 meter span, 68 in. span, and 100 in. span). These three airplanes, essentially, all have the same fuselage, differing only in wingspan and wing planform. Controls are unique in this plane, with roll being provided by WINGERONS (the entire wing surface pivots). Today, these are still available, and still ahead of their time. Ken, in conjunction with Ron Wagner, has perfected a unique molding technique that features seamless epoxy/glass construction, combined with a geodetic Kevlar tube in a pneumatically pressurized, female mold. Whew! Did I really say all that?

Encouraged by modest success in sales of these kits, and by the incredible performance of the XINGU line, Ken went on to develop the high-tech sloper for EVERYMAN. Originally designed in Plywood, the ROTOR took-off, perhaps, because it was cheaper or, maybe because the construction wasn't so intimidating with the wooden fuselage. (Actually, it was harder to build.) ROTOR, still carries the unique stamp of Ken Stuhr, however, featuring a totally static empennage, and PITCHERON control. (The wings pitch in unison for pitch control, and pivot in opposition for roll control.) As ROTOR became more popular, and of course more were crashed, slopers wanted a tougher fuselage, so Ken now produces a Kevlar/epoxy glass model. The ROTOR line emulates the XINGU by featuring an assortment of wings for different conditions or skills (58 in. span or 2 meter in different airfoils).

VS Sailplane kits are probably the best kits you will ever buy, anywhere. The plans are accurate, professional, and complete to the last detail. (Not surprising, since Ken is a draughtsman and an aeronautical engineer.) The wing kits feature high density, blue foam cores complete with core beds for skinning. All cores are cut with 2 degrees of washout. The skins are pre-cut and, get this, epoxy resin is provided to skin the cores! The instructions provided to build each kit are extensive to say the least, and will probably teach many new and innovative techniques.

Not satisfied to rest on the laurels of ROTOR, Ken took the PITCHERON concept a step farther by modifying a XINGU fuselage, producing a new airplane called Vmax and, then, Vmax-PLUS. By dispensing with the low aspect ratio fin of the XINGU, and replacing it with a static, high aspect ratio Vee-Tail, Ken changed and improved the look of this already sleek fuselage. The original Vmax concept was a PITCHERON control light lifter with a 2 meter span, but soon after came Vmax-PLUS, which utilizes the short span (58 in.) high speed ROTOR wing set! This Vmax-PLUS is definitely a good looking blade, and will slice the air into huge pieces!

Speed Merchants, Only

If you happen to be a SPEED MERCHANT though, the fastest production sailplane available on this continent is the XICA. This airplane was designed for big lift, on big hills, and to derive full benefits. Maneuvers must be flown BIG as well. I have flown the 68 in. span XICA for literally hours, in a 30+ knot wind, and the closest I can get to describing this experience is that it's like holding on to a tiger's tail!! Seriously, at 120 m.p.h. PLUS, you definitely want your mind out AHEAD of that plane!

Not satisfied to simply produce high-performance generic slopers, Ken produces small and mid-sized scale sailplanes as well. At the show was the 1/6 scale SALTO, a 2 meter PITCHERON sailplane featuring E374, foam core wings, and epoxy/glass fuselage. Running a wing loading of only 12 oz./sq. ft., SALTO (German word for loop), is designed for light lift cruising and mild aerobatics. (It rolls great!) A PSS addition to the VS Sailplane line last year is the ZULU. This little jet looks like an F-14 or MiG-29 (You choose the paint job.), and has conventional elev/aileron control. ZULU spans 44 in. with a loading of 12 oz./sq. ft. unballasted. Not at the show, but also kitted by Ken are the KOMET Me163, and the HORTEN HO IX flying wing PSS aircraft.

Ken's prices are actually quite ridiculous for value received. The ROTOR for example, sells for $115.00, the go-fast XICA, $155.00, the Vmax-PLUS, $115. The most expensive ship in the line, the XINGU 100 is 175.00. "Hey." I paid $165.00 for mine back in 1986!!

Rumblings from the VS Sailplane factory indicate that a NORTHROP YB-49 flying wing kit may be forthcoming at a scale of 1/2 in. to the foot.

Combat Models INC.

