R/C Soaring Digest

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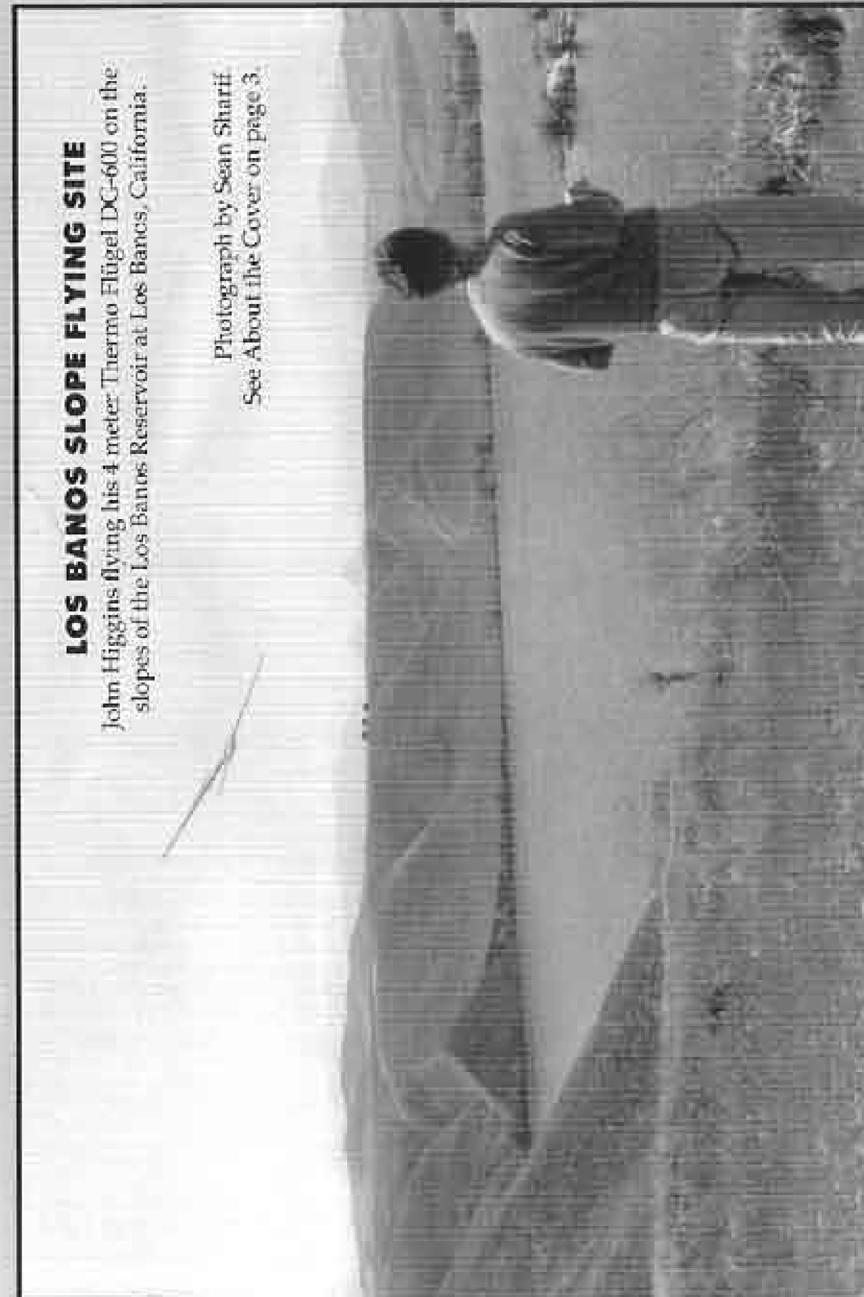

LOS BANOS SLOPE FLYING SITE

John Higgins flying his 4 meter Thermo Flügel DG-600 on the slopes of the Los Banos Reservoir at Los Banos, California.

Photograph by Sean Sharif
See About the Cover on page 3.

R/C SOARING DIGEST

A Publication for the R/C Sailplane Enthusiast!

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About the Cover

The cover photo was sent in by Sean Sharif of San Jose, California. Sean says, "I am sending the enclosed photograph in response to your request for cover photos. Although it is in color, and I don't know how it would reproduce in black and white, I still hope you can use it. It is probably one of the best photos I have taken on the subject of R/C soaring, as it captures, for me anyway, the essence of slope soaring. The picture was taken a few months ago, and it is of my friend, John Higgins, flying his 4 meter Thermo Flügel DG-600 on the slopes of the Los Banos Reservoir at Los Banos, California. Los Banos is the site of the annual Scale Slope Soar-In, and it is very much conducive to flying scale sailplanes as the lift is good and the landing area is plenty.

"By the way, John Higgins is a great enthusiast of scale sailplanes and at times he has half dozen birds in flying condition, and another dozen or so waiting to be built or in various stages of construction. He is currently working on a half

Sean Sharif with his latest ship, a Roebers Discus with a 4 meter wing span. Taken at Los Banos Reservoir.

scale model of the ASW-20.

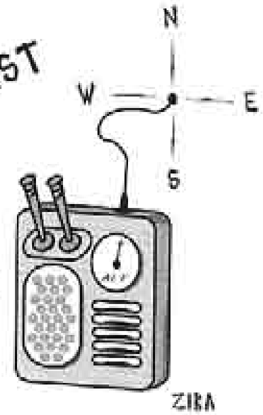
"At last I would like to thank you for doing such a good job on publishing *RCSD*. My friends and I enjoy it thoroughly and look forward to seeing it every month."

Thanks, Sean. Although in color, the photo is quite good, and should reproduce just fine.

Readers, Sean is one of the co-organizers of the Los Banos Scale Slope Soar-In. The event is scheduled for May 5th - 7th, and the announcement is included in the event section.

Happy Flying!
Jerry & Judy Slates

SOARING EAST TO WEST



with
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This month we're going to discuss some points you may want to consider while planning your big sanctioned contest this year, plus we'll hear from Alan Oliver in St. Louis about how a sport flying session with a buddy turned into a personal challenge. And, thanks to Mark Nankivil, we'll meet some people in soaring who attended the '94 LSF Nats.

Planning Your Contest

Did you know that sailplane flyers year after year attend more AMA sanctioned contests and consistently have higher number of entries than any other RC special interest group? Six years ago when our club was formed (MASS) a long term goal was to sponsor a nationally recognized contest. As a fledgling new club dominated by Gentle Lady pilots, we began holding a series of monthly club contests to gain practical experience to sponsor a sanctioned event. Our first AMA sanctioned contest was held in 1989 and drew 20 pilots, enough for a LSF Level V contest.

What should your club consider if you plan a sanctioned contest this year? There is an infinite number of details, so I'll hit what I consider to be the highlights.

First, form a team or committee of dedicated club members and select a date. Determine if you want a one or two-day event. There are pro's and con's to each. One-day events are somewhat easier to execute and less strain on manpower requirements and equipment. Generally, they attract fewer contestants. Two-day contests typically have a larger draw and are a lot of fun because it will attract contestants from greater distances. But, two-day events can also be a physical drain on your club. Take into consideration the size of your volunteer staff and determine if a one or two-day event best suits your club.

Select a date that is at least four to six months out and coordinate your date with regional clubs to avoid conflicts. Assuming your club has an AMA contest director, write or call AMA for a contest sanction form. Once you have received and completed the sanction, mail it to your District AMA Contest Coordinator. Names and addresses are listed in the competition section of *Model Aviation* magazine. The sanction will take several weeks to be processed. By the way, if your club doesn't have an AMA certified contest director, no problem. Call AMA and locate one in your area. Active contest directors receive free AMA membership.

While planning the many details and logistics of your contest, put on your "contestant hat" and consider what you expect, like, and dislike about events you attended in the past. Make a list of these ideas and keep in mind what it will actually take to successfully pull it off on contest day. Above all, make your event fun, and easy to execute considering the experience level of your club and availability of volunteers and equipment.

If you expect any out-of-towners to attend your contest you must PROMOTE, PROMOTE, PROMOTE. Start by sending a short Press Release about your event to soaring columnists in all of the national magazines. Most have deadlines months ahead of your contest date, so plan ahead. Send the same Press Release or a contest "flyer" to all of the regional newsletter editors in surrounding states. *RCSD* has a listing of newsletter editors and can provide names and addresses. Above all, send a contest announcement to *RCSD* well ahead of your contest date.

Practically no one enjoys a contest that begins with a slow, inefficient check-in processing followed by a rash of equipment problems. Have you ever been to one of these? First, have a system for processing contestants that is staffed by volunteers who understand the task. Second, begin registration, the pilot's meeting, and first flight precisely at the advertised time. Don't let those who are late hold up the contest; it's just not fair to the majority who were on time.

Too many contests become bogged down with winch and retriever line breaks. A top priority is to invest in new winch and retriever line, and re-string the equipment the weekend prior to the event. Make sure that all of your equipment is maintained and working. Assign your best operators to run the retrievers and let inexperienced people learn on another day. These people are key to a smooth running contest.

Plan ahead and have a good supply of deep cycle batteries for winches and retrievers. Deep cycle 200amp/hr batteries work extremely well for the rigors of contest use. There is nothing wrong with asking out-of-towners to bring back-up batteries and equipment, as well. If there's a short supply of batteries, consider renting a small generator and connecting chargers to all of your batteries. We've used a couple of different generator set-ups with good success.

If you anticipate 20 or more contestants, divide them into flight groups of 3 to 7 flyers. Be sure to space conflicting frequencies by 2 or 3 flight groups. This spacing helps prevent flight groups from becoming bottle-necked with heavy frequencies. Flight groups will also expedite your contest and streamline communication for calling up flyers. It is much easier and efficient to announce one flight group number than calling 3 to 7 names each time to fly.

Have periodic meetings with your contest committee and track assignment progress. Keep a "to-do" list and never, never stop asking yourself, "What are we forgetting?" Sanctioned contests make for great club activities. There's no better way to promote soaring in your area, not to mention it's a short drive for you and your members to rack up LSF points.

Sport Flying Becomes Personal Challenge

Alan Oliver from the MVSA club in St. Louis sent me an interesting letter about a sport flying experience he and a flying buddy had recently. The type of flying session Alan describes makes for a lot of fun and personal challenge and it only takes two people!

"As with most clubs, our club members participate in a certain amount of sport flying. Not unexpectedly, it seems that the people who sport fly the most seem to have the most success in our club contests. In addition, the people who compete well locally also seem to compete well at bigger contests. They may not win or place but they are calm and cool and collected at the winch at the big events. My personal ritual is to step up to my first launch of a big contest shaking like a leaf. I term big contests as any contest which is out-of-town, or has more than 20 people in it.

"Getting back to the original subject, sport flying is something I enjoy a great deal and encourage enthusiastically. Depending on the conditions of the day, sport flying can bolster your contest skills (timed landing practice, for example) or general flying skills (practicing the Old Buzzard's rules). Recently a club mate and I were sport flying on an early winter day. The day started out overcast and not very inviting, but we decided to go anyway. Much to our appreciation, the day turned out to be beautiful. The lift wasn't overwhelming, but it was certainly adequate. My first launch resulted in a 1:06:36 flight (my second Level IV duration flight). Two flights later, I was up for another 50 minutes plus. The second flight was the interesting one. My buddy and I launched within a few minutes of one another and each of us found lift. After 20 minutes or so there was some muttering from him about the idea that he could be out done by a two meter ship - the challenge was on.

"Several times I found myself low and looking. Each time I was patient, followed the rules and was rewarded by finding lift sufficient to keep me in the running. My club mate had to search for lift a number of times. After about 50 minutes, we landed within 30 seconds of one another. (Me last, yeah!)

"The great part about this flight was the challenge. Each of us forcing ourselves to try harder to keep aloft. Precisely the kind of flying which I believe improves

Cody Robertson and his O/D called the AeroBat. Fiberglass pod and aluminum arrow shaft boom. Cody developed his own airfoil for the model and the sheeting is basswood. Note the swallow tips.

flying skills. Winter lift in Missouri seems to be more stable but less powerful than spring, summer and fall lift (fall lift?). The sink is somewhat less vicious as well.

"So patience and smooth flying are the order of the day. At any rate, the hard core in our club fly year round with perfectly adequate lift available year round as well."

I believe Alan's experience demonstrates how sport flying can develop into some friendly, low-key competition where everyone wins by having a good time and learning something to boot!

People in Soaring

Thanks to Mark Nankivil, this month we're going to show you a montage of people and planes taken during the 1994 LSF Nationals in Muncie, Indiana. Thanks for the memories Mark, and here's to the summer of '95!

That wraps it up this month. Many thanks to you who have sent in articles and photos about your clubs and other soaring experiences.

Keep them coming, and we'll paint a picture of soaring east to west.

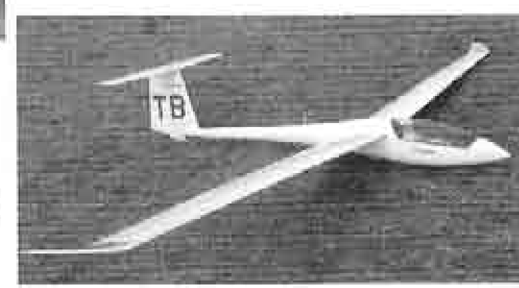
Thermals! ■

The Monarach fliers. Designer Joe Hahn on the left.

Rusty Shaw and his Pitch Moth. SD7037 airfoil, 400 square inches, 12.5 oz.

Don Harris and his O/D HLG. 390 square inch ship with S4061 airfoil. Don has flown this the last couple of years and it's a fine flyer. For those of you who don't know Don, he was the first LSF Level V east of the Mississippi River, a great guy and a gracious competitor.

Joe Wurts "javelin throwing" his Monarch. Great form, and big reason for his towering launches.



Terry Luckenbach's Unlimited ASW-20 flown by him to 10th place. Note the "tailhook" skeg at the base of the fin.

What Makes a Good Towplane?

...by Robin Lehman
New York, New York

Photo 10 - This smaller Robin 99 with a G62 pulls up a 1/3 ASK-18 (26 lbs.). The towplane is just starting a left turn.

All towplanes should have the following attributes:

1) They should not be overweight.
2) They should have a large enough wingspan to be seen at height.
3) They should be very stable and easy to fly.
4) They should have quite a bit of excess power.
5) You should have a Plexiglas viewing port in the nose (or wherever you have the fuel tank), in order to be able to look in and see whether or not you have enough fuel to take off for the next tow. If you plan to tow several gliders in one motor run, put in a very large fuel tank.
6) A tow release should be installed in the body of the tow plane near the rear of the wing. If you use a low wing towplane, put it on top of the body in a similar spot.
7) The towplane should be rugged, have a very forgiving landing gear and should be able to sustain many take offs and landings.
8) The air speed of the towplane should match the air speed of the glider. Why bother to tow at all?

Photo 9 - 1/2.5 Grob G103 Twin Acro. Weighs 50 lbs and floats around the sky. We need our largest towplanes for this ship!

Photo 1 - Senior Telemaster with an o.s. 160. Note the small stab on this ship. Weighs 12 lbs.

It's true that you can winch any glider, but the larger the glider (and the heavier it is) the less satisfactory the winching becomes. With quarter sized scale gliders and up, airtowing really comes into its own. When towed to one to two thousand feet of altitude, the resulting flights can last 15 to 20 minutes with no lift.

I might add, that once you know how to do it, airtowing is by far the safest way to launch and to fly the larger sailplanes.

Last but not least, airtowing makes gliders compatible with powered aircraft - there is no winch line floating down around the take off area to bother people. Most power R/C clubs have a limit on how many pilots can fly at any one time. This is because essentially everyone is using the same air space and so you are usually allowed 4 or 5 pilots at most at any one time. In the three clubs where I (and others) regularly airtow, an exception is made for towplane and several gliders. We are allowed to airtow in <u>addition</u> to the usually maximum number of pilots allowed to fly at any one time. This is so because when airtowing we immediately fly up, up and away from the crowd, and so do not add to the risk of mid-air collisions.

When landing and taking off, we follow the normal procedure for motor planes at the club. When there is a wait for frequencies, the gliders are treated just like a powered ship - a time limit! A little courtesy goes a very long way!

The precision required of doing a good airtow is challenging enough to interest your best powered pilots - and where will you find such a person? In the normal R/C club!

<u>The very best towplanes that I have used:</u>

1) For smaller gliders less than five (5) pounds like the Gentle Lady, Olympic 650, etc., the <u>Telemaster 40</u> with a 50 or so motor for power.
2) The <u>Telemaster 40 with a 60 size motor</u> for the Olympic 99, the Aquilla Grande, etc., and the lighter quarter sized scale ships like the Roke ASK-18, Robbe ASW-24; but for these, there is a much better choice of towplane if you are starting from scratch and have a choice:
3) The <u>Senior Telemaster</u> with an O.S. 108 (or equivalent) for power. With an APC 15 X 8 prop this motor puts out 14 + pounds of thrust. The Senior Telemaster will tow scale ships up to 15 pounds. An O.S. F.S. 160 twin with a 15 X 8 APC prop gives the same power as the O.S. 108, with a superb sound, but costs much more. (Photo #1)
4) If you choose to build your own <u>Senior Telemaster</u>, here are a few suggestions:
   A) Beef up the center section of the wing with ply dihedral braces.
   B) Put aileron servos in the wing.
   C) Beef up the body especially

Photo 2 - ARF Senior Telemaster with (L - R) 1/4 ASK 18, ASW 24, Twin Astir, and SB 9 on the ground. Weighs 12 lbs.

the front end, adding 1/32nd of an inch ply from the front to the rear. This adds very little weight but adds a lot of strength!

D) Put the rudder and the elevator servos in the rear of the body.

E) Use 5 inch wheels and a nice forgiving fiberglass undercarriage. Attach this to the body with 4 - 1/4 X 20 nylon bolts in case of bad landing.

F) If you use a gas motor such as a G23 or G38 (or larger) motor on the Senior Telemaster, make sure to strengthen the body and the wings even further.

G) Always use struts when flying the airplane.

H) Use one less rib on either side of the stab (elevator). It flies better with a smaller stab and looks much better!

I) Use about half the dihedral called for in the kit. This make the airplane a little bit easier to turn and a bit more responsive.

J) Use a 24 oz. or larger tank and make the front hatch for the tank compartment of Plexiglas so you can see if you have fuel for multiple tows.

5) If you plan to use the ARF Senior Telemaster, the O.S. 108 fits right in with just a little sliver taken off the motor mount. DON'T FORGET TO USE THE STRUTS!!! They don't tell you this in the instructions! (Photo #2)

Photo 3 - Clipped wing Cub with G-38 and Ka-6E. Weighs 14 lbs.

6) Other possible towplanes suitable for scale gliders up to 15 pounds are: quarter sized Cubs with the O.S. 108, O.S. 4-stroke twin 160, a G38 or larger motors. (Photo #3) I have used the Byron Husky with an O.S. 320 4-cylinder 4-stroke, but this is a somewhat fragile airplane and, in the long run, is easily damaged. It does tow very well, however.

Popular in Europe is the Polish Wilga - it comes in many sizes. This one has a G38 for power. (Photo #7)

Photo 7 - Polish Wilga comes from 1/5 to 1/3 size. It is very popular as a towplane in Europe.

Photo 4 - Enlarged Robin 99 with a Quadra 100. Weighs 25 lbs.

7) For up to 1/3 sized gliders weighing 30 pounds or more, the G62 with a 22 X 8 zinger prop which pulls 24 pounds is the sort of motor you will want to use. We use a modified and very much strengthened Robin 99 for this task. Indy Hobby still sells this kit, but if you do get it, you will notice that it is almost entirely built out of balsa - you need to add lots of ply up front and along the body and also beef up the wings with extra ply dihedral braces.

Another airplane I have used with the G62 is a Yak 112 (Airworld in Germany), an all-glass scale ship with a span of 9 feet +. (Photo #6)

8) For the very largest sailplanes up to 50 pounds (27 foot span) we use the above mentioned Robin 99 with a Quadra 100 with a 24 X 12 zinger prop - this pulls 32 pounds static thrust. (Photo #4)

9) Last but not least, the largest of all towplanes that I have used is a 1/3 Stinson L5 (Vailly Aviation Plans) with a Sachs 8.4 twin with a 26 X 12 prop which pulls 35 pounds static thrust. (Photo #5) This is perhaps the nicest towplane of all as it is very scale and realistic and flies

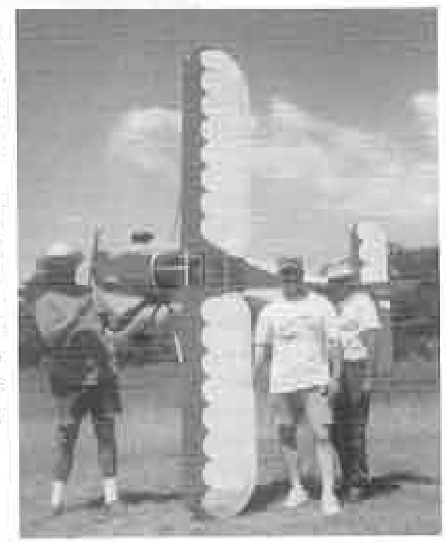


Photo 5 - 1/3 Stinson L5 with an 8.4 Sachs twin. Weighs 34 lbs.

Photo 6 - YAK 112 with G62 up front. Weighs 22 lbs.

Photo 8 - This Jodel Robin has a span of almost 10 feet and weighs in at 26 lbs. with a large twin up front.

with a lot of excess power. The L5 glides almost as well as the large sailplanes it tows! This is a beautiful ship and will pull anything and everything.

Also very popular in Europe is the Jodel Robin. This will be my winter time project. (Photo #8)

There have been many articles on how to airtow which I'm not going to go into here. Certainly the right combination of towplane and glider is of the utmost importance, and if you have an excellent towplane to work with - with all of the above mentioned attributes, you will be well on your way to success.

One last point about motors and propellers - when running a motor for the first time, I always do a "pull test" with a fishing scale to see which prop does best. You would be amazed at how much difference the correct prop makes.

Towing, by the way is pulling - not the same as doing aerobatics, and so I have found that in this case the fishing scale does give you an accurate reading on what prop to use. This has been borne out in the air when I have tested various props. And guess what? Most manufacturers do not know what static thrust their motors will pull.

Now that you have read all this, and you know that your buddy has a something or other in the basement with a such and such motor on it, you might be wondering if this thing will be a good towplane. If it's overpowered, has a light wing loading, flies extremely well, and is easy to handle, the chances are you might have a good towplane there. Just bear in mind the one cardinal rule when towing - especially if it's your first time - IF IN DOUBT GET OFF THE TOWLINE - release - and try again!

Those who fly power will know the characteristics of the airplanes they were flying, and with a little preliminary conversation you can go a long ways towards figuring out whether or not such and such airplane will do the trick.

Good flying to all! ■

Condensation & Bursting the Bubble

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

In the September 1993 issue of *R/C Soaring Digest*, Graham Woods reported an unusual condensation pattern on an Ellipse wing. Woods speculated on the possibility that the pattern of condensation was caused by a bubble of stagnant air over the airfoil. Elliot Cohen and I observed a similar effect last spring. I was shagging the parachute while Elliot was making a number of short flights to trim his F3B Eagle. Somewhat after sunset, and after the last flight of the day, a pattern of condensation developed on the Eagle's wing. although the day had been warm, when the sun went behind the mountains, the air quickly cooled and the air over the pasture was still and somewhat damp. The pattern of condensation which developed on the Eagle's wing resembled the picture included in the Woods article. Because the skin on the Eagle wing is somewhat translucent, it was possible to see that the condensation appeared in areas where the skin is unsupported, but not where there was underlying structure. It is my conjecture that the pattern of condensation resulted from the thin skinned portions of the wing (low thermal mass) being cooled during flight more than the areas above the spars, ribs, or other areas of skin which are reinforced. What I believe is that a similar effect can sometimes be seen on auto hoods when the structure of underlying braces appears in dew or frost. The pattern appears when the auto is parked. The pattern is caused by the skin above the underlying braces cooling more slowly (greater air mass) than the metal on the remainder of the hood. Because the condensation on the Eagle's wing only appeared on large areas of unsupported skin, and never over areas over the internal structure, I'm inclined to think what I saw is unrelated to a bubble of stagnant air. My explanation could be tested by taping a coin under the skin. If the coin shows up in the pattern of condensation, then the pattern is due to differential cooling. ■

by Curt Nehring
San Dimas, California

on the Wing

B²

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Alan Schwerin's "Essence"

Dr. Alan Schwerin, of Lake Charles, Louisiana, wrote to tell of his latest project, a swept 'wing which he calls "Essence". This 'ship, his second 'wing, has several characteristics which will be of interest to tailless enthusiasts.

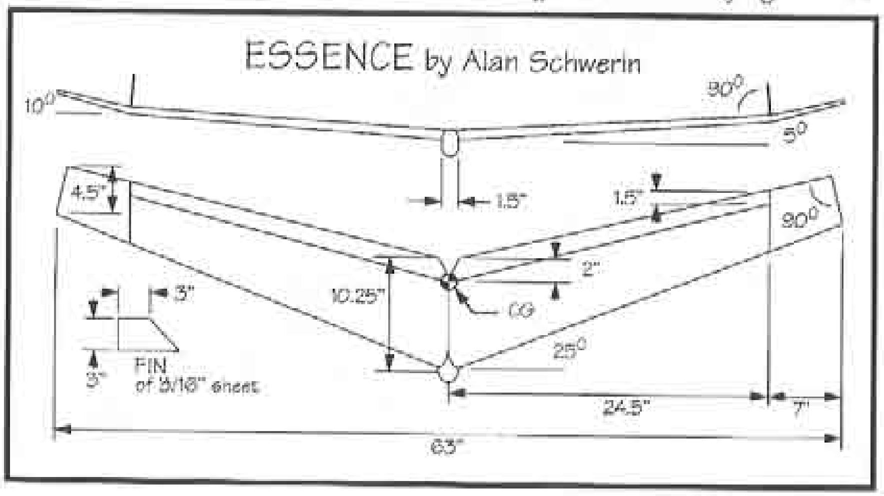
Alan used the SD 7037 as the root section and the SD 8020 for the tip. The transition from one airfoil to another is linear across the semi-span. Neither of these airfoils is generally considered to be appropriate to tailless applications, but the combination seems to work very well for this planform. Lateral stability is achieved through use of enlarged fences. These fins are three inches high and are outboard, at about 80% of the semi-span.

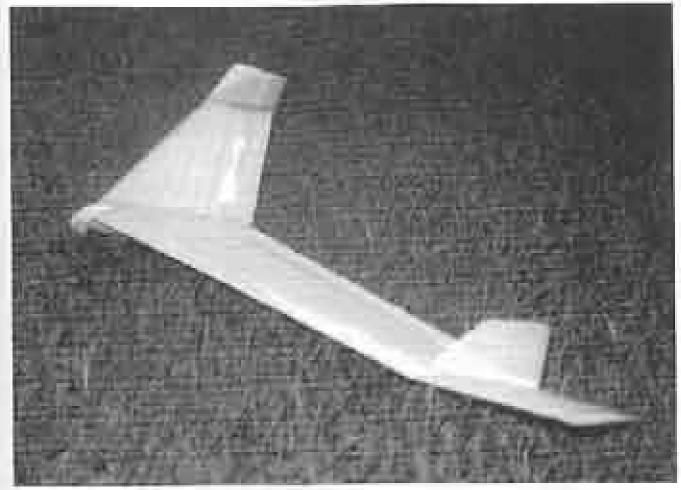
Alan put five degrees of dihedral into the wing's center panels, and ten degrees of dihedral into the outer panels. Dihedral usually makes winch and high start launching difficult, but this has not been the case with "Essence" — it high starts very easily.

"Essence" is constructed of blue foam which has been sheeted with obechi. An Airtronics micro receiver, two micro servos, and a 100 mah battery make up the flight pack. Elevons serve as the only control surfaces. These extend out from the root to the fins, and the roll rate is excellent. A minimal fiberglass keel provides a hand hold and houses and protects all of the radio gear. Total weight is 17 ounces, but with an area of 450 in^2, the loading is down to 5.44 $oz./ft^2$.

"Essence" started out as an RC-HLG, but it was soon discovered that, despite its relatively low wing loading, its ability to circle was not nearly adequate for HLG contests. "Essence" does, however, have a rather broad speed range, and is capable of flying nearly as slowly as an Eppler 387 equipped RC-HLG of conventional tailed configuration. This makes for a lot of leisure flying fun.

Alan concluded his letter with the following observation; "There are so many negative comments in the literature about 'wings and their inefficiencies, I had to find out for myself. I am not entirely sold on 'wings, but the fun of trying out one's own ideas, over very high grass, appeals to me."





"Essence" by Dr. Alan Schwerin

Questions, comments, ideas, suggestions, and materials for future "On the 'Wing..." columns may be sent to us at P.O. Box 975, Olalla, WA 98359-0975. ■

Jer's Workbench

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Something nice to have

I recently made the monthly trip to Home Depot to get some Fire Ant poison for my Fire Ants. If you haven't seen or heard anything about Fire Ants, that's good. Unfortunately, they are a nuisance here in Texas; just one bite can cause a great deal of pain. The poison doesn't kill them; you just have herd them around and keep them out by the barn. Anyway, while at Home Depot I like to wander up and down the different aisles to see what else I might need.

I stopped in front of a sale area. Looking over the items, I said to myself, "Well look there, a sale on foam rubber carpet padding, $.35 per. ft. I can probably use some of that!" What am I going to do with it you ask? Well, I took some home and cut it into strips 12 inches wide and 6 feet long. The strips make a swell pad to lay over a workbench; I can lay a wing on the pad when working on it. Over the years, the workbench has become a bit rough, and with bits of epoxy here and there, I don't want lay a wing directly on the bench as it will damage the wing skin. When the pad is not in use, it is rolled up and put on the shelf out of the way.

I also found something else while wandering the paint department aisles of Home Depot. Krylon has Appliance Epoxy Paint in a spray can. It is fast drying, resists stains, fading, chipping and is scrubable. I have just painted a fiberglass fuselage with it and I like it. Try it; you may like it, too.

Something else worth looking for? Look in your local telephone book in the yellow pages to see if you have an "Exotic Wood Place". I did, and found for myself a piece of Bass Wood, 1/2 X 8 X 96 inches; the cost was $15.00 plus tax. I cut it into strips that will be used for leading edge stock. If you are still using balsa wood on your leading edges, try the Bass Wood. It's light, stronger than balsa wood, but yet soft and easy to work with.

This is it, keep your wing tips up and will be with you next month. ■

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Hitting the Spot

Well, it appears that thermal duration contests of the 90's are won in the landing zone most of the time. Those that have better landing capabilities can come from behind, or separate themselves from the pack. Now this is not always the case, but if you want to win on a regular basis, you better sharpen up your landings.

A few months back, I did a quick review of the landing pattern and zone, leaving this article with a promise for the finish. So, here it is.

Recapping what was already said, the first thing you must do is set up an approach pattern. This could, or will, include an up wind leg, then a down wind leg, base leg, and a final approach. You will probably want to use the up wind leg. This mainly applies to full size ships. Now, the reason for the pattern is mainly to slow down the plane, and use up the last minute of flight before touch down.

This past year, I timed for a lot of different folks, and there were only a few good at landing at the right time and scoring high scores on every flight. They also won the contest or placed real high. Now, the things I noticed about the folks that had the good scores, was that they had a set up for landings and they used it ninety percent of the time.

I can't stress enough about a planned pattern for your final minute of flight. Normally, the last minute for most of us, we are so tense that you could break a two by four across our back and not even break the skin. What I would like to do is try and talk you through the last thirty seconds. You might say, "Now, who is Cornfed, and how can that hill billy help me?" Well, I probably practice thirty to fifty landings a week. My times are within two seconds of desired time, and my landing scores, eighty five to ninety percent of the time. And, if that ain't enough, you can ask my wife. She believes everything I tell her.

O.K. Now to the meat of this here article. You will have about thirty seconds left to go. Your timer will be calling out the time, or you might be using a small Sony Walkman. Anyway, at about thirty seconds, you will want to be ninety degrees off of your left or right shoulder. Now, as far away in feet, that will be determined by how much time you will need to burn up on your base leg. You will have to decide. If you want a ten second base leg, then you will need to be about two hundred feet away from you, at thirty seconds.

All right. You just flew the plane by you at thirty seconds, and at about twenty two seconds you turn on the base; so, maybe you're fully into the base leg at twenty or eighteen seconds to go. Now, here comes the critical judgment call. **When do I turn onto the final leg?** Let's stop here for a minute and let me say that these times might vary for each of us. This is just a paper landing, and you will want to develop your own times for where you want to be at thirty seconds, and when is base, and how much time you will need to make that final approach.

So, let's make the final approach. For myself, I will turn onto final at about fifteen seconds to go and, if I can get everything across to ya'll, I hope this will be what you understand the most. I have noticed that the biggest mistake that people make is that they don't know the timing of the plane in relationship to speed and the distance needed to cover the amount of ground that the plane will have to travel during the last fifteen seconds on final.

Here are two reasons for bad finals:

1. Too high and having to put the nose over, which causes too much air speed, causing a fly through or dart landing. This is what I call an almost out of control landing.
2. Making a real deep or far away final approach, will cause you to either fall short or get to the zone late. This approach, of course, might work for you, but in my case, it is always harder to judge the amount of time I need to burn off when the plane is far away (straight away coming at me).

There are probably other reasons, but these two are enough for now. On final, I hope you have some kind of speed control devices on your plane. Preferably, flaps. The reason being, is on our gliders we have only two ways to slow down and speed up the planes: elevator and air brakes. They are not like power planes where they can be powered up if the plane is falling short of landing; a glider must be landed with speed control and directional input. This is, and will be the key, to good timing and projected final touch down of your plane.

So, now you turned onto final and dropped the flaps. Everything looks good except that you look a little too fast, and might arrive too soon. Pull full flaps and give as much up elevator as the plane can stand without stalling it; don't balloon the plane up! Just ease into it with both flaps and elevator control together. Now, the plane will still be coming towards you, but its descent will change. It will look like it is mushin' in, kinda droppin' down, which is a flare out. Yeah, a flare out.

O.K. Now you have slowed the plane down and you are looking good, but what if you have to speed up to make the time? Ease up on the flaps and give it some down elevator. What I'm trying to say is that, if you can just drop the flaps, put the nose over, and point for the circle, it will be a hit and miss type landing. This procedure only works with a lot of practice.

If you look like you are going to land short, then you will need to bring up the flaps; don't forget that if you pull them up too fast, you can cause the plane to quit flying, because you were already flying below stall speed for the plane. So, ease the flaps up, and give down elevator at the same time.

Another problem that could happen is to arrive a little late. You could be right on the deck and carrying a lot of air speed, because you are pushing the plane to get the time. You pull the flaps, and immediately give full down elevator. If you don't give down elevator, the plane will balloon up and change your planned approach angle.

Now, let's land on the spot. What you are trying to do is make a controlled landing with air speed controlled by the flying surfaces. The best way to determine, as to when you will put the plane down, will be by hand and eye coordination, removing as many problems as possible.

One problem that needs to be addressed is how to fly straight down the line. A real airplane won't decide to line up with the runway at the last moment. They line themselves up way ahead of time, and that is what you need to do when you turn on final. Make sure you are coming right down the imaginary line to the tape. Your body is part of that line; therefore, you must be straight in line with the tape. If you come in from an angle, you must shift yourself around to make an imaginary line between you and the head of the tape: the one hundred point spot. It is easier to shoot pool balls straight than to have to shoot one ball off the side of another ball in order to make the balls go to the planned spot. That is what you are doing. Making two objects meet at one spot with your eyes.

If you bring the plane straight down the line with controlled air speed, it is much easier to put her down where planned, versus too fast, poor alignment, and having to put a lot of side-to-side directional input into the plane. One cannot think and do that so fast. So, take out as many problems as possible when you first turn onto final approach.