Byron Bruce and brother Derek produced the F-16 foamie the last couple of years in great quantities. That market they feel is now sated and they have discontinued the Falcon. Turning to the power plane market for bigger volume and increased sales, their new entry is the F-15 EAGLE. This foamie could be built as a PSS jet for heavy lift but, at a 33 in. span, don't expect sailplane performance. The Brothers Bruce do have some Power Scale Sailplane kits in stock at very low prices. These are the A-10 WARTHOG, the MiG 27, and the A-4, all featured at the price of 34.95 while stock lasts. The kits are fairly rudimentary, with built-up wooden fuselages, white foam core wings, plywood skins, some paper templates and construction sketches. I have flown COMBAT against Byron's MiG 27, and this is a fast little ship. I still have some MiG paint on the wing of my Jaguar!! (I think he got me!)

Douglas Aircraft

Doug Hertzog, the quiet man at the DOUGLAS AIRCRAFT booth showed his small but potent slopers, the SILHOUETTE, and the QUICKSILVER. The SILHOUETTE is definitely a small sailplane spanning only 43 inches, while the QUICKSILVER is an expanded version, about 53 inches. Both kits feature built-up wooden fuselages and foam core wings. Doug offers an optional glass fuselage for the SILHOUETTE. Doug also offers a foam cutting service aimed towards large volume orders of 100 units or more for kit producers.

Doug Hertzog of Douglas Aircraft with QUICKSILVER.

Dickey Bird Models

This company features A.R.F. type sailplanes with a unique type of construction. The wings are solid balsa sheet JEDELSKY construction. The fuselage is built around a solid, vertical, keel, which is a plywood/balsa sandwich similar to a profile, control-line model. The radio gear is then installed into cut-outs in the vertical keel and, finally, a vacuum formed plastic body is attached to the keel

Two PSS type aircraft with considerably stretched wings are featured: the SPITFIRE, and the Me109. These two FUN SCALE Warbirds may also be fitted with a .05 electric motor. The Warbirds both span 60 inches, with an area of 420 sq. in., weighing 27 oz. glider and 44 oz. electric.

Two other classic gliders of the 1930's are represented by a KIRBY KITE and a GRUNAU BABY featuring similar construction to the Warbirds. The Scale Gliders span 72 in., at 390 sq. in., weighing 27 oz.

Peter Marshall
21128 18th Ave. RR14
Langley BCV3A 7R2
Canada

More on the IMS

I was disappointed to note that (you) missed the Hobby Horn booth (in the March issue), manned by owner-operator Bob Sliff (F3E U.S. team manager), Ross Thomas and Dale Lemmons. It featured the Gnome 2 meter, one of the more popular wood kits in the Southern California area. Originally designed as a 60" hand-launch by John Lupperger (See: "Quiet Flight", *Model Airplane News*), it was later scaled-up to two and three meter size. The D-tube wing is basically an optimized Eppler 205, and I (and all the other members of The Harbor Soaring Society) I'm sure will attest to witnessing numerous full-pedal launches and zooms.