Slow the plane down as much as possible, and fly it straight down the line. And, when you drop the nose over to hit the spot, allow for a margin of slide.

In closing: PRACTICE, PRACTICE, & PRACTICE!!

Signing off,
Cornfed

P.S. Say your prayers and eat your vegetables.

ATTENTION: Ed White of Stanford, Florida. Would you explain to cousin, Earl, that C.G. don't mean cookin' good. It means Controlled Gravity... ■

Lighter is Better???

An interesting part of the sailplane sport is all the controversial subjects involved in sailplaning. I bigger better? What airfoil to get? Who makes the best plane? And, lighter planes fly better?

With some of the new airfoils coming out, I got to thinking about making a very light plane. The new 7012 airfoil that I have been flying on a two meter Vulcan works great. The 7012 launches much like the 7003, yet can be slowed down for thermalling like the 7037. The 7012 launches like a missile and retains energy extremely well. My thought was to give up some of this energy retention by building very light and maybe wind up with a plane that would be light and still penetrate well.

The procedure I used on the Vulcan can be applied to most any sailplane if you happen to feel that lighter planes fly better.

The fuselage was first. If you are willing to wait a little longer, most kit manufacturers can order a lighter than stock fuselage from their suppliers at a very small price increase. But remember that the fuselage will not be as strong as the stock one. I ordered a light weight fuselage and saved almost 2 ounces. The canopy is held on by tape. The servo tray is made just large enough for the servos. Any extra wood was removed. Wing hold down plates were made as small as possible and were taped for the wing hold down bolts. No steel T-nuts were used. Wing hold down bolts are nylon. Pushrods were installed with CA glue using Z-bends, only. No clevis, and in the case of the Vulcan, the V-tail is held on with nylon bolts taped into a small plywood plate. The fuselage was sanded to remove any excess glass and left unpainted. The battery was pushed as far forward as possible, and no switch was used. The battery was plugged directly into the receiver.

The tail was worked on next. To begin with, the V-tail is already fairly light, but to make it even lighter, I cut as much of the center out as was practical and ran a few cross braces for strength. The V was glassed to the hold down plate with 1.5 oz. cloth and epoxy, and any excess epoxy was blotted off with a paper towel. The tail was covered with Ultra Coat plus, and small plywood horns were CA glued on. Pushrods were installed using a Z-bend. The completed tail weighed 1/2 oz.

The wing, like the fuselage, was also ordered special. I requested a light wing from Mark Allen with the understanding that it also would not be as strong as a stock wing. One thing Mark did was to use a hard balsa spar instead of a hardwood spar. I am not sure, but I would think that less carbon fiber and epoxy was used. Anyway, the wing weighed a few ounces less than a stock wing. I capped off the surfaces with balsa instead of bass and used very light balsa for the tips. Servo mounting gears were removed, and any excess material was removed from the servo arms.

The cases were also sanded down a little. Servo wires were extended to a point that they could reach the receiver, eliminating extensions. Control horns were made of plywood and control rods used Z-bends to again eliminate clevises. The outer panels were glassed to the inner panel with 4 oz. cloth, and excess epoxy blotted off. Only two coats of polyurethane was wiped on, and tape hinges were used.

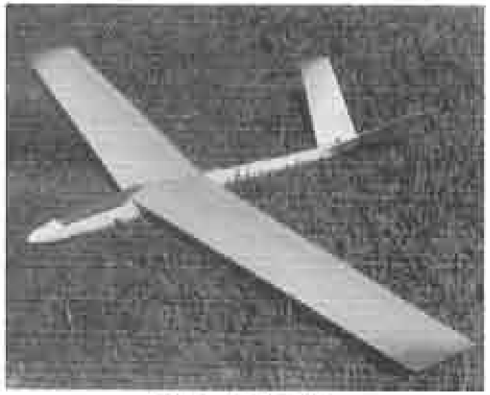
Every effort was made to keep the weight down and to try to get the CG correct without adding nose weight. Actually, the plane came out a little nose heavy, and the receiver had to be moved back.

A stock Vulcan builds out at about 35 - 37 oz. My light weight Vulcan, ready to fly, is 27 oz. I was very happy with this. I thought this would make a really neat two meter light weight for thermalling, yet enough penetration to get back up wing and still enough energy retention for launching.

The first test flights were on a day with a slight breeze and not much lift. After all the effort, time and extra money, guess what?? It did not fly any better than the stock plane under the same conditions. I mentioned this to Jim Thomas, and he said he was not surprised. He said that some airfoils fly better at center wing loading, and maybe the 7012 was one of them. This seemed to make sense and a very good point. I also mentioned this to Mark Allen, and he said lighter is always better because it would fly better in real light lift conditions, and you could always add ballast if the wind picked up. Another good point.

Well, the controversy continues...

Good Flying! ■



This Old Plane

...by Fred Mallett
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Traveler

There is no such thing as one size fits all, and this is one plane that will fit no one task, perfectly. This aircraft was designed to meet the needs of my summer business traveling. Summer traveling, because I am sitting on a plane as this is written, and it is 6:30, and at 24,000 feet it is already dark. So much for after work sessions. But, oh, picture summer business travel. At home there is always something else to do around the house, or working late. On a trip, for me, when the class bugs out, I am usually on my own. But, depending on where you travel to, you could need a HLG (ball parks, parking lots), a thermal plane (football fields, big parks, high start), or a slope ship (highway overpasses, buildings, and an occasional real slope). This plane was designed to do all the above reasonably well, but since it fits in a 28X3X7 inch box, it won't exactly win contests at any of them. (It did come in 13 of 35 or so at a Dallas HLG contest; my first ever contest!! With a good pilot, it might have done better...)

What this plane will do well, is climb straight and true off a small high start (that also fits in the box), and floats and thermals well for its size; high winds are no problem, and it penetrates very well. It will get consistent 40 second HLG flights in 80 degree dead air, and has many spec out hand launches (10 min+) to its credit. Put it on a slope, and with the big ailerons, and reflex, it does a very passable roll; throw in some lead to get energy retention and speed. In other words, I am very happy flying this plane in all three environments found in my normal travels.

The construction techniques were quite normal for anyone who has built a foam core wing, but there were a few interesting things used that will be discussed. First, though, is the design criterion, and selection process used in the planning phase, mostly because I hear so many people say they would like to do a scratch build, but don't know where to begin.

The design criterion to me is the most important, as I am not very scientific in my methods. So, decide on the goal, then make each step fit that goal as the build goes along, I never plan all aspects before starting, which is why the design often changes along the way. Think of these as adventures, not dead ends. The goals for this plane were:

Fit as carry on. I never check bags.
Give decent thermal type performance for HLG and high start.
Be fun to fly, and fun on the slope.
Be durable, as my traveling fields/slopes are not always the best.

With that in mind, the basic plane emerged. You can see how scientific the design was: 54" span, and a two piece wing, as these cores were already cut from a previous project, and would fit in the 29" box size. I needed it completed soon for a trip, so I used a NSP HLG fuselage I had in the closet. (Not really a scratch design, then.) More wing area would have been nice, due to the expected extra weight of making the wing two piece, and planning on adding a layer of cloth to the inside of the fuselage from the wing trailing edge forward, but

Traveler
General Specifications

Span:	54"
Length:	28.5"
Weight:	16 oz.
Type:	Portable Glider

Wing
Swept back 2" at trailing edge

Area:	324 sq. in.
Root Chord:	7"
Tip Chord:	5"
Dihedral:	1.5"
Aileron chord:	1.375"

Tail
Full Flying V-tail
Tails swept back to match wings

Each panel:	26 sq. in.
Root Chord:	3.75"
Tip Chord:	2.75"
Length:	8"

Fuselage
Fiberglass pre-built HLG from NSP
Re-inforced wing TE forward w/4 oz. glass
Cut to 28.5"

Controls
Elevator and spoilerons

Designer
Shop Leftovers

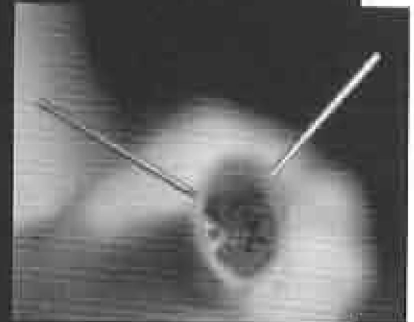
I didn't deem it worth it to cut cores for the extra 3 inches of span; I hate big balsa wing-tips.

The SD7037 foil was used for good thermal ability, and good speed range, at the expense of inverted flight performance on the slope. The 7037 will give decent inverted performance if you reflex the trailing edge. After looking at the cores, I decided to sweep the wings back some to make it look faster, and help with the CG location. The NSP HLG fuselage has a short nose, and I usually end up adding lead, so this time, with sweep in the wing, and shortened tail moment, the plane balanced without lead, using a 270ma pack, and a 7 channel Rx. Were I to do it again, I would have used the Avion fuselage, because of the integral fin, and built a flying, removable stabilizer, mid-tail height. The Traveler pictured has a full flying V-tail, for portability, and I went through a few re-designs before I got it working smoothly. I also threw the tails off a few times, and proved the durability of the re-inforced fuselage. Due to the short tail moment, the tail surfaces are fairly large, and come in at 17% of the area of the wing. This helps with slow speed flight, and the larger tail was needed due to the short tail moment. How big should the tail be? Well, there are formulas, but who cares; look at another plane that flies well, and make the tail about the same percentage of wing area. Make it a little smaller if you lengthen the tail, larger if you shorten the tail moment. It will fly fine. In the picture, you can see the wood blocks inside the tail of the fuselage used to strengthen the v-tail wires. The bottom picture of the v-tails shows a rubber band used to hold the v-tails on. This proved not to be needed, as the music wire pushrods, using a 110 degree bend to hook into the hole in the control horn, proved enough to hold them on.

Designing is a combination of art, and science, but you can treat it as either one. The important part of successful designs is being able to trim out the plane (not the colors) both by getting the wing-tail incidence correct in the building, and setting the CG close to correct before the first flight. (It helps to have the control surfaces move in the right direction also, but that is another story.)

In the construction pictures, you can see the plywood root rib, and sub rib installed to support the wing joining tubes. If you use sub ribs, it is easy to get the dihedral correct. Drill the root ribs, with the holes near the top of the ribs, and install them. Cut the slots for the sub rib, and drill holes in a strip of plywood that

V-tails viewed from the bottom.



V-tail pivot wires glued in w/wood blocks inside fuselage.

Root rib installed. Sub ribs ready to be epoxied in.

Aileron connections. Note the throwing stick was first installed way too far aft, and was moved 3".

is the correct width to slide in the slot in the wing.

Install the one piece wing rod tube, through both root ribs, and slide the whole assembly together; then set the dihedral angle by sliding the sub ribs up and down 'til they are even. Draw a pencil line even with the top and bottom of the core on each piece of sub rib plywood. Take the wings apart, and cut/sand the sub ribs until perfectly flush with the cores, on the lines drawn; then glue in place with the wing join tube installed. Leave enough room between the wing panels to saw the tube in half to separate the panels. A file will trim the tube back flush to the root rib.

If you look at the picture of the wing servo installations, you will see that the aileron pushrods are just bent 110 degrees, and slipped into the control horn, with a Z bend at the servo arm. I learned this technique from building a Waco Mosquito. It did not seem solid enough, but in practice it worked fine. It is simple and easy, but I wouldn't recommend it for a fast slope ship.

The plane came out at 16 ounces, and could have been much lighter. The wings on this version have a full layer of 4 oz. cloth under the obechi, which is overkill on strength but, then, it has bounced out of many a tree and street lamp pole in hotel parking lots around the country.

For protection in the box when traveling, I use bubble wrap around the fuselage, and the original beds from the core cutting as protection for the stabs, and wings. To create a good sandwich for the wings, try laminating a layer of 4 oz. fiberglass to the trailing edges of the foam beds when they are lined up and taped together. When they cure, you open the beds like a book, and slide the wing panels in. Some holes need to be cut to accommodate the servos, and control horns. ■


Genesis on launch!

Three Fox's And a Whisper

...by Gordy Stahl
Milwaukee, Wisconsin

Recently during business travels I found myself in Iowa, the USA's slope soaring capitol - NOT!! I had decided to carry my Weston WACO 550E electric sailplane as well as my Airtronics 2 meter Whisper for the trip just in case fate and the weather would cooperate. I figured if Iowa could produce a champion sailplaner like Mike Fox (and many others), I should go prepared.

From my motel room in Cedar Rapids, I got out my trusty copy of *RCSD* and looked up the Soaring Contacts list. Bob Baker of the Eastern Iowa Soaring Society gave me Mike's number, since I was headed toward his home town of Davenport. We connected and set a date for soaring at his site along highway 80 at the Northwest Blvd. exit. (The owners of the land like to think of it as 7 Cities Sod Farm.) He warned me his dad and brother would be along and to be prepared to have some fun.

Mike is known for more than his recent championship piloting as you might have seen in Lee Murray's October *RCSD*, Mike Fox, Lil' Scorpion review.

The day was windy, according to Mike's dad, "When the telephone wires sing, it's about 25 mph," and they were. Fortunately, the sky was full of thermals and the wind modulated down to near calm at times.

In the photos are Mike's dad, Charlie, with his proof-of-concept 1/3 scale Genesis flying wing. Mike is kneeling down, and next is Rick Fox (Mike's brother), and me. The aircraft are my Whisper (right front), Mike's Lil' Scorpion (right center), and Rick's 100" Scorpion.

To start with, the Genesis giant was extremely fast in the air. It banks really hard in the thermal turn and just grabs altitude. I was amazed at the way it handled the high winds, and the R.O.G. winch launch was especially neat. Charlie is a full size sailplane jock and volunteered to build the model for flight testing. The small elevator is used only for pitch assist as this is a true flying wing; it is not needed for flight stability. The goal of the Genesis project, as I understand it, was to create a world class competition sailplane to face off against the German ASW's.

Mike and the guys have seen high performance electric sailplanes before, so I didn't get the usual "WOW!!" when I put up my Weston WACO 550E, but they certainly were impressed. I have an Astro FAI 15 on 8 1700mah SCR's with a 9.5x5 folder, and the new amazing FX35D micro computerized controller (available from Slegers International), and this model is hot going up and in flight. Flying it to its full potential takes some learning, but it is an absolute rush and joy. I put my ailerons up about 70 degrees for landing, which allows me to come in violently fast and steep, then stop and settle like a feather.


(L - R) Charlie Fox, Mike Fox, Rick Fox, Gordy Stahl

I've got to tell you I love my Whisper, and have had great success in local competition, but I was amazed at the performance of Mike's Scorpions. Rick built and flies the 100" version, and is a contest winner himself; and from what I saw, I think he's the one in the family with the real soaring talent. He just doesn't get to practice much, and is happy to let Mike take the glory.

Admittedly, they ballasted up for the conditions, which I hadn't done with my Whisper; the Scorpion speed range and handling was nothing less than exciting. As Lee said in his review, the Scorpions slow down really well during crow, and Mike often caught his plane instead of landing.

Later in the day, when the winch battery had died, Mike began hand launching his plane and managed to get in some good flight times. For those of you interested in Mike's Scorpions, he can be reached at (319) 322-1244 in the evenings.

Special thanks to *RCSD*, and to Bob Baker of E.I.S.S. for being there for us. I travel a lot, so don't be surprised if the phone rings some day and it's me, wanting to fly. If you would care to write or call, my information is: Gordy Stahl, 6623 W. Chambers, Milwaukee, WI 53210; (414) 873-5842. Please include your phone number in your letters. ■

TRAINER CORD

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Acrobatics

Two and a half more tasks have been added to my list of aeronautical achievements. Hand launching is the first. At this point it is the most thrilling aspect of my flying career. Standing on the side of a hill, I find it incredible that a creation of balsa and foam, when pitched into the abyss, transforms to soar skyward.

I pretend that I am a javelin thrower (albeit a whimpy one). Holding the plane in my right arm with the elbow cocked back, my left foot forward, I move forward onto my right foot. Simultaneously my arm extends parallel to the ground and the plane is propelled forward and released. It is important to keep the nose down and propel the model with authority to keep the wind from blowing the glider back over the hill. As of yet, I am not entrusted with power to my transmitter at launch time.

Secondly, I learned to retrieve! (The word Sucker is not fitting.) I'm an avid hiker who loves to spy on the minions of Mother Nature. My instructor occupies himself with another of the gliders which have followed him to the site while I wander downward.

Every task has its requirements. Once the errant plane has been reached, the receiver needs to be turned off. Only then is the transmitter turned off. The order is not to be reversed, because without the transmitter signal, the receiver is free to pick up ambient signals which chatter the controls. Occasionally, they are strong enough to cause over extension and breakage of the control surfaces. So, receiver off first; transmitter off last.

To the bottom of the hill I merrily went. This excursion yielded a tennis ball, corn cob, gnawed antler, meadow larks, and mourning doves. Thankfully, a pack of bicyclists had watched the plane submerge itself in the weeds and could point the location. Just as I turned off the receiver, down comes the second plane. As long as I'm retrieving, I might as well retrieve as many as I could carry. Back up the mountain I trudged.

The half accomplishment which I've half accomplished is LANDING. In order to instruct me with expedience (which means many, many repetitions), and with the least danger to his beloved plane, my private tutor took me to a huge unobstructed park. We talked at length about wind direction, and wind direction indicators. Henceforth, I will notice which side of my face is getting cold, which leaves are rustling in the breeze, and which direction the dust is blowing. I will always take note of the foot long, 1/4 inch wide strip cut from a flimsy vegetable bag hanging decoratively from my transmitter antenna.

A plane is launched into the wind. Landing is not to be a random act. One lands in a pattern: Downwind, base, final. Before even attempting flight, it is important to determine where to land. If the wind shifts, so must your pattern. The basic pattern is a U with the plane flying downwind beside you, making its base flight cross wind and having its final approach being toward you. A new axiom was being engraved in my cerebral mass: downwind, base, final! In this big field, with no magnetic trees, I stood standing in the middle so there was plenty of room beside me for the downwind leg, behind me for the short base, and toward me for the final. Only practice is going to train my eye to judge the distance between the plane and the ground. Flying a landing pattern allows me to adjust the path of the glider several times to accommodate changing wind or lift conditions. Checking the streamer on my transmitter and the other indicators, I start downwind giving the plane enough down elevator so that it descends enough for me to make the base turn at about twenty feet and the final turn at about fifteen. As it comes to Mamma, I must keep the wings level by instantaneously moving the stick toward the low wing. The plane is coming toward me; therefore control movements are reversed. Keeping the wings level, a slight bit of down elevator, and your toes crossed, the plane should slide across the turf at your feet.

My first, second, and third attempts brought the plane in cartwheeling. Practice showed some improvement. It just spun upon impact. I did not know that a husband could have so much patience. It was quite endearing to see the way he would rush to the plane. Carefully he would turn it upright checking the wings to see if they contained the original number of polyhedrals.

Then I froze to the controls (the old left vs. right coordination conflict), and the plane landed smooth and straight. Oh well, a good landing is a good landing. ■

International Hand Launch Glider Festival

...by Steven Stricklett
Escondido, California

Are you a closet hand launch glider pilot? Have you ever actually built one of those small lightweight gliders, but kept it in your garage or worse yet, the trunk of your car because it wasn't as exotic as the unlimited ships everyone else was flying? Have you every taken a hand launch glider out to the field to fly only to be told that you will be in the way of the other flyers, and if you want to fly it you should go over to that far away corner of the field by the trees where the weeds are up to your thighs? Have you ever waited patiently in the pits for all of the other pilots to finish for the day only then to pull out your hand launch and to start flinging it around as everyone else is going off to have lunch together? Have you ever skipped a morning of work to sneak out to the field to take advantage of those good morning thermals on an off day when no one else is at the field? Have you ever gotten up before the sun was up in order to get to the field long before other pilots so you could get some hand launch flying in before anyone else shows up and sets up the winches?

Well, if you can identify with any of these situations, maybe you are in fact a hand launch glider person. Well, if you are, rejoice! Your time has come! Now you can step forward and be properly recognized as the talented R/C pilots that you are.

The *Torrey Pines Gulls* are pleased to report that history has been made. The first inaugural two day competition for hand launch gliders has been completed and it was an overwhelming success. The INTERNATIONAL HAND LAUNCH GLIDER FESTIVAL was held on October 29 & 30 in San Diego, California. The weather on Saturday started off with a low cloud cover which burned off by the second round. The rest of the day was perfect for a hand launch contest, not too hot and not too cold, and by the second round the thermals were popping everywhere. The wind did come up in one round on Saturday and tried to discourage us, but all it did was cause the thermals to break off the field a little faster. Some of the best lift of the day was during that round. For instance, the author launched into five thermals in a row in that round.

Sunday broke with the sun shinning brightly and only a couple of lazy wisps of clouds could be seen anywhere. It was one of those picture post card days that San Diego is so famous for. Again, the thermals were active all day long with many pilots finding there planes at the 1,000 foot level just two minutes into their flights. The only problems then were keeping the planes in sight and keeping track of how many loops and rolls you performed on the way down.

The contest featured ten rounds of man on man competition followed by the top ten pilots being pitted all together in one flight group for the three additional rounds. Think of that! Thirteen rounds of flying competition. I don't know of any other contest in the country that offers that much competitive flying time. That's almost two hours of competitive flying time over two days. That's over twice as much as the other big contests that I know of. This, in a practical sense, provided the opportunity for anybody to have a bad round and still be able to get back into contention, in addition to providing a great amount of flying pleasure.

The plan had been to force the pilot who won to do so by facing the best the field of competition had to offer all at one time. The points from the fly off were added to the scores already accumulated through the first ten rounds, so the leaders maintained their relative advantages entering the fly off. However, it did afford the opportunity for the top ten pilots to reposition themselves during the last three rounds. The fly off did

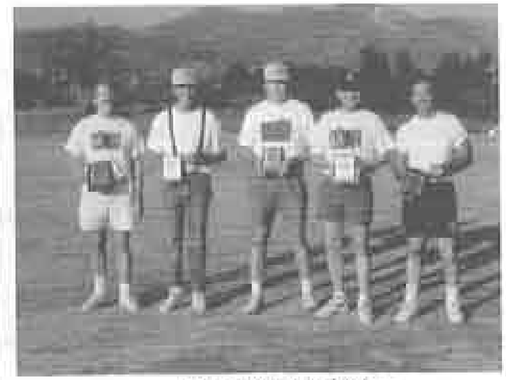
George Joy shown catching an airplane after a successful flight.

exactly that with Mike Reagan, from Thousand Oaks Soaring Society and the tenth place pilot after the first ten rounds, moving all the way up to fifth and capturing a trophy by the end of the fly off.

Several of the tasks were relatively new to hand launch glider competition, but had been tried out in recent contests with great success, including the AMA Nats. (The *Torrey Pines Gulls* are the club that recently ran the soaring portion of the AMA Nats in Lubbock, Texas.) One of the new ones was to accomplish the following flight times in sequence: 15 sec, 30 sec, 45 sec, ... , 105 sec, 120 sec. This task calls for nine minutes of flying in ten minutes of working time. A pilot had unlimited throws to complete this task, but he must complete each time before trying for the succeeding one. In other words he must accomplish the 15 sec. flight before he can start trying for the 30 sec. flight. There are eight possible flights in this round and the pilots are scored based on how many of the assigned flight times they were able to accomplish.

Another of the new tasks was increasing flight times. The object of this task was to accomplish flights of increasing times. If a flight (B) was longer than the previous flight (A), the pilot received credit for it. If a flight (B) was not longer than the previous flight (A), then it did not count and he would have to try again to get a flight longer than the last one (A) that he

First place, three man team Torrey Pines Gulls (L - R) Paul Naton, Charlie Richardson, Steve Condon



First through 5th place (L - R) Joe Wurts, Arthur Markiewicz, Gordon Jennings, Steve Condon, Mike Reagan

got credit for. In other words, for a flight to count it had to be the longest flight the pilot had flown to that point in the round. In this round, the pilots were scored on total credited flight time.

This particular task presented a real tactical challenge and the pilots really had to keep tabs on what the other pilots in their heats were doing. For instance, if you caught a thermal with eight minutes left in the round, should you only fly long enough to make a flight longer than the last one and then try to relaunch into that thermal, or should you try to max the round with that thermal and chance falling out of it with, let's say four minutes remaining in the round? If that happened you would not have enough time left in the round to be able to make another increasing flight. Yet, if one of the other pilots got into the same thermal and did max the round, you ran the risk of getting buried in that round.

There was not a lot of diversity in the airplanes being flown. By far, the predominate airplane was the CR Aircraft "Climmax" with over half the field flying it. The only other production airplane was the "Monarch", which was flown by three pilots. The balance of the field was made up of original design aircraft.

There were four straight wing aileron planes which all gave a good showing for themselves. (Two of them placed first and second.) Based on the way these planes flew, they very well may be the hand launch plane of the future. Their maneuverability became legendary after the first couple of rounds. The difference between these planes and the polyhedral type airplane is like the difference between a hummingbird and a pelican. The aileron planes were doing figure eights inside of the same space that the polyhedral planes were doing tight thermal turns. It was very impressive.

One of the reasons for the success of this contest was the fact that a Dinner was provided at the field on Saturday night. What made this dinner different than most other contest BBQs was the fact that

The results of the contest follow:

Joe Wurts	12843.1	First	Pasadena Soaring Society
Arthur Markiewicz	11459.8	Second	Torrey Pines Gulls
Gordon Jennings	11174.5	Third	Central Valley Radio Control
Steve Condon	11045.3	Fourth	Torrey Pines Gulls
Mike Reagan	11012.2	Fifth	Thousand Oaks Soaring Society
Steve Condon, Paul Naton, Charlie Richardson			Top Team

it was catered by a Tony Roma's Restaurant. It very well may have been the best part of the weekend. It definitely was the biggest draw. More dinners were served than there were contestants.

Trophies were awarded to the top five finishers and the top three man team. Based on the feedback from this year's contest, the field should be even stronger and larger next year. If you ever wanted to have a great time flying hand launch gliders and fly against some of the best in the world, this is the event to come to. So plan now to bring the family and let them enjoy the beach or any of the many other world class attractions in the area while you delight yourself with two days of hand launch ecstasy. ■

That Sinkin' Feeling or Hand-Launch Topics

...by Scott Smith
2 Sugarpine, Irvine, CA 92714
(714) 651-8488
evenings after 7:00 PST

Hand-Launch Contests Galore!

Here in Southern California, three clubs will be sponsoring 11 hand-launch contests this year: TPG with 7, SULA with 2, and ISS with 2. Hope they can keep the dates straight! Hope I can keep the dates straight.

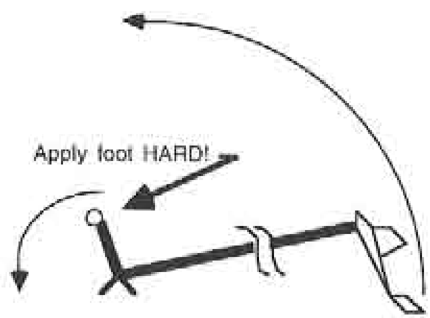
New Planes

Merrill Farmer of MM Glider Tech showed me his new Illusion. Basically it is a version of his Commoner with a new wing. This wing is also a 7084, but is 5 inches shorter and has replaced the common chord with a constant root cord and two additional tapered panels at the tip. Merrill says it launches higher and turns sharper than the Commoner. However, it takes a little longer to build, and so Merrill will continue to offer the Commoner. Both are outstanding values for the "traditional" builder who prefers built-up construction over foam. Even using Monokote, the total weight is just over 12 oz.

I saw DCU's Viper for the first time. The wing is the standard 7037 white foam sheeted with 0.032" balsa, EXCEPT that it is "cut" in two. Each half plugs into the side of the fiberglass fuselage using two wing rods. A flying stab using a push-rod and a bell crank get the elevator "off of the ground" to avoid landing damage, while pull-pull cabling controls the rudder. Like the Illusion, this plane weighs a little over 12 oz. This plane is not cheap, but I think all it needs is a good pilot and a few contests to give it the distinct reputation that other planes like the Monarch and Climmax have. The plane is available in an aileron version as well; this would be a tricked-out mini-F3B ship.

Atlatls

Throwing sticks, that is. The object is to apply the throwing force over a longer distance. How about a foot-powered "step-on-it" machine as follows?

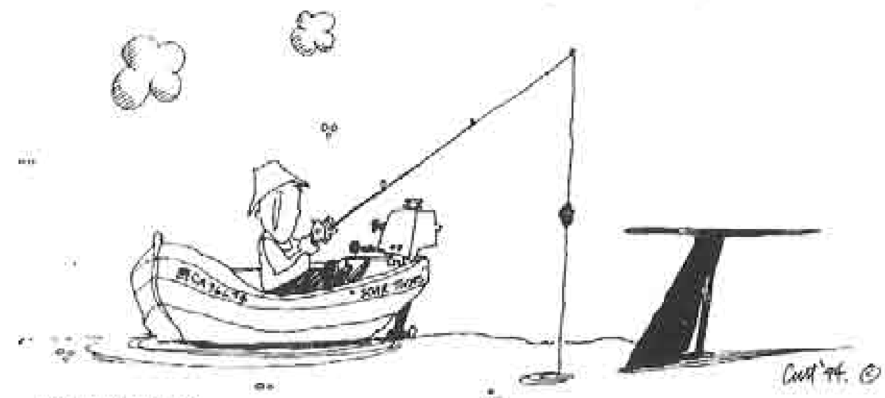


Remember this from last month? Well, I built this one but, with all the rain here in "sunny" California, I haven't had a chance to try it out. Next month, I'll fill you in on how successful I was. I have a feeling that, either it will work so well that everyone will want one, or the results will be so embarrassing that we'll all get a good laugh. ■

Dodgson Orbiter

...by Dennis A. Tyson
Great Falls, Montana

The sailplane I would most like to tell you about is the Dodgson Orbiter. Last spring, I built one of these from Bob's plans and am now working on my second one. I can't say enough about this little gem of a ship! Mine is the three channel version using micro servos and the AFART reflexing device that is common with the Pixi, Camano, Lovesong act. I believe that this is the best handlaunch on the market, today. It is somewhat complex to build and is a little parts intensive besides the fact that you have to scratch build it, but the outcome is definitely worth the extra effort. Having the ability to reflex the trailing edge full span provides an unusually high launch and 90° flaps allow you to descend at steep angles and bring her right to you every time. I must say that I agree with Bob that tips up is not always the answer, since any sweep in the wing acts as dihedral. So, I don't feel that a good handlaunch has to necessarily be a polyhedral. Having flown my Orbiter through a complete Montana flying season, I am extremely impressed with its ability to core in light thermals close to the ground and then head for the stars. The first time I thermaled out, I thought it was just luck, but before long I was thermalling out more often than not. And with reflex, this little bird will take you anywhere you want to go and fast! Don't get me wrong, I have definitely dorked mine a few times, but the structural integrity has taken it. As you can see, I am proud of my Orbiter and would like nothing more than to see this ship start to dominate the handlaunch world, because it certainly has the ability to do so. ■



by Curt Nehring
San Dimas, California

Understanding Sailplanes

...by Martin Simons

13 Loch Street, Stepney,
South Australia 5069

Back to Basics
Introduction Part II
Free fall

Let us now look at some of our most tested theories in relation to things in flight.

A sky diver jumps out of an aircraft at some altitude and, at first, accelerates earthwards. The parachutist has a body with clothing, boots, parachute and harness, a total amount of substance or **mass.** Gravity acts on mass to produce **weight**. As explained before, for our own convenience we can total all the separate little weights and replace them mentally with one weight acting at the **centre of gravity**. Above another planet, the mass would be the same but the weight would be different.

If there was no air around the earth, any object released above the surface would accelerate downwards at about 9.81 metres **per second every second**. (For imperialists, 32.2 feet per second per second.) The **acceleration due to gravity** would produce a fall of increasing rate; from zero to 9.81 metres (32.19 fps) in the first second, to 19.62 m/s (64.37 ftps) after two seconds, to 29.43 m/s (96.56 fps) after three seconds and so on at ever increasing speed until hitting the ground.

Fortunately, there is an atmosphere for us to breath. Also, because the sky diver is surrounded by air, the acceleration never reaches 9.81 m/s/s. There is **aerodynamic reaction**. The air behaves as a fluid which has to move aside as the sky diver passes through, and it closes in behind. As the velocity of the descent rises, the air reaction increases. The reaction of a fluid to a body moving through

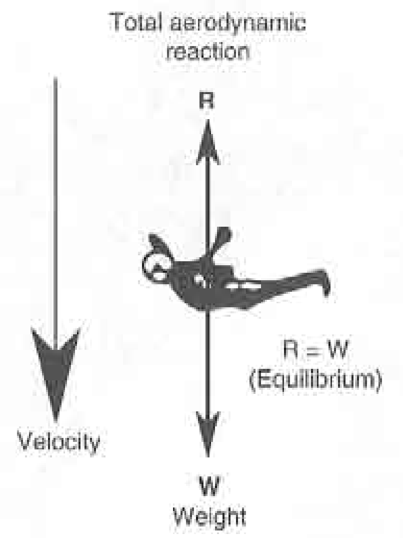


Figure 4
Forces acting on a skydiver in stable spread position

it has been found, from measurements supported by calculation, to increase in proportion to the square of the velocity. That is, if the rate of motion through the fluid, in this case the **airspeed**, doubles, the air resistance is four times as great. If the airspeed is ten times as much, the aerodynamic reaction is 10 x 10 = 100 times as great, 100 times as fast means 10,000 times as much air reaction force and so on. (Approaching the speed of sound, this simple law no longer applies. Air resistance increases even more rapidly ss the speed approaches the speed of sound. Model gliders do not, yet, fly fast enough for this to matter.)

The standard position at the start of a parachutist's free fall jump is the 'stable spread', belly down, with arms and legs extended and the spine slightly arched back. (Figure 4. The arching may be thought of as a slight **negative camber** of the body, which helps to stabilise the attitude. In the same way, an ordinary cambered wing profile, inverted, has a degree of automatic stability and will tend to remain in this position.) The skydiver's stable spread presents the largest possible area of body to the airflow.

Angle of attack refers to the angle at which fluid flow meets a moving object. The **angle of attack** of the parachutist is 90 degrees. This is nothing to do with the angle of the body to the ground, but only to the relative airflow. From the ground we see the falling parachutist descending through the air, rushing down through the fluid, but from the point of view of the person falling, the air is coming up from below at 90 degrees to the body.

The air cannot pass smoothly round a human body at such an angle, but breaks away and forms a turbulent wake. The flow is separated or **stalled**. The flow might even be described as deeply stalled or super stalled. The loss of energy is very large, and increases according to the square law. After a few seconds the flow velocity around the parachutist's body becomes so great that the **upward aerodynamic reaction force equals the downward weight force**. A state of **equilibrium** results and there is no further acceleration. The sky diver is conscious of the air flowing past, feeling it blowing on the face and tugging at clothes, but the sensation otherwise is rather like lying on a resilient mattress. When lying on an ordinary bed, the weight is equalled and opposed by the upward reaction of the mattress. Action and reaction are equal and opposite. The force of the sky diver's weight is equalled and opposed by the reaction force of the air.

(As before, we should recognise that the airflow over the skydiver produces innumerable small reactive forces. When we speak of **the** aerodynamic reaction, we are mentally adding together all the innumerable tiny reactions and replacing them with a single force which, in accordance with the Newtonian laws, must in equlibirum be equal and opposite to the total weight force which we imagine as acting at the centre of gravity.)

Of course parachutists who theorise that the state of equilibrium, a **balance between weight and aerodynamic reaction**, is a state of no motion, either change their theories quickly, or never have the chance to change them again. The Newtonian laws are laws of motion, they are about objects moving, not standing still. Lying in bed is not the same as lying on a bed of air. A state of equilibrium is not at all the same thing as a state of motionlessness. The aerodynamic reaction force is generated **because** the body is moving very rapidly through the air and only because it is moving. Downward velocity remains high, much too high for a safe landing.