C. Nehring
500 S. Main #650
South Tower
Orange, CA 92668

Slope Soaring Index of Companies

COMPANY	SAILPLANE	FUNCTION	SPAN
American Sailplane Designs 2626 Coronado Ave., #89 San Diego, CA 92154 Gary Anderson 619/575-5133	ASW-20	1/3 scale, big!	5 meters
	GATES LEARJET	1/8 scale aerobat	65 in.
	PILATUS B-4	scale	2 meter
	LS-3	pocket scale	65 in.
	PHOEBUS	pocket scale	48 in.
	PENETRATOR P-51 PSS	aerobatic	48 in.
Bob Martin RC Models 1520 Acoma Lane, Lake Havasu City, AZ 86403 602/855-6900	KATIE II	ail. trainer	72 in.
	COYOTE	aerobatic	72 in.
	SR-7	aerobatic	54 in.
	BOBCAT	polyhedral ail.	2 meter
	TALON	aerobatic lite lift	50 in.
Cheetah Models 14725 Bessemer St. Unit B Van Nuys CA 91411 Bob & Larry Pettyjohn 818/781-4544	SUPER CHEETAH	aerobatic combat & trainer	64 in.
	LYNX	aerobatic	50 in.
Combat Models Inc. Fightertown U.S.A. 8535 Arjons Dr. Suite R Miramar, CA 92126 Byron & Derek Bruce 619/536-9922	A-10 WARTHOG	aerobatic PSS	48 in.
	A-4	&	48 apr
	MIG 27	combat	48 apr
	F-15 EAGLE	aerobatic PSS	33 in
D.C.U 1556 S. Anaheim Blvd. Unit C, Anaheim, CA 92805 Mark Hambleton 714/535-6969	MICROFLY	aerobatic	36 in.
	DRAGONFLY	aerobatic	
	SUPER DRAGONFLY		
	STRYKER	aerobatic PSS	
Dickey Bird Models P.O. Box J Westminster, CA 92684-000J 714/775-4153	ME 109	aerobatic PSS	60 in.
	SPITFIRE	aerobatic PSS	60 in.
	KIRBY KITE	scale	72 in.
	GRUNAU BABY	scale	72 in.
Douglas Aircraft P.O. Box 92472 Long Beach, CA 90809 Doug Hertzog 213/498-1737	SILHOUETTE	aerobatic	43 in.
	QUICKSILVER	aerobatic	53 in.
Larry Hargrave Enterprises 2271 Chevy Chase Dr, Glendale, CA 91206 818/244-3948	JAGUAR	aerobatic PSS	72 apr.
Ross Models Inc 708 Dermody Way, Sparks, NV 89431 Ron Ross 702/358-7677	HOBIE HAWK	rudd/elev cruising	100 in
Sig Manufacturing 401 - 7 S. Front St., Montezuma, IA 50171 Mike Pratt 515/623-5154	NINJA	aerobatic	58 in.
Slope Scale 12935 Laselle St., Moreno Valley, CA 92388 Brian Laird 714/924-8409	ME109, FW190	aerobatic PSS	46 in
	ZERO, SPITFIRE	&	46 in
	KING COBRA,	combat	46 in
	P-51, HELLCAT		46 in
Vortech Models P.O. Box 15132 Long Beach, CA 90815-9997 Jeff Fukushima 213/594-9365	ZERO,	aerobatic PSS	52 in.
	P-51	aerobatic PSS	50 in.
	F-15 EAGLE	aerobatic PSS	45 in
	BD-5	PSS	46 in
	V-1 VIPER	aerobatic	54 in.
VS Sailplanes 2317 N. 63rd St Seattle, WA 98103 Ken Stuhr 206/525-5776	XINGU 100	aerobatic racer	100 in
	XICA	speed aerobatic	68 in.
	ROTOR	aerobatic	58 in
	Vmax	lite lift aerobat	2 meter
	Vmax-PLUS	speed aerobatic	58 in.
	ZULU	aerobatic PSS	44 in.
	SALTO	scale lite lifter	2 meter

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*.

Case Hardened Steel Wing Joiner Rods

...from Dave Squires

The wing rods I offer are made of H11 tool steel. They have a core hardness of R44 on the Rockwell 'C' hardness scale. The case hardening measures between R65 to R74. This means that you can't even scratch the surface with a file. The thickness of the case varies between .008" and .018". The case hardening on a softer core makes for an extremely stiff rod that is not brittle but nearly impossible to set a permanent bend under normal flight and winch loads. Even a bad nose-in crash off a winch will only slightly tweak one of these rods. I know. I've done it. I believe these rods to be the only "bullet proof" ones that can be found anywhere. Carbon fiber is just as strong and stiff and much lighter, but tends to be brittle. These rods are TOUGH!! I guarantee them to NEVER set a permanent bend in flight or under the heaviest winch loads. The wings of your glider will fail before the rod bends far enough to be permanent. The only exception is that I won't guarantee them against bending on crashes. Hard landings will not be a problem. Most bending in the case of crashes will be slight and the rod can be straightened back out and reused. If you bend one on the winch or in flight, just send me the bent one and I will send you a new replacement free of charge.

The table below shows recommended ranges of diameter and length for different types of gliders. If you intend to do high speed aerobatics and want to do zoom launches wide open on the winch, then favor the larger diameters and longer rods. If you are just going to thermal and float around the sky and do normal winch or high-start launches, then the low end of the range will be safe. I use a 5/16" rod 12" long on a 110" home-built twist-wing glider. The only time I have tweaked the rod was on a nose-in crash on the winch. The crash destroyed the fuselage, but only slightly tweaked the rod. I could still slide the rod out of the joiner tubes with only a little binding. That should give you some idea how strong these rods are. My recommendations would be to use the tie rods according to the table.

I recommend the larger diameter rods for F3B because of the speed run requirements where 40G loads are not uncommon. Also, the strains on the winch are pretty heavy so larger rods make sense to avoid problems. The 1/2" diameter rods are unbelievably strong.

Dave Squires
2225 Fazeli Ct.
Campbell, CA 95008
(408) 371-4789

Wing Span	Glider Type	Rod Diameter	Rod Length
<2M	Slope & Hand Launch	3/16" - 1/4"	4" - 6"
2M	Light Weight Thermal	1/4"	6" - 10"
2M	Aerobatic Type	5/16"	8" - 12"
80" - 110"	Thermal and Slope	5/16" - 3/8"	10" - 16"
100" - 120"	F3B	3/8" - 1/2"	10" - 16"
3M - 5M	Scale Thermal & Slope	3/8" - 1/2"	12" - 24"

Floater G-110

...from Great Northern Model Engineering Company

Great Northern Model Engineering Company is pleased to introduce an exciting new concept to open class soaring - *low cost*! For a mere fraction of the cost of most open class sailplanes, you can build our new Floater G-110 RC Glider with a 110" wing span, six square feet of wing area, and a fuselage length of 48". Wing loading is a modest 7.9 ounces per square foot unballasted.

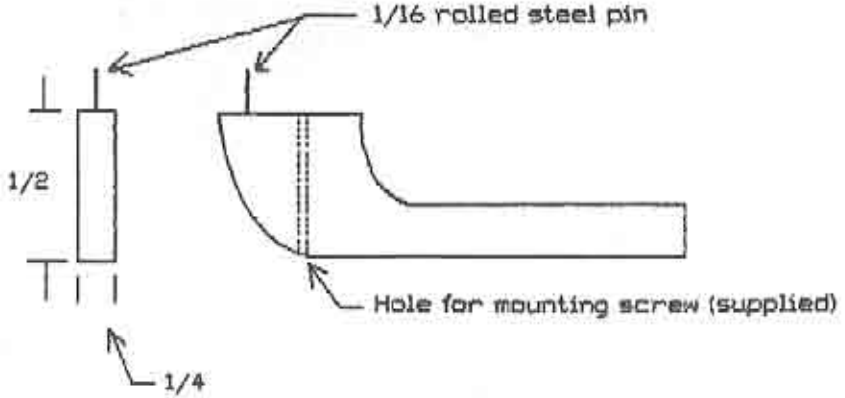
The Floater is a classic pod and boom design by Frank Zaic, noted author and designer, which utilizes economical built-up construction. Structurally sturdy, the design includes features such as an all plywood fuselage built from high quality, aircraft grade plywood imported from Finland. The Floater G-110 is constructed from top quality, hand selected balsa, spruce, and aircraft grade plywood (no lite-ply!).

The Floater airfoil is an easy building, flat bottomed, NACA 6409 section. It is 11% thick with a camber of 3.9%, and possesses flight characteristics similar to the familiar Clark Y section. Aerodynamically forgiving, the Floater will assume stable flight by simply releasing your transmitter control sticks.

The Floater saves you money because it comes with all necessary hardware components. The hardware package includes metal wing rods and tubes, nose weight, push rods, control horns, hinges, and adjustable steel tow hook.

Have fun and save money during the recession with a value priced Floater! The complete kit is priced at $48.00 plus $4.00 PH&I in the lower 48 states. Elsewhere, please add appropriate postage.

For more information, see our ad in this issue, or contact Great Northern Model Engineering Company at P.O. Box 9145, North St. Paul, MN 55109-9145.



Announcing the Super Towhook for 1991

$7.50 each, 3 for $20.00

John F. Clarke, 911 Covert Avenue, New Hyde Park, NY 11040; (516) 775-4780

FUN

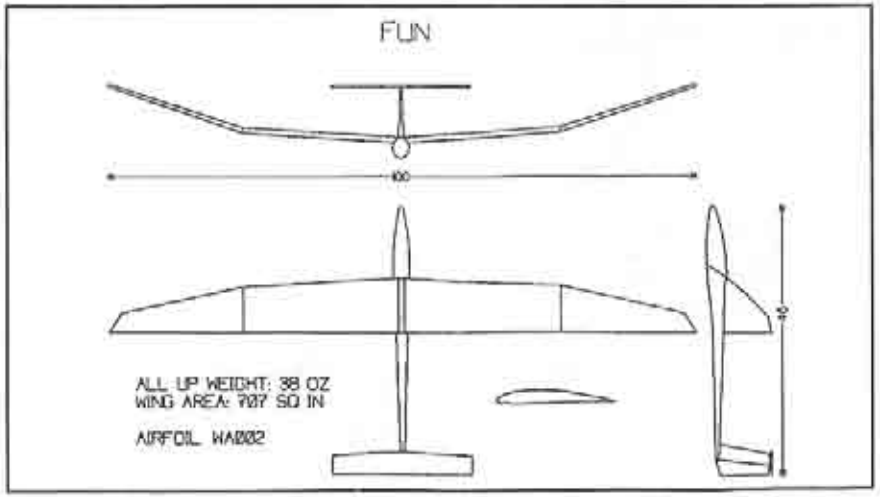
Are We Having FUN Yet?