Once equilibrium is established, the motion continues and will continue at a constant rate unless something is changed. To change the motion, a force must be applied to the falling body. The parachutist can do nothing at such short notice to change mass (except perhaps by a little involuntary excretion!). It is possible, however, to change position relative to the airflow. The hands, arms and legs can be moved this way or that, producing small forces to turn or tilt the body. This is similar to the use of control surfaces on aeroplanes.

Every such alteration produces the normal mass inertial reaction, equal and opposite.

Aerodynamic zero

By slanting the body downwards, 'trimming' the attitude with arms and legs, the body can be aligned with the airflow; that is, vertically head down. (Figure 5. Feet down would be much the same.) In this position, at an **aerodynamic zero angle of attack**, the air passes round the body more smoothly, in fairly **streamlined** flow. There is less loss of energy. The total aerodynamic resistance is greatly reduced, but only temporarily. (Streamlining will not be perfect with a rather irregular shape like that of a human body with parachute pack, boots, etc.)

When the parachutist changes the angle of attack, equilibrium is disturbed. The upward aerodynamic reaction is now less than the weight because of the improved streamlining. Gravitational acceleration occurs, with the inevitable mass inertia reacting against it. The velocity through the air increases. But the square law still applies. As velocity increases the total aerodynamic reaction increases more rapidly, twice the velocity, four times the air reaction force. Soon the reaction becomes again equal to the weight. (Inertia ceases as soon as the velocity through the air becomes constant.) Equilibrium prevails again, but now at a very much higher rate of motion through the air (Figure 5).

By adopting a position between the (stalled) spread and the aerodynamic zero, the direction of the airflow relative to the body can be brought to a moderate angle of attack, somewhere between 90 degrees and zero. This is not necessarily a stable position but can be maintained by small controlling movements. A new equilibrium can be found at an air velocity less than in the zero angle of attack position, but more than in the stalled condition. The mass has not altered so the final, total, vertically upward supporting force required is still the same after the change of attitude as it was before.

Here is one of the most fundamental points to be understood. The total mass of the parachutist depends on things such as diet, skeletal structure, muscles, etc., and the clothing and other gear carried. Weight, the effect of gravity on the total

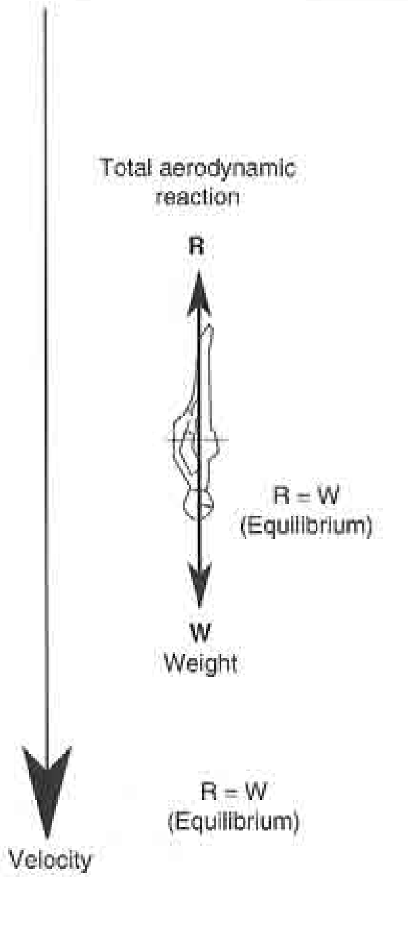
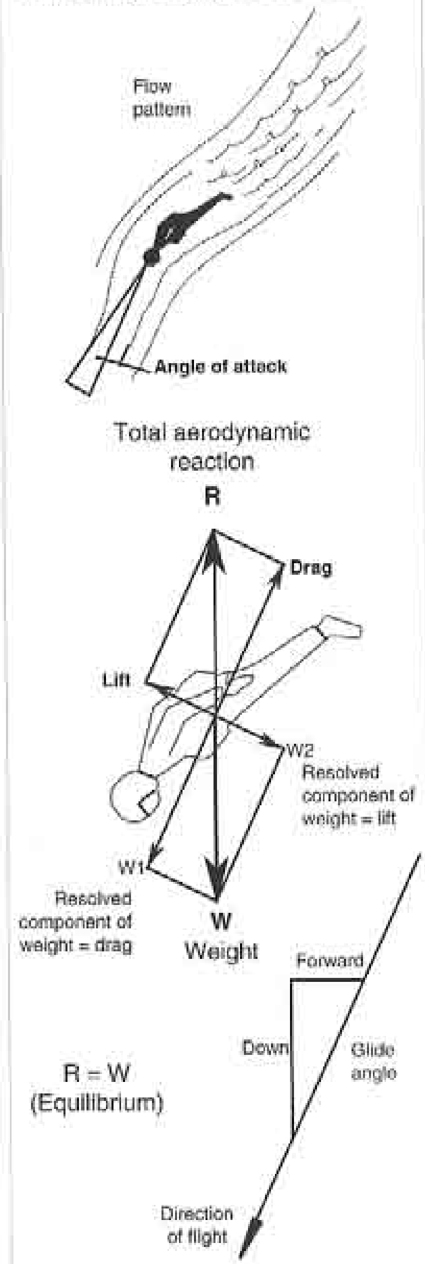


Figure 5
Terminal velocity. Weight is the same. Aerodynamic reaction equals weight.
Velocity very high

mass, is therefore determined. **The total of upward air forces required to establish equilibrium equals the weight.** When the position of the parachutist is altered, the angle of attack relative to the air flow changes. When a new equilibrium in the new attitude is found, the total air reaction force in the new balance will be exactly the same as be-

Figure 6
Forces in gliding flight resolved



fore, equal to the weight.

What will be different, is the rate of motion. In a parachutist's stable spread, a relatively slow rate of descent will produce sufficient reactive force to balance the weight. In a low drag situation, head down, a higher rate of aerial motion will be required, not to produce a larger force, but to produce the same force as before, equal to the weight. At some intermediate angle of attack, the weight being the same, an intermediate rate of motion will be required to produce the same sustaining force. This is a common feature of aeronautics. So long as the weight of the aircraft does not change, the total sustaining forces required for flight do not change. But depending on the **attitude** of the body to the air, i.e., **the angle of attack**, the velocity through the air required for flight must vary accordingly.

Tracking

When the skydiver takes an attitude between the stable spread and the vertical, head or feet down position, not only does the rate of descent change, but the direction of motion through the air also alters. The skydiver begins to track horizontally as well as falling. This is truly gliding flight (Figure 6).

The total aerodynamic force may now, for our convenience, be divided or resolved diagrammatically into two components. One of these, termed the **lift**, is drawn at **right angles to the flight path**, the other, **drag**, is directly downstream, i.e., back along the flight path. The weight, too, may be resolved into two components, one acting forwards along the flight path and the other at right angles. The simple two force equilibrium diagram becomes a balanced four component diagram. There is a component of the weight moving the body along the inclined path rather than straight down. There is an aerodynamic drag component which resists this and is equal to it. There is a component of the weight at right angles to the flight path; the lift component resists and is equal to this.

It must be emphasised that nothing has been changed by the simple device of resolving the forces in the diagram. Fundamentally, in gliding flight, just as in vertical falling through the air in equilibrium, we are supposing **one weight force** and **one total aerodynamic reaction** equal and opposite to the weight. By drawing the diagram with 'lift' and 'drag' marked and labelled, we have only adopted a handy dodge or neat trick which helps us to understand how gliders can move forward horizontally as well as coming down. We do not alter the basic situation in any way whatever. Lift and drag are not separate forces. We are taking only one force, reactive equal and opposite to the weight, which for our own purposes we now choose to think of as two forces at right angles having the same effects on the motion of the flying body. That is all lift and drag are, **a way of thinking** about a single aerodynamic reaction force, a **mental model** that helps us to understand. That is what they remain throughout everything that follows and through all the literature of aerodynamic theory that may ever be looked at or considered.

It is useful to use ideas like lift and drag because, as the diagrams show, the angle at which the parachutist descends is determined entirely by the relationship, or ratio, between these two force components. The forward distance covered in each second is small. The **glide ratio** of a skydiver is very poor, perhaps 1 : 2, that is, for each unit of forward distance, two units of height are lost. The glide slope may be expressed as the **lift/drag ratio** or **L/D** because, as the geometry of the diagram (similar triangles) shows, the ratio of forward distance covered to vertical distance fallen, is the same as the ratio of lift to drag.

But remember what is really happening here. The velocity of the flight through the air is that required to produce a single total upward force equal and opposite to the weight. In the 'spread' position, at 90 degrees angle of attack with the flow of air separated and stalled, the required velocity is obtained with a vertical descent. In the body vertical attitude, aerodynamic zero with nearly perfect streamlined flow, a vertical descent gives a very high downward velocity, necessary to produce the same reaction force. At any other attitude where it is possible to resolve the forces into a proportion acting vertically, and a proportion acting horizontally, there will be a positive glide ratio, i.e., a proportion of the motion will be horizontal.

Pull the ripcord!

Our sky diver has been falling long enough. The parachute is now deployed. Immediately, the total air reaction forces are hugely increased. The rate of motion through the air decelerates very quickly, even with a violent jerk. Equilibrium is soon re-established but at a greatly decreased rate of motion. Now the weight force is again balanced perfectly by the upward reaction of the entire, opened parachute canopy, and the rate of descent is small enough to be survived without injury, or if managed clumsily, with some small damage perhaps (Figure 7).

Given a parachute of suitable design it becomes possible to glide horizontally as well as down. The opened steerable parachute, is a kind of wing. This leads to the general principles of winged flight as they apply also to sailplanes.

A simple experiment

A wing, whether it is a type of parachute canopy or the wing of a sailplane, generates reactive force by moving through the air at some speed and at some suitable angle of attack. Take a piece of stiff card or plywood, representing a wing-like surface, and hold it in a horizontal

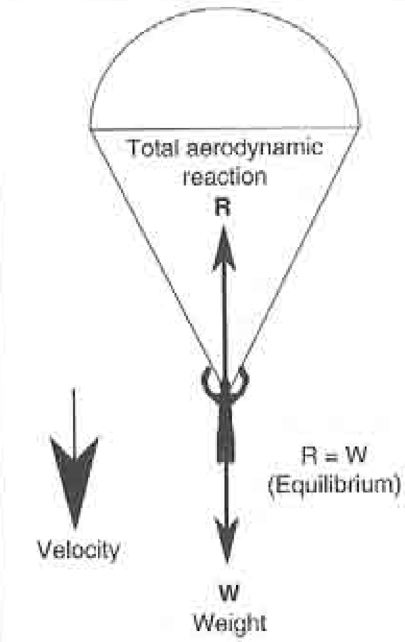


Figure 7

Forces acting on open parachute

airstream, such as the fast breeze from a powerful fan. By changing its angle this way and that it will be possible to feel the various forces that arise.

If the card is held in a vertical or nearly vertical plane in the horizontal airstream, the total aerodynamic reaction will tend to push the wing in the direction of the flow. At this angle of attack, about 90 degrees, the flow behind the card is totally separated, like the flow behind the sky diver in the spread position (Figure 8).

The skydiver is falling vertically but feels a flow moving past although the air mass itself is not moving up appreciably. Although seemingly obvious and trivial, this is quite significant. The parachutist is moving through the air, but what the parachutist feels is the air moving by. Far below (at least we hope it is far), the earth appears to be expanding steadily but once equlibirum is established there is no other sensation of falling. We see the skydiver falling through the air, the skydiver feels the air blowing up and around his, or her, body.

The card in the stream of air from the fan is not moving, the air is streaming past and around it in the more or less horizontal direction. But the card, if it could feel, would sense itself moving through the air. The flow of the air round the card would not change appreciably if the fan were positioned to blow upwards with the card held horizontally in the flow. The flow over an aircraft as it moves through the air, is, for all practical purposes the same as if the aircraft were not moving and the air was blowing past it. For this reason, the results of wind tunnel tests on aircraft, or parts of them, can be relied on to predict, with fair accuracy, the behaviour of aircraft in actual flight. Nothing is ever quite so simple as it seems, as we shall find when we come to talk about wind tunnel testing, but the principle is sound. An aircraft seen from below to be moving through the air, experiences a flow of air over it and the character of this flow is what keeps it flying and enables it to be controlled.

Zero angle of attack

Now move the card in the fan stream to align it as exactly as possible edgewise with the flow. It becomes immediately obvious that the total aerodynamic reaction is much smaller. This is the aerodynamic zero angle. The aerodynamic force on the card will hardly be felt by the human hand. To measure the force, some fairly elaborate measuring apparatus would have to be set up, so, to allow the argument to proceed, accept that there is some aerodynamic reaction force, although relatively small, on the wing at zero angle of attack.

Now move the card to some other angle of attack. At once, it will tend to move up

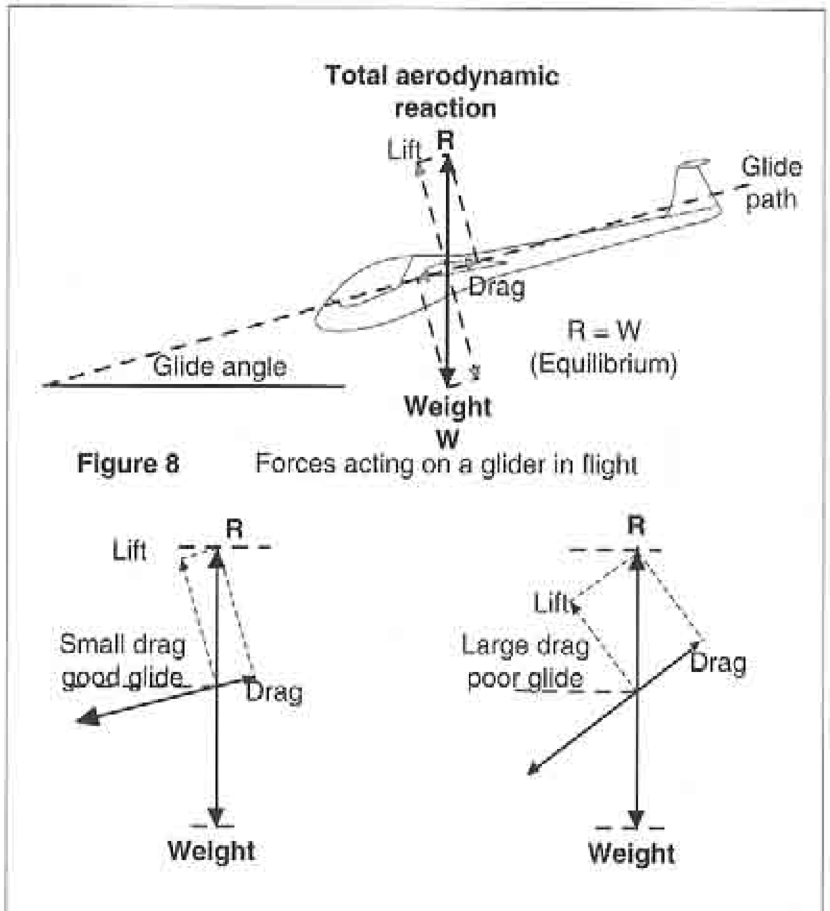


Figure 8 Forces acting on a glider in flight

or down and will have to be restrained. The actual direction of the aerodynamic reaction force will be inclined at some angle backwards. Mentally, we may resolve this force into lift and drag, but do not forget that it is one force. The division into lift, at right angles and drag directly back along the flow direction, is a mental trick and no more.

Stalling

If the angle of attack is reduced and increased in gradual stages, up from the zero position, down from the 90 degrees angle, distinct variations in the forces felt will be noticed and at some angle there will be a marked change, perhaps at about 15 degrees to the horizontal, although this is not a rigidly fixed figure. Around this angle, the direction of the aerodynamic reaction will undergo a marked change. If we could make the air visibl;e, as can be done by inserting streamers of smoke into the flow or by attaching tufts of wool to the card, we would recognise that the crtical angle we are investigating is associated with a marked change from smooth flow to separated flow over the wing. This is **stalling**, and we are investigating the **stalling angle** of the wing.

This change at the stall is not so much a change of the total aerodynamic reaction, but a change of its direction. We may describe the effect as a pronounced alteration of the resolved components, lift and drag. As the angle increases from zero, the lift component, at right angles

to the flow, increases quite steadily. The drag component also may increase, but not so markedly or so predictably. Then, at and beyond the stalling angle, the lift component decreases sharply and the drag rises. Remember still that the forces we are describing here are components of the single aerodynamic reaction and have no indpendent existence.

The wing will stall at the same angle whatever the airspeed may be. This could be discovered by using a multi - speed fan to produce the airflow. The stall will occur at the same angle of attack whether the speed of the air, or **airspeed** for short, is fast or slow.

We find already a point that is useful to us in our every day flying experiments. If the card in the fan flow is transformed into a real wing in flight, we must recognise that flow separation and stall can happen at any airspeed, fast or slow, if the the wing is brought to a sufficiently large angle of attack. An example of this m,ay be seen when a glider is being launched by towline or winch. If the wing is forced to an angle of attack more than the stalling angle, even if the airspeed is high it will stall, usually with catastrophic results.

The normal limits

Two important angles have now been mentioned. The aerodynamic zero angle corresponds to the terminal velocity dive attitude. The lift component, at right angles to the flow, is nil. In a vertical climb or dive, and in some other manoeuvres, the wing may be held at its aerodynamic zero or pass through it for a brief moment. In normal flight, these extremes are avoided.

Note that the aerodynamic zero angle of attack is not usually the same as the geometric zero angle, either of the wing itself, or of the whole aircraft. This geometric zero refers only to some convenient datum line on the plans as a reference for the drawing. Marking some arbitrary line on a piece of paper in no way affects the behaviour of a sailplane in flight. Measuring angles from such a line on the plan, does not determine the angles at which the various parts of the model will meet the air.

At the stalling angle, lift is not zero but it is much reduced, and drag is high. Normal flight beyond this angle is impossible. In aerobatics the wing may be deliberately stalled, to perform stalled turns, spins or flick rolls, but when the flow separates the aircraft usually becomes to some extent uncontrollable and cannot continue for long in this state.

It is possible to place an aeroplane, and even a glider, in a deep stalled attitude where it falls like a skydiver with the angle of attack at, or very close to, 90 degrees. This did occur in the case of some early jet airliners during prototype testing and resulted in disastrous accidents. With separated flow over everything including control surfaces, and no air getting to the intakes and hence no engine thrust, it was impossible to get the aircraft out of the deep stall. The vertical velocity required to establish equlibrium with such totally separated flow is not high, but it is still far too great for people in the aircraft to survive on impact with the ground. As mentioned before, anyone in aviation who thinks that equilibrium equates with zero motion, must think again quickly. Another example is the so-called flat spin, which is essentially a deep stalled situation where, in addition to falling vertically, the aircraft is rotating rapidly. recover may be impossible.

In 'free flight' modelling, deep stalling is sometimes used deliberately to bring an aircraft down safely. After the desired time in flight has passed, the tailplane is tilted to a very large negative angle, forcing the deep stall, and the light model floats down vertically at low rates of descent like a leaf, normally landing without damage.

Between the angles of aerodyamic zero and stall, the wing is capable of operating effectively, giving lift without excessive drag. Aircraft are designed, as a rule, to stay within these limits or to exceed them only occasionally. The pilot controls the angle of attack to prevent the wing reaching either its aerodynamic zero or its stalling angle, except perhaps momentarily.

Inverted flight

It is worth mentioning that if the angle of attack is reduced beyond the aerodynamic zero, the wing will produce lift in the opposite sense. This enables flight to continue upside down. The aircraft may be turned onto its back, passing through aerodynamic zero to the negative side. At a sufficient (negative) angle of attack the wing will produce lift. Again, if this angle of attack is too great, a stall will result. The wing therefore has one aerodynamic zero but two stalling angles, positive and negative.

Gliding aircraft

The arrangement of forces and force components on a glider, or aeroplane gliding with engine stopped, is exactly the same as the tracking skydiver, except that the ratio of lift to drag is normally much higher. ■

WINCH LINE

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Design Thoughts Part I

We have had several requests for the basic parameters to design a good flying sailplane. Well the design depends on the individual and his or her tastes in flying and what the airplane is intended to do. There are also a number of theories on the subject of designs that conflict in many ways. It is like asking a bunch of flyers which airfoil is best; you are going to get any number of answers for a like number of reasons.

A number of years ago, this publication provided a forum that debated the subject of design in regards to the Sportsman Multi-Task concept and it got quite intense a couple of times. Some of "us" are very opinionated to say the least. But some good designs came out of the arguments and that was a good thing. At any rate, to make a long story longer, I noticed Daryl Perkins' concept on design in the October issue of *MA*. I liked some of his ideas and didn't agree with others, but I figure he now has what he wants and that is what counts.

I will attempt to stir up the hornets nest once again by presenting some general design ideas and some basic numbers that work in designing a sailplane. Anyone is welcome to jump right in and disagree, as I am certain a few will actively do.

There are several ways to begin your design: researching the leading books on the subject (both model and full size) or carrying a tape measure to the flying field to get ideas from the planes that you know fly well. Then, there is the "flying style" consideration: which set of parameters work well for your particular flying style. If you have a sailplane that you enjoy flying and do well with, that is a good place to look for starters.

As they say, "the wing is the thing" and is the place to start. My preference tends to be somewhat smaller in span (I love a good flying 2 meter.) and I have a friend, Dale King, who likes them large (about 3 meters). While we have differing points of view, we both design wings in the same fashion. We draw out the basic planform that we like, and then try to hit an aspect ratio and wing area that will work well. After playing with the numbers, we settle on one that should fit our design expectations.

With the span for the wing decided (figure about 114 for sake of discussion), remember that for the full span you will have about two inches of fuselage in the middle that will not count in the wing panels. This equals a 56 inch wing panel. Using the span of the panel, figure out what total area you want to obtain for this wing. The high 800s or low 900s is a good target. I also want to consider a good aspect ratio so that I can move around the sky pretty well. Dale and I use a ten inch root chord for open class ships and nine inches for two meters. Again, this is what we like and your ideas may differ.

The next decision is what type of planform you want for this plane. You can build a triple taper with a straight trailing edge, a triple taper with a straight center panel and tapering tips, a triple taper with taper on the leading and trailing edge, or straight double taper design. I always clip out the three view drawings of various designs that look interesting and look at the way the wing is designed just to get new ideas. Hopefully, the designer has given some thoughts on why that particular design was used to shed some light on his strategy.

I am going to use a triple taper with a straight trailing edge and a root chord of 10 inches for this discussion. You can use graph paper to get the scale right or you can do it on computer if you want to easily copy one design and then change it to do a comparison later. First, I draw a scaled line for the root chord and the trailing edge to the wing size. If you are working with a double taper wing, use the root chord and use a line for the end of the wing to define the span dimensions. I also figure in the wood used for the root rib and tip, as well.

Dale and I have found that we tend to use the same tip on most of our open ships and it is usually 9 inches in length. I make a mark on the trailing edge line to indicate the tip panel length. This leaves 47 inches to play with for the rest of the wing panel.

Here is where it gets interesting. What will the inboard panels sizes be? If you are into the conservation of foam, then the 50% split formula will work (i.e., both panels 23.5 inches long) or you can make the inboard panel shorter to pick up a better aspect ratio. The idea is to obtain the best aspect ration versus the maximum amount of wing area.

Now to throw some mud into the equation; we also need to figure the size of the panel ends to figure the AR and wing area. We generally just use dots to indicate the size of the panels so that we can figure the wing area and aspect ratio before drawing the final front lines for the panels. Now is the time to get out the calculator and do some figuring. The equations for both panel area and aspect ratio are:

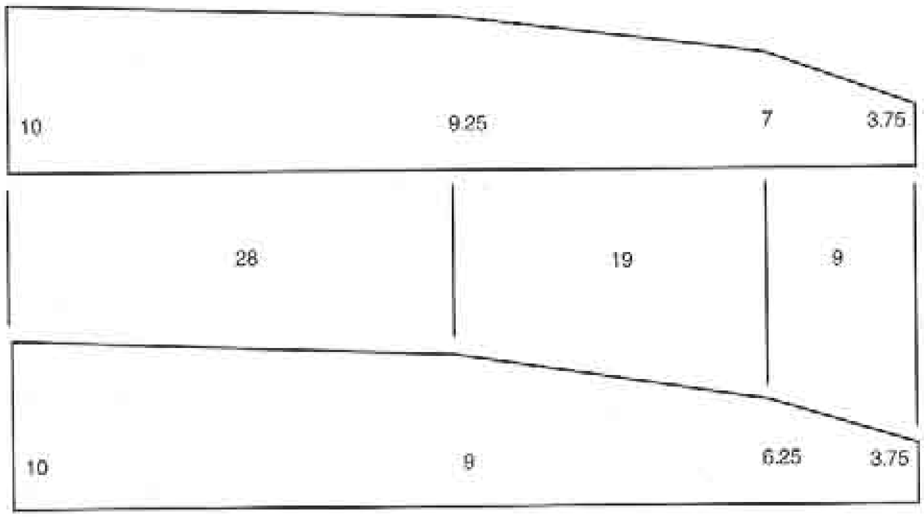
*Panel area = root + tip ÷ 2 = average chord x panel length = panel area

*Aspect ratio = span ÷ average chord = aspect ratio

*Figure each panel separately then add the figures together for the desired calculation (x 2 for the whole wing). I don't round up while calculating as I would rather be conservative in my totals.

The drawings below show two different wings with the associated dimensions for each panel, the square inches and aspect ratio for each wing. You will note that a slight change in the panel sizes will affect both the aspect ratio and the wing area. In this instance the difference of .25" on the first break and .75" on the second break. While this does not seem like a lot it sure makes a difference.

Wing Span: 112" 944 square inches Aspect Ration 1:13.8



Wing Span: 112" 905 square inches Aspect Ration 1:14.74

The wing with the higher aspect ratio flew better than the lower aspect ratio wing. This was tested using the same airfoil and airframe in the same conditions. It would also seem that the idea of a higher aspect ratio is catching on as the newer kits seem to all have a better aspect ratio than in days past.

Another way to change the aspect ratio/wing area is to shorten or lengthen the size of the wing panels to obtain the desired aspect ratio/wing area. It can get interesting with several planforms sitting in front of you and trying to decide which will work best. Dale and I have tried probably every conceivable combination over the years, and it can be a lot of fun.

Once you have made your decision, mark the locations on the drawing and fill in the lines to represent your wing layout. Here is where the LAR (Looks about right) theory comes into play. If you have everything the way you want it, it should look about right as well. Looking at some of the current wings on the kit planes will tell you if you are on the right track. You will note that if you are working on a 2 meter wing it will look rather stubby and the aspect ratio will not be as good, but that is the nature of 2 meters.

Now that you have the wing figured out, go build it; then see if your ideas work out in the air. ■

A SINGLE-HANDED LAUNCHING DEVICE FOR R/C SAILPLANES

(Intended for the relief of aching (or aging) backs!)

...by Fred Freeman
Ontario, Canada

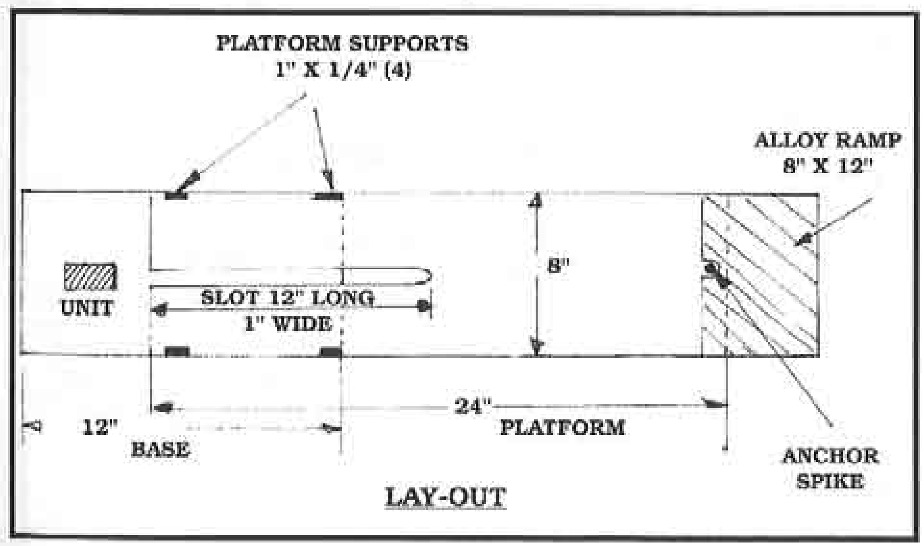
O.K., so you've spent twenty minutes or so wandering around the field, setting up the hi-start. You pick up your plane, switch on and hook it up to the line fighting the wind and the tension of the line, only to find that your transmitter is lying seven feet away! Your poor old back is breaking; your arms ache from the effort, and you're puffing like a grampus. You realize that unless you can find some place to anchor the line, you'll have to let go of the line, which means you'll have to start all over again!

(Come on, I hear you say? It can be managed better than that!)

But, the situation can arise; if you are young and supple, you'll probably shrug it off quite easily, but for those of us who are "chronologically disadvantaged", the struggle can be very dicey and might result in a damaged plane, due to a premature launch, not to mention strain which could precipitate a heart attack in extreme cases. I'd often thought about this scenario, but until recently, when I had to launch a somewhat awkward scale model, hadn't really got down to solving the problem; so I decided it was time I did. The result of all this thinking is presented herewith.

THE UNIT:

The main body of the device is made from 1 1/2" x 3/4" "U" section alloy suitably drilled and slotted to accept the various components. Two 1/4" holes are drilled in the base to allow mounting to a baseboard. The release cam is machined from 2 1/2" dia. alloy stock and is secured to the body by means of a 1/4" dia. pin. A 1/4" dia. release pin is free to slide in a slot cut in the main body, and the two are linked by light coil springs, in such a manner that the release pin is normally engaged by the tail end of the cam. Bowden cable is firmly attached to the center of the release pin, the cable passing thence via a hole in the back plate to a release handle. A towline



extension is made up from dowel and 3/32" dia. M.W. and attached to the 'chute end of the hi-start.

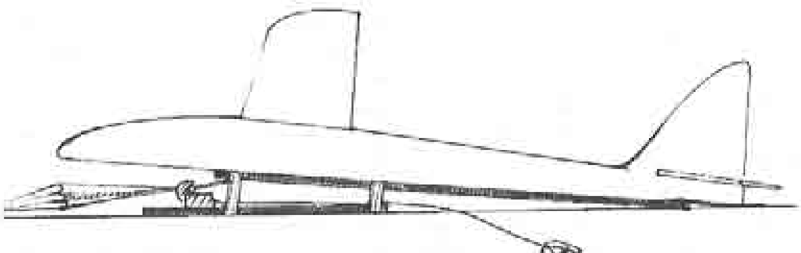
IN USE:

The unit is mounted on a baseboard of 3/4" ply, and a platform (Launching Platform) is fastened to it in a convenient position for the towline extension to engage the towhook thru a 1" wide slot in the platform. The dimensions are optional, and can be varied to suit your needs. I covered the platform with a piece of carpet to provide a reasonably friction free surface; I also added a ramp on the rear of the platform to avoid damage to any model that may have a skid on the rear. It's not essential, but it could prevent unnecessary breakages. A single 1/2" dia. hole is drilled at the rear of the platform thru which a spike is driven to hold the assembly on the ground. The dowel on the towline extension is attached to the hi-start at the 'chute end, and is placed on the top of the unit in such a way as to engage the jaws of the release cam. When the release handle is operated, the release pin is pulled rearwards, clearing the tail of the cam. This frees the towline extension and launches the sailplane.

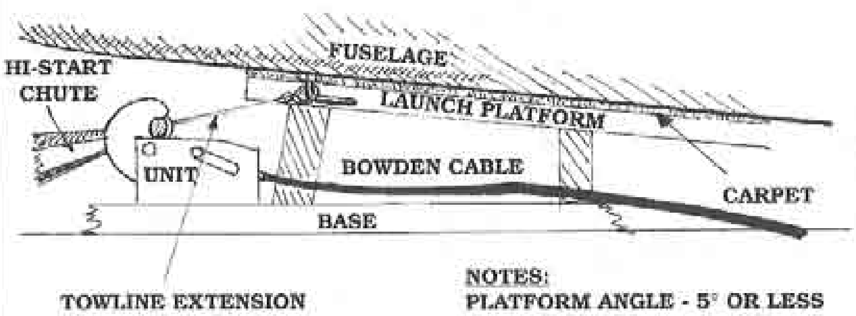
This device can probably be improved on, perhaps a foot operated release would suit you better, but I have used this set-up a lot this year, and it has worked faultlessly.

On occasions, when there is a moderate to strong wind, it may be necessary to steady a wing tip, but I have not had that happen as yet. I found it best to hold the nose down on launch.

This unit has made launching much less of a chore, and certainly a lot less hectic. If you decide to have a crack at it, let me know how you liked the experience. I'll be glad to sort out any snags you may encounter. Call me on (905) 627-9090. ■