Since the Hobie Hawk blazed its way into history, the world has stood in need of a good, affordable, pre-built sailplane. Yes, the Hawk had a few faults (sudden unexplained departures from flight, the wing loading of a whale), but all in all the concept of an affordable, pre-built, entry-level competition sailplane has its merits. There are many of us out there who just don't like to build and who also don't have fat wallets. There are also a great many power flyers who would like to try soaring but don't want to make a major investment in time and money. Many of us would like to get our sons, daughters, grandsons, granddaughters, wives, mothers, etc. started in the sport but can't see letting them try out our MAGIC in competition. The bottom line is 'that there is a need for a good looking, high-tech, affordable, stable, lightly wing-loaded, competition capable, pre-built sailplane.

The problem is that good looking, high-tech, competition, and pre-built, are not usually adjectives used to describe the same noun as affordable, stable and lightly wing-loaded. But now, Weston Aerodesign Co. (WACO) and modern American technology, in the form of miracle fabrics and innovative production methods, brings you FUN, the ultimate blend of contradictory adjectives.

FUN is an all composite construction, 100 inch span, polyhedral, 7.75 oz/sq foot wing loaded, entry level competition sailplane. The FUN fuselage is constructed of Spectra and fiberglass using the male plug and rolled boom method. The wings and empennage are vacuum bagged glass epoxy over extruded foam. The airfoil is the new WAOO2, a 12.5% foil designed for moderate performance and high durability. FUN is delivered completely assembled and ready to fly with removable nose-cone, Kevlar pull-pull control cables and hardened steel wing rods for $249.95. (Introductory price $199.95)

FUN can be flown with an inexpensive 2-channel radio, launched with a highstart, and requires no complicated assembly at the field. Wings and stab are completely removable, and FUN can be packed in a standard 48X10X10 lamp carton and



shipped or transported anywhere. FUN is not a plastic toy that will soon frustrate its owner with poor performance. FUN is not built in a sweatshop in Taiwan where first consideration is the profit line. FUN is built in a sweatshop in good old Arnold, MD, USA where first consideration is performance.

Right now, you are probably asking yourself three questions:

Question #1. How can anyone build and sell a quality sailplane for $199.95 and expect to stay in business? Good question. The answer is unique production methods and a willingness to innovate and take risks. They don't call us WACO for nothing.

Question #2. What in the hell is Spectra? Also a good question. Spectra is a new fiber which goes a long way toward making FUN possible. Spectra was listed as one of the top technical achievements of 1985, the year it was introduced. Spectra is the strongest lightweight fiber ever made -10 times stronger than steel. This strength is even more amazing in light of Spectra's incredibly light weight. Its specific gravity is .97 compared to 1.44 for aramid (Kevlar) and 2.5 for S-glass. Below is a table which compares physical properties to other commonly used structural materials.

What this table doesn't tell us is that Spectra has an impact resistance 20 times greater than any other material. Fortunately for WACO, we have acquired an experimental batch of plasma treated 2 oz Spectra of 7 mil thickness. This stuff is just right for fuselages and wing reinforcement. Imagine a 46 inch fuselage which can double as a baseball bat and which weighs a mere 2 ounces. FUN has it. Spectra is so light it floats, as stiff as carbon fiber, three times as strong, and has unbelievable impact resistance.

Question #3. How does FUN fly? The first test flight of FUN was a hand launch for trimming. The second launch was by hand to test trim changes - it lasted 12 minutes at an altitude of 50 to 75 feet with FUN playing small bubbles of rising air. The third launch was by high start. At the top of the launch the controls were turned over to a pilot who had never flown a sailplane. He flew for 20+ minutes and made the landing unassisted. He then bought the prototype. On his next landing, our new owner tested another aspect of the FUN design. He cartwheeled FUN wing tip to tail to wing tip to tail down the field. The only damage was a rudder which detached from its pivots when the concerned designer rushed to the crash scene and over-enthusiastically tested moveable surfaces checking for damage. FUN was ready to fly again in 30 seconds.

Hopefully, by now, you are asking yourself one last question: How can I get a hold of FUN? This answer is easy. Just contact us at (301) 757-5199.