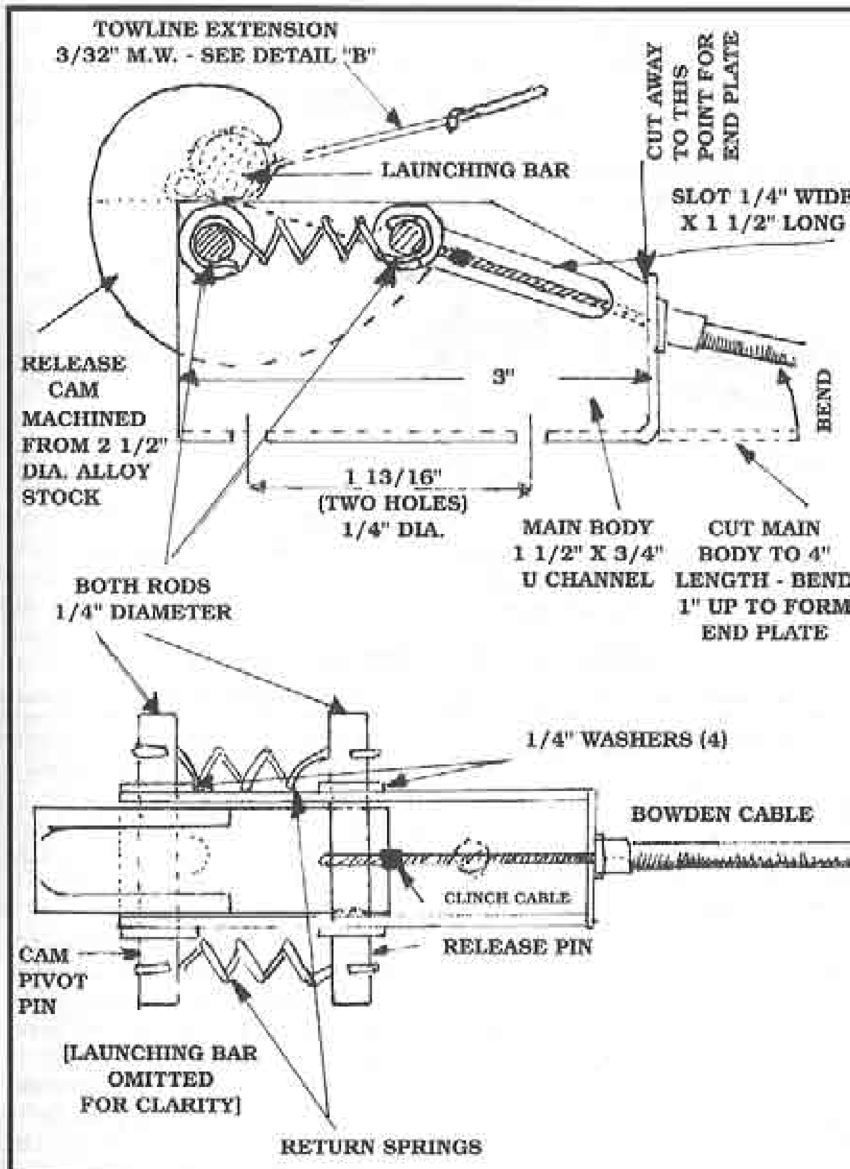


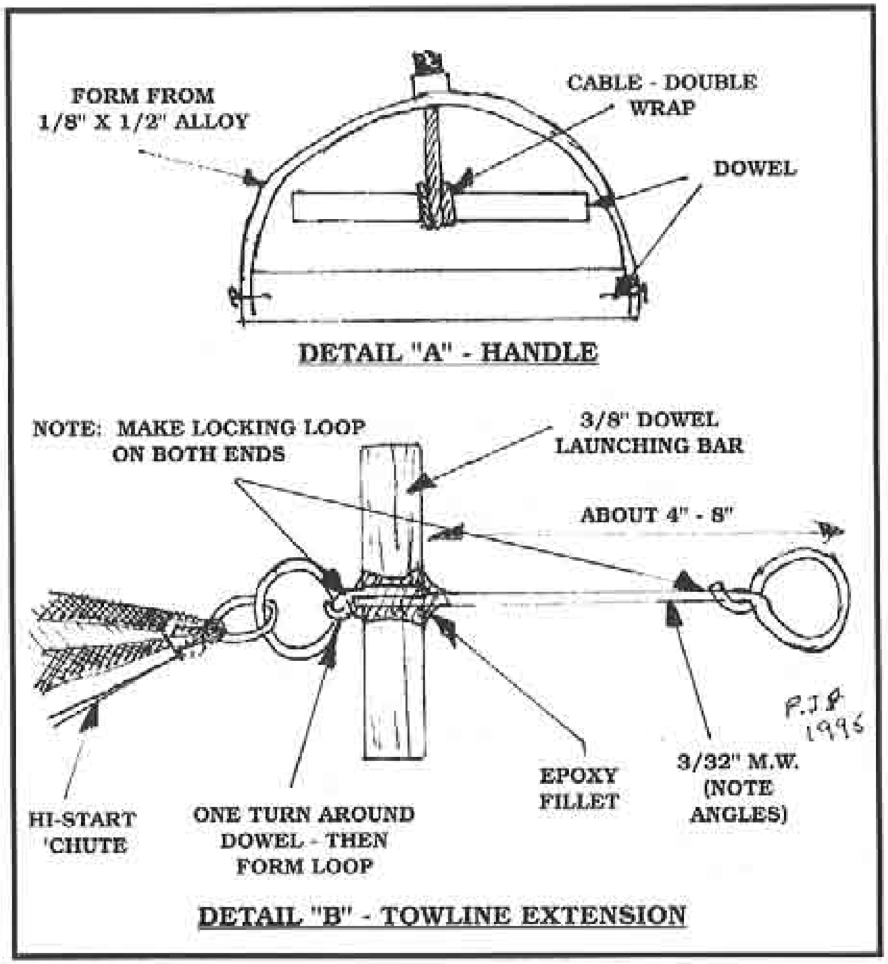
LAUNCHER IN USE - NO SCALE



NOTES:
PLATFORM ANGLE - 5° OR LESS
CABLE - REAR BICYCLE BRAKE
PLATFORM COVERED W/CARPET

DETAIL OF HOOK-UP
SECTION THRU CENTRE
OF ASSEMBLY - SHOWS
ATTACHMENT OF TOWLINE XTN.





Another CG Test

...by Pancho Morris
Mesquite, Texas

The dive test is a useful and controversial method for checking to see if your CG is at the optimum position. Another good test to be used in conjunction with the dive test is what I call the turn test or spiral stability test.

This test is best done on a fairly calm day when there is nice, steady lift or at least very buoyant air. With your trims set for nice steady straight flight, enter a fairly large thermal turn, preferably in lift. You can put in a little up trim or flap or both, but do not change the rudder or aileron trims. When you have established a smooth, steady turn, let the sticks go back to neutral and see what the plane does. If things are just right, the plane will stay in the circle with no tendency to tighten up or come out of the turn. Do this test in both directions. If it responds differently in one turn than the other, you have a warp in the wing, the rudder or fuselage out of alignment, or a heavy wing, or some other factor causing your plane to have a tendency to turn one way more than the other. If your plane tightens up in the turn and starts to spiral in, you should try moving the CG back. If the plane comes out of the turn and resumes flight, you should try moving the CG forward.

What we are looking at here is the relationship between the Center of Gravity and the Center of Lateral Area. The lateral area of a plane is a straight side view projection of the airplane. This takes into account the dihedral/polyhedral angles, the outline of the fuselage, the size of the vertical fin-rudder. The Center of Lateral Area then would be the exact center of this side projection. It would be as if you made a cardboard cut out of the side view of your plane and then saw where its balanced.

For our discussion, we will assume that any plane in a banked attitude will have some amount of sideslip to it. As it slips sideways, if the Center of Gravity is ahead of the Center of Lateral Area, the nose will drop into the turn. If the CG is behind the CLA, the tail will slide into the turn.

There are people that say that the CLA theory has nothing to do with spiral stability, that it is bunk. Blaine Beron-Rawdon wrote a very in-depth, multi-part article for *Model Aviation* several years back on spiral stability. I read it, but being a bear of very little brain, much of it went way over my head. My dad was the aeronautical engineer. It did sound good, and I have had other noted designers in the area whose opinion I respect say that he is right. I'm sure he is right, but I have a suspicion that they are both right to some degree and that there is a fine interplay between the two. Anyway, the concept of the CLA is much easier for me and my feeble mind to grasp, even if it is an over simplification of what is really going on.

If you are flying a kit design, you should not have to move the CG too far. If you do, you will upset the trim you have for the dive test. The designers usually have it pretty well worked out. If you are doing your own design or modifying something, you may have to change some things. There is usually a balance between dihedral/polyhedral and vertical fin size. During the 70's, two of the major sailplane kit designers were Tom Williams (California Tom) of Craft Air, and Lee Renaud of Airtronics. Tom liked lots of polyhedral balanced by large rudder/fins. The Sailair is his most classic example of this. Lee used less polyhedral and consequently, smaller vertical fins. Scott Christensen's Metric (Top Flite) had very little polyhedral and a very small vertical tail. The Hobie Hawk was one design that was notorious for having a vertical fin that was, at best, borderline. The Hawk was famous for doing the Hobie Roll. This was what is called a Dutch roll caused by too small a vertical fin sliding in on a turn and actually getting to occilate from side to side. The severity of the problem varied by the amount of dihedral each individual Hawk had, as there was some variation in them. Ones with more dihedral had more problem. Many fliers solved the problem by adding extra vertical area at the back of the plane.

If the vertical fin is too large, the plane will want to tighten up in a turn, and you will need to apply opposite rudder to keep it up.

What we are looking for both with the dive test and the turn test, is a plane that requires very little input to fly smoothly. The more input you have to make to the plane to control its flight, the more drag you create causing it to come down faster. You should not have to fight the plane for it to fly smoothly. It is fun to see Jack Hamilton standing out in the middle of the field with his transmitter hanging from his neck strap and his hands folded on the top of his head, and a big grin on his face, and to look up and see his Bounty Hunter circling lazily in a thermal on its own! ■

A New/Old Method For Launching R/C Sailplanes: The Auto-Tow

...by Gary Fogel, Don Scharf,
and Larry Fogel
Southern California

Full-scale glider pilots have generally used three methods other than aero-towing to launch their planes. Bungee cords were used in the 1930's to launch primary gliders to a low altitude. Winches could haul sailplanes to higher altitudes, provided that there was enough room on the ground to stretch out the steel cable. A less common method was the auto-tow. A car driving along at a reasonable speed would pull the sailplane into the air using a fixed length of cable. This became a common technique in the 1930's at places like the Torrey Pines Gliderport near San Diego, CA, where there is not a lot of room near the cliff edge and the local pilots did not have a winch at the time. After learning of this method from some pioneer glider pilots, we wondered if the same technique could be used to launch R/C sailplanes.

Clark Dry Lake in the desert east of San Diego, has been used for auto-tow launching since 1938 by members of the Associated Glider Clubs of Southern California. The dry lake is roughly 3 miles across and 2 miles wide surrounded by mountains that tower above the valley. We began our experiments by attaching 1000 feet of 20 lb. test woven nylon string to the rear of our Oldsmobile station wagon. The string was then made straight by driving the car into the slight breeze. (Larry Fogel drove the car, Don Scharf in the front passenger seat served as coordinator.) A small parachute was connected to the tow hook of a Paragon (Gary Fogel was the pilot, see Figure 1).

The pilot lifted the plane above his head so that the coordinator could tell the driver that the pilot was ready. The pilot quickly put the plane back down on the ground and waited for the launch. The car then was rapidly accelerated to about 15 m.p.h. The Paragon lifted off the ground in less than 10 feet and began "kiting" up behind the car. Once the glider was off the ground, the driver increased the speed to about 20 m.p.h. This best towing speed was discovered without braking the wings, although we came close on the first few trials. Once the desired altitude was attained, the pilot released the line by diving ahead of the car and allowing the parachute to slip off the towhook. At times that didn't work. Although the pilot thought he was off the line, he suddenly found the plane reorient itself to the path of the car. Most of the launches had the Paragon flying directly above the car with the string standing straight up indicating a 1000 foot launch!! To verify this, a Casio altimeter watch was carried in the plane. It consistently indicated maximum altitude gains of greater than 900 feet.

Having the pilot stand at the take off position had its good and bad points. The pilot had full view of the take-off and could easily re-hook the plane if the O-ring slipped off. On the other hand, both the car and the plane soon were tiny as they drove away from the pilot. It was hard to tell whether or not the plane was on the line. The parachute and line soon became invisible. With an average take-off-to-release time of 30 seconds and with the car travelling at 15-20 m.p.h., the plane was close to a mile and a half away from the pilot at the point of release!

To avoid this problem, we had the car make a gradual turn to the right or left to keep the plane in the vicinity of the pilot, but it was very hard to judge the attitude of the glider as it went around the turn on tow. Imagine watching your next winch launch from the side! This could have been avoided if we had a voice radio contact between the pilot and the coordi-

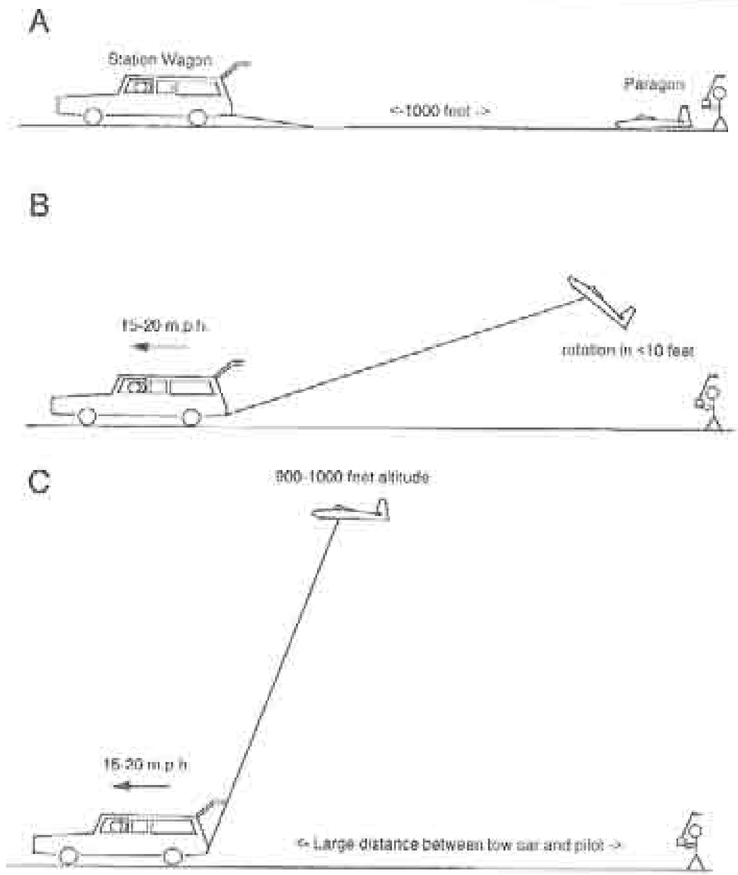


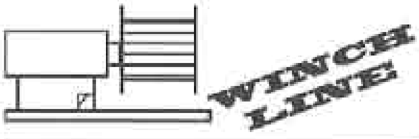
Figure 1. Auto tow of the Paragon showing three phases of the launch.
A) Ready to go. B) Rotation occurs in 10 feet, model assumes 45° angle.
C) Final phase just before release.

nator in the car. He could inform the pilot about the atitude and speed of the glider.

We also tried leaving the glider on the ground and had the pilot ride in the back of the car...watching his plane being pulled into the air across the dry lake (similar to viewing a normal winch launch from beyond the turnaround position). This was not generally successful. It was very hard for the pilot to ascertain the attitude of the plane and there were several "pop-offs".

Thinking it would be possible to "kite" the Paragon up to the 1000 foot altitude by starting with 500 feet of line and reeling out the rest very slowly, we obtained 1000 feet of 15 lb. fishing line and a fishing pole. The coordinator sat in the rear of the station wagon with the end of the line connected to the Paragon. On the first attempt, the pull on the fishing rod was tremendous and nearly pulled the coordinator out of the car. On the second attempt, the Paragon gained altitude so quickly that he could no longer see the plane as it flew above the car and ran out of line. We ended our experiment with one final 1000 foot launch.

Overall, the auto-tow is a neat way to launch R/C models, provided there is lots of room to drive a car. You get a really great launch, but remember, there's nothing wrong with the good-old hi-start!! ■



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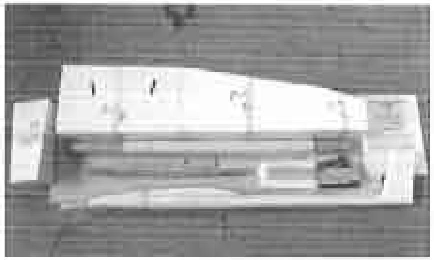
Saturn 2.0

The Saturn 2.0 is a nifty two meter that flies like a much bigger airplane. It resembles its big brother, the Saturn 2.9T, not only in appearance but with its ability to thermal and slow down for landing. Plus, you have the option of building it with either a conventional T-tail or turning it into a V-tail. The design uses an HQ 3/10 that transitions to an HQ 3/9 at the tip which combines the great lifting characteristics of the Quabeck with a little thicker section to eliminate it being a handful as some two meter airplanes are want to be.

For those of you who are not familiar with David Layne Designs (formerly Layne/Urwyler), he is a cottage industry. (Read "garage" as Dave doesn't own a cottage.) Dave Layne and Pete Urwyler started commercially building sailplane kits about four years ago with the inception of the Saturn 3.0. As with most of the kit manufacturers, it started as kitting their design for other folks and grew into a business. The designs favor the European look that Dave has always preferred, and the Helmut Quabeck airfoils that he has become addicted to over the years. They offer their kits in either total kit form or with a sheeted wing and stab which, in this day of pre-sheeted airplanes, is a little different. The blend is a stable of well designed airplanes at <u>very</u> reasonable prices.

The kit comes with the PVC spar assembly pre-installed for the T6 aluminum carry through arrangement that Layne/Urwyler has used in their other airplanes. This spar assembly is almost indestructible and is simple. The fuselage is fiberglass with Kevlar reinforcement in a lay-up that provides an extremely strong fuselage. Inside the box is a set of white foam cores, obechi and all the fiberglass and carbon fiber to provide plenty of strength while remaining light. The kit is very complete with even the electrical connectors and wire for the wing servo wiring provided. Add all the clevices, building instructions, wood pieces and you have a very complete kit in every respect.



Rather than a blow-by-blow, how to build it description, I want to detail some of the unique ideas that have gone into the design of Saturn 2.0. The spar is a length of PVC that is sized to fit a T6 aluminum carry through. Dave takes a circle template and cuts the circular hole for the spar in the inboard wing panel block; then the airfoil shape is cut. The trick here is to align both inboard panels so that the spars line up. Not a problem after you have done it a couple of hundred times. The PVC is then tack glued into the wing panel and the dirty deed is done.

The reason I mention the PVC is just tack glued into the wing panel, is that the excess resin from the obechi lamination process fills the remaining space around the spar and bonds to the obechi, carbon fiber and fiberglass to form a really strong structure. I have used the same technique on a couple of wings and it is super strong, yet simple. But Dave is into <u>SIMPLE</u> ways of doing things. While this spar method is not new, this is the only example of it being used commercially that I know of.

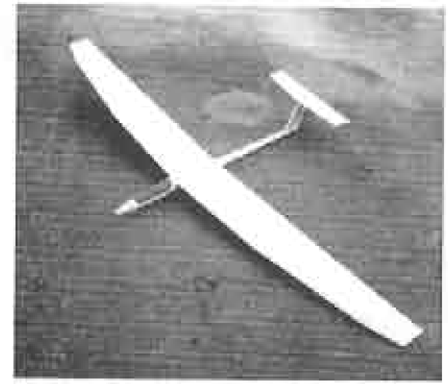
The stabilizer is another example of a simple construction technique. The foam cores are first joined at the center; then the location of the two hardwood blocks is marked. The foam is cut out to accept the hardwood blocks with as tight a fit as possible. Then temporarily mount the blocks and mark the airfoil shape. Sand and fit the blocks to the airfoil shape and then tack glue these in place. As with the spar the resin used to laminate the obechi will take care of the blocks. Once sheeted the hold down bolt holes are drilled and the stab is aligned to the fuselage.

The fuselage was designed with utility as the key. First the fin had to be large enough to mount a servo for the elevator, if desired. The boom had to be large enough to provide a solid platform for the V-tail configuration, and it had to have the beef so that it would not break on the first landing. The design managed to meet all of the above criteria in fine fashion; plus it is an example of some pretty good glass work as well.