Property	Spectra	Aramid	S-Glass	Graphite
Density	0.97	1.44	2.50	1.81
Sp Strength	315	198	188	137
Sp Modulus	18.1	8.8	3.6	21.6

NEW PRODUCTS NEW PRODUCTS

The following is a reply to a request asking if there was anything available on high-starts.

What a good idea! I hadn't thought of this as a subject by itself, but I have come to the conclusion that I could probably do at least an hour's worth of video on "Launching Equipment and Techniques". After all, I've been flying about 20 years or so now, and have probably seen and/or been a victim of just about every kind of launching device used!

I remember when I first started flying "gliders". My first was a Malibu...about an eighty-inch span, I think. We were launching on a high-start, hacked from some quarter-inch surgical tubing, some 30 pound test monofilament, a tent stake, and chute. (The first clever idea was the chute, for obvious reasons.) Airtronics hadn't yet released its "Launch Pail". We had, of course, skipped hand-towing altogether!

In any event, the problems I had, at first, had to do with CG and towhook location. Trying to solve two problems at once which had interactive elements was very frustrating, as I recall. (Launch, Crash, Rebuild: Launch, Crash, Rebuild...) Looking back on it, I think that since I broke the nose off and then glued it back on so many times I probably added enough weight to the nose to correctly balance the model! Then, somehow figured out to move the towhook forward a bit to eliminate an additional tendency to stall (and splatter).

Sailplanes which are not stable on launch are not fun! CG location and towhook placement (disregarding radio failure) are about the only things that could make a model do something stupid (like stalling) during launch. Most kit manufacturers show conservative towhook placement on the kit's plans. It's almost always best to use the position indicated for the first flights.

First, before you go out to the field, balance your ship in both roll and pitch. Use the CG indicators on the plans to achieve pitch-axis balance. Also, make sure to balance the model in roll axis. If one wing is heavier than the other, use one or more nails driven into the tip to achieve the proper balance. Use the indicated towhook placement. Also, make sure that you have fully charged your batteries!

At the field, stake out the high-start so that you will be launching directly into the wind, if any. It is best to have a 5 - 10 MPH wind when using a high-start as both stability and resulting launch heights are superior to times at which there is no wind at all. Also, if there are gentle winds, there is very probably thermal activity present! Good! Assemble the model making sure to check battery and servo connections, control surfaces, etc. Making sure you have a frequency pin, then range check your radio by collapsing the antenna and walking about twenty paces or so away from the model. If you can observe control surface deflection while moving the sticks, everything's OK. Otherwise, find out which battery you forgot to charge.

Next, hand-toss the ship to make sure it has a flat glide. If possible, find some very high grass or weeds to act as a cushion, just in case. To launch, jog upwind a few strides with the ship held javelin-style. If it feels like it's going straight...not trying to climb or dive...while continuing to jog, briskly push it out front away from the body, at about eye level, keeping the fuselage parallel to the ground until release. Re-read this paragraph until you can picture it in your mind.

You can easily do a hand-toss all by yourself, or you can trust someone to chuck it for you if you wish. (Just don't overdo it by throwing too hard.) Doing it by yourself is kind of a right of passage as when you've thrown the model into the air and then landed it, you've actually flown it yourself for the first time. It doesn't matter if you're a rank beginner, or seasoned veteran; throwing any new model for the first time gives you the same rush!

The next step after making the necessary adjustments indicated during the hand-toss phase is the maiden flight. Just make sure that you have hand-tossed the ship several times and that a relatively flat glide requiring little, if any correction, is attainable. So, now we're ready!

Retrieve the chute and pull back (downwind, of course) on the line until it has at least six pounds of pull. Heavier models — those weighing more than four pounds — should probably use eight to ten pounds of pull. (It's almost impossible to use too much pull on a high-start line.) Using a standard high-start rubber length of fifty feet, this amount of pull should occur at one hundred paces or so from the point at where the line was lying in a relaxed state. Let someone else hold the line or hook it to a stake in the launch area while you turn on your transmitter and receiver. Then, hook up the ring to the towhook and face downline (upwind). Hold the model in a slight nose-up attitude if there is no wind. If there is any wind, just hold the model so that the wind doesn't push up on the nose prior to release.

Now, comes the moment of truth. Release by pushing the model away, out and up...remembering to let go! Decide that you are going to let go prior to hooking up!

I'M GONNA DO IT! WOW, that's really climbing out FAST!!! (OK. Now remember...DON'T PANIC!...What you want to do now is just keep the nose going upwind, straight down the line. That's all. Just keep it going straight upwind.) OH, OH...it's starting to curve to the right...(PUSH the elevator stick slightly FORWARD and it'll straighten out.) OK...that's better. WHEW! It's starting to slow down and it's pretty high. What's next? (Just let the ship fly off the tow. If you have a bit too much up, you may have to push forward on the stick, then pull back a little to get the model to fly off. Once free of the tow, steer into the wind...etc.

Yeah, that all sounds simple. Right? But that's really all there is to it. If you can steer in a straight line, you should be able to easily launch on a high start. Below are a few common problems and what to do.

STALLING: The model stalls when its flying speed is too slow. Most commonly caused by too steep an attitude (the nose up too high). When this occurs, the model simply falls because its wings can no longer generate lift. The model will shudder, and then sharply veer to one side or the other on the launch. (Stalls while flying normally (e.g., not during launch) will usually be straight ahead, unless you're in a tight turn. Anyway, to regain stability in a stall, push forward on the elevator stick to increase airspeed. Reducing the angle of attack (lowering the nose) causes the model to gain speed and regain lift.

SPEED: Due to lack of line tension. If you haven't pulled back far enough, lower nose and fly straight ahead — don't turn! Just try to land straight ahead.

LINE BREAK: (Not likely unless there's a high wind.) Nose straight up — don't do anything until airspeed is regained. Try to achieve forward velocity before effecting control. HUH? OK. If the line snaps, the ship will normally climb straight up. Don't do anything, yet, as it won't do any good unless the ship is moving in its forward vector and air is flowing over the control surfaces. Wait until the ship stops upward movement, stalls, and starts to fall. Then, when the nose rotates downward towards the ground, the airspeed will increase and only NOW should you pull back on the stick to attain level flight (a save, in soaring pilot parlance).

LOSS of CONTROL — BEFORE launch: Turn everything on and tune everything out! Concentrate. SENSE...

Since you've now achieved a successful launch and understand how to correct any veering off, you can experiment with elevator settings to achieve maximum launch height. Just remember to take it easy, one step at a time and, if possible, get experienced help! D.O. Darnell, 4227 E. 83RD St., Tulsa, OK 74137

"Launching Equipment & Techniques" video will be available March 15, 1991.

Database for RCSD Articles and Sources (Part II)

...by Lee Murray

In the first part of this two part article, a description was given of the references to *RCSD* articles and advertisers and the value they add to the *RCSD* subscriber. In this article a somewhat detailed instruction is given to the novice computer user on:

* How to download the database files from a free 24 hour a day BBS, and
* How to import that information into the MS Works database.

Through the graces of Andrew Meyer, system operator of the Bear's Cave Bulletin Board System (BBS), the information is available "Free of Charge" except for the call itself. The BBS files containing the information in a generic form are offered in two formats (tab and comma delimited). Delimiters are characters that separate the information fields in the database. They can be downloaded (sent from Andy's computer to yours) by way of a personal computer having a modem and communications software. The operation described will be the downloading, and conversion of the tab delimited text files into a Microsoft WORKS database using WORKS communications software. The particular integrated software, WORKS, was chosen because it is a low cost integrated software package offered with a number of IBM PC/PS-2 clone computers. The discs containing the Microsoft Works files can be ordered from the author vs the downloading operation if you prefer to spend your money in postage and discs rather than for the cost of one or more phone calls.

CONNECTING WITH BEAR'S CAVE AND DOWNLOADING

Bear's Cave BBS is a 24 hr a day BBS which is available by dialing (414) 727-1605 in Neenah, Wisconsin. If you have the "Call Waiting" feature on your touch tone phone, you might add 1170 in front of the phone number to keep an incoming call from crashing the communications with Bear's Cave during the transmission. You should set your computer software to the following settings:

8 Bits
No or Masked Parity
1 Stop bit
X-On/X-Off Handshake

Although Bear's Cave can operate at 2400 baud, if you are calling from a great distance, have a noisy line or have difficulty, you might try a lower baud rate.

As you sign on you will have to enter "NEW" as your name. As a new user of this BBS you will be asked to give your name, address, phone number, and password for future communications. After this, you will have immediate access to the general areas for messages and files. The file transfer area is accessed from the Main Menu by selecting "T:ransfer" on the Main Menu. From here you can list the files available for downloading by selecting "L:ist Files" from the Transfer Menu. The files you are interested in are shown below:

Because there are over forty files available (not all *RCSD*), you will want to capture the list or print them as they are listed. As an option, you can apply the "*.TAB" or "*.CMA" mask to list the files of interest.

Select "D:ownload File" from the Transfer menu. You will be shown more information about the file and asked to confirm your intention. Use the Tab delimited version unless you need the comma delimited version. Select the file transfer protocol of your choice. X-Modem is the default and is selected by

KEYWORD .CMA:	1k :Key Words for RCSD DB - comma delimited
RCSD8486.CMA:	44k :RCSD database - 84-86 - comma delimited
RCSD8788.CMA:	52k :RCSD database - 87-88 - comma delimited
RCSD89 .CMA:	24k :RCSD database - 89 - comma delimited
SOURCES .CMA:	16k :RCSD equip & info DB - comma delimited
KEYWORD .TAB:	1k :Key Words for RCSD DB -tab delimited
RCSD8486.TAB:	39k :RCSD database - 84-86 - tab delimited
RCSD8788.TAB:	48k :RCSD database - 87-88 - tab delimited
RCSD89 .TAB:	1k :RCSD database - 89 - tab delimited
SOURCES .TAB:	14k :RCSD equip & info DB - tab delimited
XMODEM .DOC:	8k :Explanation of Xmodem transfer protocol

using <Enter> or Carriage Return. The options are:

Q: Abort Transfer(s)
0: Don't Transfer
1: ASCII
2: XMODEM
3: XMODEM-CRC
4: YMODEM
5: YMODEM Batch

Protocol (?=list, <C/R>=XMODEM) : 0

You will be told that Bear's Cave is ready to send and is waiting for you to start. At that point activate your computer's transfer mode.

In the MS Works Communications program, you use Alt-T to get the pull down menu to "Receive a File". You will have to name the file that will be used to hold the information. When you complete this, the modems will begin to transfer information. Works will show the size of the file and the number of bits transferred. When the file transfer is complete, your computer should beep telling you it's time to do something or be kicked off the BBS. There are several files to download so you might take the opportunity to take as many as you want at this time or come back for more later. I would prefer to look at what I have in the first file then get more later when you see that everything works well.

Because the database if fragmented into two-year periods, you may want to combine them. You can do this by extending one file with another or copying one file to the other using a Copy feature. A word processor like Word Perfect could load files successively allowing you to delete the field labels on files other than the first. These labels are the first lines of each database file. Save the combined file as a text file. My instructions now will pertain to Microsoft Works. Load Works and use Alt-F to get the File pull down menu. Select "Open existing file". When the program sees that this is a non-Works file, it will show you options that will allow you to open it as a Works Database File. What you will see will look a little strange since the fields will be in the wrong place, and be labeled with a generic label. Move the cursor over the generic field name and type the new field name ending with a colon e.g. "Vol:". Repeat this pattern for the other field labels. The last fields can be labeled C1: and C2: since they are text fields for the descriptions. There is a date field that you will see in the reference database which will appear as several numbers. This is an Appleworks date code which is redundant information. You can delete this field from your database.

The field size is adjusted by using Alt-F for format followed by Z for "field siZe". Change the field lengths to suit. I used the following field sizes for "Form View".

REFERENCES	SOURCES
Vol: 2	Company: 50
No: 2	Key Words: 65
Pg: 5	Products: 62
Contributor: 35	Address1: 68
Key Words: 40	Address2: 59
C1: 78	Phone: 30
C2: 78	Vol,#: 15

The "List View" requires different field sizes and not all the fields will appear on the screen at one time: To change the width of the field in List view, use the Alt-T for "formaT", select W for "field Width" then change the field as needed. The sizes I chose are as follows:

REFERENCES
Vol: 4 No.:4 Pg.: 5 Contributor: 30 Key Words: 30
C1: 78 C2: 78

SOURCES
Company: 30 Key Words: 20 Products: 40 Address: 40 City,State,Zip: 30 Phone: 15 Vol,#: 15

Be sure to save your work to a new file name so that you can go back and recreate the database should you discover a problem. In using the databases, you can move from one view to the other using the Format menu (Alt-F). Search for references using the Select menu (Alt-S) followed by "S" for search. You will have several options to create reports for yourself to search certain fields for information you would like.

I hope these two articles have served a useful purpose in getting you to use *RCSD* as the great information resource that it is and to become familiar with computer databases.

Good Lift,

Lee Murray
1300 Bay Ridge Rd.
Appleton, WI 54915

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