The overall construction is very straight forward and will not pose a problem for the builder. And another nice thing about David Layne is that you can call up if you do have a question and get an immediate answer. Dave is more than willing to help out if you run into a problem. He doesn't get many calls by the way.

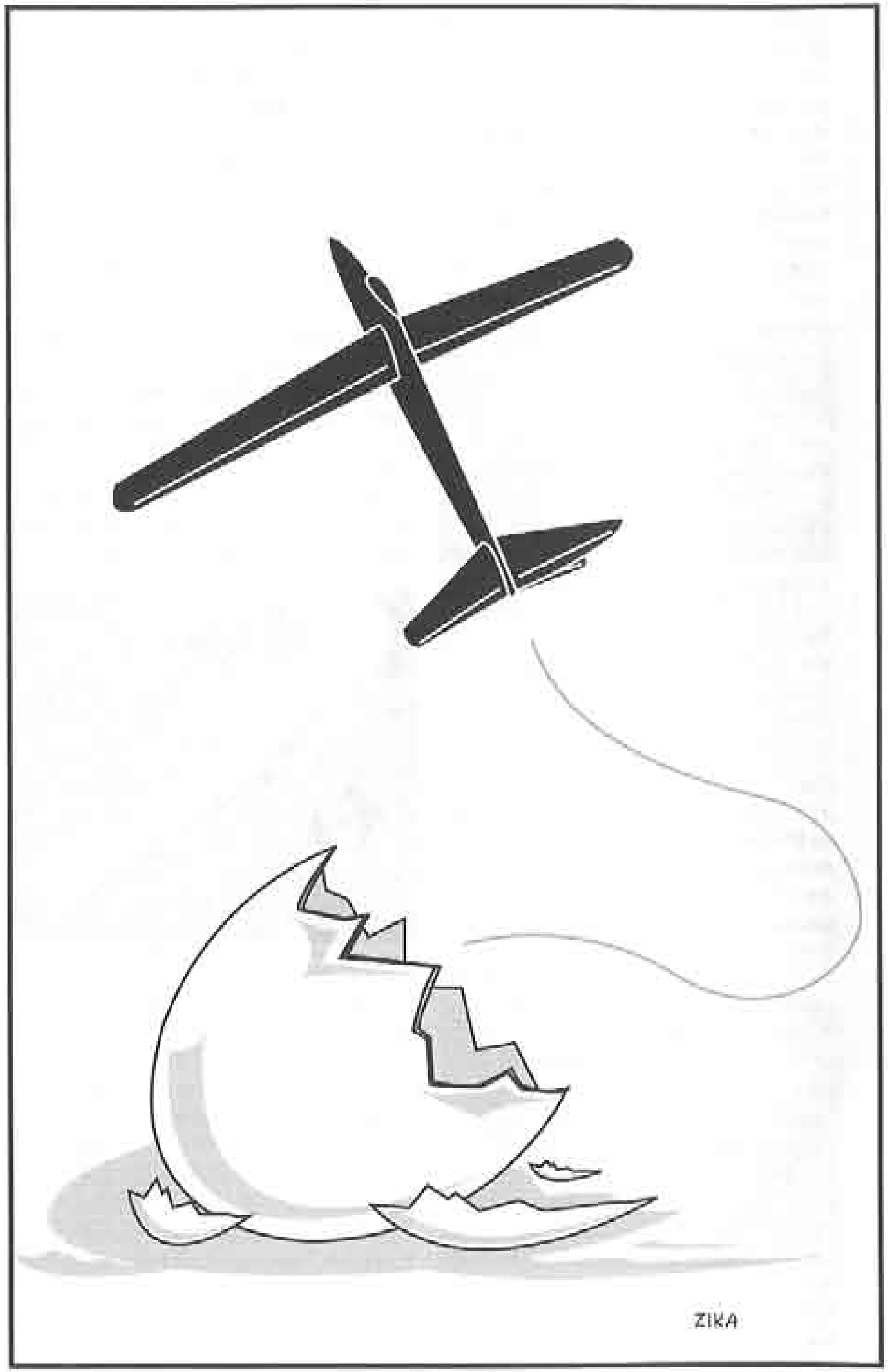
I built mine from the kit and in the first hour the wings were in the bag; followed shortly by the stab. While waiting on the flying surfaces to dry it was off to the fuselage. Not really much in the way of surprises here. As with any other kit, take your time and be sure of fit and align and all will be well. Take your time balancing once the radio is installed and the first hand launch should make a nice circle back to land at your feet.

Flying the Saturn 2.0 is fun! I was fortunate enough to be able to fly the original prototype when Dave brought it to Texas for the Texas National Tournament. On the day prior to the contest we spent the afternoon really abusing the airplane. From the original design, only two slight design changes have come about which speaks highly of the initial design.



The production airplane is a dream to fly. The term "flies like a much bigger airplane" certainly applies here. From a full pedal launch (I love vertical rolls off launch.), to thermalling, to putting it on the spot on landing, it handles like its big brother the 2.9T all the way. I especially like the light air capabilities of the HQ that let you thermal on the deck if need be and not get creamed in the process.

If you are looking for an interesting two meter that is easy to build and a ball to fly, try this one for size. You will be pleasantly surprised. ■



NASSA
NORTH AMERICAN SCALE SOARING ASSOCIATION

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

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LSF

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

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

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

The Vintage Sailplane Association

Soaring from the past and into the future! The **VSA** is dedicated to the preservation and flying of vintage and classic sailplanes. Members include modelers, historians, collectors, soaring veterans, and enthusiasts from around the world. Vintage sailplane meets are held each year. VSA publishes the quarterly **BUNGEE CORD** newsletter. Sample issue: $1.00. Membership is $15.00 per year. For more information, write to the:

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

T.W.I.T.T.
(The Wing Is The Thing)

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

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

You are invited to join the
NATIONAL SOARING SOCIETY

• OFFICIAL AMA SOARING "SPECIAL INTEREST GROUP" • YEARLY NSS "SOAR-IN" TOURNAMENTS • NATION WIDE "EXCELLENCE AWARDS PROGRAM" • EXCELLENT BI-MONTHLY NEWSLETTER • NSS FULLY SUPPORTS THE F3B SOARING TEAM & LSF SOARING PROGRAM • NSS IS INVOLVED IN THE ORGANIZATION AND OVERSEEING OF THE SOARING PORTION OF AMA NATS (INCLUDING AWARDS BANQUET) • YEARLY DUES ARE $15 U.S.A. AND $20 OVERSEAS (SPECIAL FAMILY RATES) • NSS OFFICERS ARE FROM ALL 11 DISTRICTS

For info., Contact NSS Secretary/Treasurer
Robert Massmann
282 Jodie Lane
Wilmington, OH 45177
(513) 382-4612

R/C Soaring Resources

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

Contacts & Soaring Groups - U.S.A.

Alabama - North Alabama Silent Flyers, Ron Swinehart, 8733 Edgehill Dr. SE, Huntsville, AL 35802; (205) 883-7831.

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

Arizona - Southern Arizona Glider Enthusiasts, Bill Melcher (contact), 14260 N. Silwind Way, Tucson, AZ 85737; (602) 325-2729. SAGE welcomes all level of flyers!

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

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

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

California - South Bay Soaring Society, Mike Gervais, P.O. Box 2012, Sunnyvale, CA 94087; (408) 683-4140 after 5:00 pm.

California - Southern Calif. Soaring Action, Pete Young, 6592 Belgrave Ave., Garden Grove, CA 92645-1802; (714) 892-3473.

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

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

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

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

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

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

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

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

Maryland - Baltimore Area Soaring Society, Russell Bennett (President), 30 Maple Ave., Baltimore, MD 21228; (410)744-2093.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Seminars & Workshops

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

Schedule of Special Events

Date	Event	Location	Contact
Feb. 18	2M/Open	San Antonio, TX	Greg Dickerson, (210) 656-1796
Mar. 18	Open Floater 2 CH Highstart, Open w/Winch Launch	San Antonio, TX	Gene Warner, (210) 732-3101
Apr. 8-9	Masters of Soaring	Covina, CA	Pete Olsen, (909) 597-2095
Apr. 23	Handlaunch	San Antonio, TX	Tom Meeks, (210) 590-3139
May 5-6*	Rosebowl Soaring Festival	Pasadena, CA	
May 5-7	Slope Scale Soar-In	Los Banos, CA	Lynsel Miller, (408) 275-6403
May 20	Six Rounds of Open	San Antonio, TX	Jerry Caldwell, (210) 438-4077
May 20-21	Electric Fun Fly	Memphis, TN	Tom Ernst, (901) 767-9518
May 20-21	Spring Fling	Davis, CA	Joan Nolte, (916) 966-0857
May 27	SASS HL 1	Redmond, WA	Jim Thomas, (206) 488-2524
June 15-18	Mid-South Champs (International Contact)	Huntsville, AL	Ron Swinehart, (205) 883-7831 Tom Ernst, (901) 767-9518
June 24-25	TNT Open	San Antonio, TX	Perry Van, (210) 658-8842 Mike Howell, (210) 657-3332
July 15	HL/Open	San Antonio, TX	Mike Howell, (210) 657-3332
July 15-16	SOAR 95 (Unl, 2M)	Redmond, WA	Jim Thomas, (206) 488-2524
July 21-24	Wasatch Mt. Scale/PSS Soaring Festival	Pt. of the Mt., UT	Bob Harman, (801) 571-6406
July 22-23	SWIFT/Western XC	Mead, NE	Christopher Knowles, (402) 330-5335
Aug. 12-13	Thermal Grabber **	Redmond, WA	Jim Thomas, (206) 488-2524
Aug. 19	Handlaunch	San Antonio, TX	Jerry Caldwell, (210) 438-4077
Sept. 2	SASS HL 2	Redmond, WA	Joseph Conrad, (206) 630-2670
Sept. 16	2M/Open	San Antonio, TX	Gene Warner, (210) 732-3101
Oct. 7-8*	Fall Soaring Festival	Visalia, CA	
Oct. 14-15	Fall Soaring Tournament	Memphis, TN	Bob Sowder, (901) 757-5536
Oct. 21-22	Canyon Lake Classic 2M, Open, HL - Potters Creek Park	Canyon Lake, TX	Greg Dickerson, (210) 656-1796 Tom Meeks, (210) 590-3139
Nov. 19	Open	San Antonio, TX	Perry Van, (210) 658-8842
1998	World Soaring Jamboree		

* Western States Triad

**Unlimited, 2M

Outside U.S.A.

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

Canada - Manitoba, Winnipeg MAAC Men Gliding Club, Bob Clare, 177 Tait Ave., Winnipeg, MB, R2V 0K4, Canada, (204) 334-0248.

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

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

Hong Kong - Robert Yan, 90 Robinson Road, 4th Floor, Hong Kong; (852) 5228083, FAX (852) 8450497.

Reference Material

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

BBS

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

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

NEW PRODUCTS

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*.

David Layne Designs
New Name/Same Quality

...from David Layne

An announcement is in order to clarify the name change of Designs by Layne/Urwyler to David Layne Designs. Unfortunately, Peter Urwyler, the co-founder of Layne/Urwyler, is now unable to participate in the model business due to the expansion of his Commercial Electrical Contract business. David Layne will continue to operate the business under the new name.

The current line of Saturn sailplanes will continue to be produced and a couple of prototypes for new designs are flying at this time. A new 130+ version of the Saturn using an HQ2.5/9 airfoil is flying with great results. Several other ideas are being contemplated for the future that may be of interest as well. ■

Stiletto HQ 2.5/9

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

NEW - A Stiletto HQ 2.5/9, for the scrach builder. This new, epoxy, S-glass, Kevlar reinforced, 49 inch long fuselage is ideal for a 100 - 114 inch wing span with a 10 inch cord at the root. Using S-glass and a change in lay up technique, these fuselages are coming in with a gross weight of approximately 7.25 - 7.50 ounces. If you are a California Slope Racer and need a fuselage that is a little more robust, let me know when ordering and I will custom make a fuselage to fit your needs.

Price for the epoxy, S-glass, Kevlar reinforced 49 inch long fuselage is $75.00 plus $10.00 shipping. Texas res. add 7.25% state tax. Add $4.75 for COD orders. Viking Models USA, 2 Broadmoor Way, Wylie, Texas 75098; Tel. (214) 442-3910, Fax (214) 442-5258. ■

STILETTO HQ 2.5/9

Hobby Shops that Carry *RCSD*

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

Air Capital Hobbies
8989 West Central
Wichita, KS 67212
(316) 721-4164

California Soaring Products
1010 North Citrus
Covina, CA 91722
(818) 966-7215

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

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

HiTecHobbys
284 - B Wellsian Way
Richland, WA 99352
(509) 943-9241

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

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

Hobby Town USA
8090 S. 84th St.
La Vista, NE 68128
(402) 597-1888

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

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

Classified Advertising Policy

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

Personal ads are run for one month and are then deleted automatically. However, if you have items that might be hard to sell, you may run the ad for two months consecutively.

For Sale - Business

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

"After a couple of flights, Wolf Hirth felt that I was a natural born flier and let me have a try in the Minimoa." One of over 670 quotes and stories by Frank Zaic in **FRANKLY SPEAKING.** $6.95 plus $1.25 postage. Model Aeronautic Publications, Box 135, Northridge, CA 91328.

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

POWER SCALE SLOPE - BAe Hawk (T-45 Goshawk) Fiberglass fuselage, foam wing and stab cores, Obechi sheeting, all hardware and Cad drawings. Span 47.5". Weight 35 oz. $120.00 plus shipping. TLAR Enterprizes, 14221 45th Pl. W., Lynnwood, WA 98037; (206) 743-9358.

CLEARANCE SALE: ESTEEM 110... $295.00 plus shipping; Titanium 3/8" wing rods... $15.00 ea.; 3/8" carbon wing rods... $10.00 ea.; 3/8" x 18" carbon tube wing spars... $12.00 ea. Kennedy Composites at (512) 206-0478, Texas.

SPECIALS on new and pre-owned kits: ROKE 1/4 scale B-4, built, never flown, NEW... $650.00; Multiplex DG-500, two place, very nice... $475.00; Multiplex DG-300, 1.4 scale... $475.00, Fiber Glass Flügel (FGF) Salto H101, all glass, 2.7m, flaps, RTF... $525.00; FGF ASW-20L, 4.15m, all glass with retract gear, outstanding performance... $1000.00; FGF SALTO H101, 2.7m, all glass, spoilers, RTF, new, never flown... $600.00; Vern Hunt ACRO, L39, PSS, painted, RTF... $385.00; JR Radio PCM-10, new with case... $495.00. Pete Bechtel, Windspiel Models, (208) 667-2276, FAX (208) 667-8712, Idaho.

For Sale - Business

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

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

For Sale - Personal

Spectrum, S3021 airfoil, used in Slegers ads... $375; Spectrum 2 Meter, w/JR wing servos, flown very little... $350; Synergy 91, w/1000 ma battery and JR wing servos... $550; Aquila Grande, good condition... $250; Saturn 2.9T, built/never flown... $375. Will consider trades. Prices + S&H. Gordon Jones (214) 271-5334, Texas.

Stiletto II, bolt-on RG15 108 inch span, built/never flown... $375; Elf 2 Meter, bolt-on HQ25/10, built/never flown... $275. Plus shipping. Dale King (214) 475-8093, Texas.

SYNERGY 91 w/servos, very nice plane... $575.00; BANSHEE with servos, complete... $400.00; NIB SKYHAWK, 7037 airfoil, white glass body... $425.00. Fred Rettig (205) 471-2507 (days), (205) 660-1318 (eve), Alabama.

GENESIS... $200.00; BOBCAT... $20.00; AVOSET altimeter-barograph-thermometer watch w/manuals. Barry Kennedy (512) 206-0478, Texas.

Airtronics Vision 8, NIB, never used... $350.00; Airtronics Micro receiver, CH 38, NIB... $60.00; RCD Micro receiver, CH 54, Futaba plugs... $65.00; two Multiplex Stell servos, NIB... $50.00 each; FALCON 880 sailplane, ARF, final construction stage... $275.00; Dodgson SABER kit... $175.00; Dodgson PIVOT, ready to cover... $125.00. Randy Patchett, 4818 Owens Creek, Spring, Texas 77388.

1 Vision XMIT Module on HAM CH #00, 50.800. 1 Air. rec. XTALL on #00. 1 Fut. rec. XTALL on #00. $32.00 for all ppd. Brian Smith (615) 393-4876, Tennessee.

Multiplex kits NIB: ALPHA elec... $180.00; ARRIBA elec... $350.00; LS-3... $350.00; COTINA... $300.00; AKRO... $220.00; Alpina CS... $450.00; FLAMINGO... $200.00; FLAMINGO Contest... $250.00; ASW-20... $400.00; DG-300... $450.00. All kits NIB plus UPS. Mr. Kite (612) 435-7406 after 5:00 pm, CST, MN.

PIK-20E sailplane, w/fiberglass wings-fuselage-carrying case, rare 3.5m Finnish sailplane w/optional retractable engine... $650.00 plus shipping; Airtronics OLY 650... $30.00; HOBBIE HAWK... $275.00; Dodgson Camano... $120.00; Bridi TERCELL... $15.00; Graupner DISCUS... $450.00; Mark Allen built FALCON 600... $225.00; FACTOR fiberglass fuselage & pre-sheeted wings... $90.00; Dodgson WINDSONG, factory built fuselage... $230.00. Barry Kennedy (512) 206-0478, Texas.

CATALINA Cross Country sailplane kit... $150.00; Pierce AERO PARAMONT kit... $200.00. Will ship UPS no additional charge. Also have TopFlight Gold edition P-51, and a "Zing!" control line kit from the 40's designed by Carl Goldberg. Bill Baker, 1902 Peter Pan St., Norman, OK 73072; (405) 329-1018.

RnR SYNERGY 91, includes 6 new Airtronics 94141 servos, 800 mAH battery & switch harness, like new condition, 18 total flights, just add receiver and program your Vision with included setup sheet listing all setup parameters and fly... $850.00 + shipping OBO, will consider airframe only offers. John Ihlein (505) 294-7943, New Mexico.

All glass Multiplex DG-300 w/servos, excellent... $975.00; Robbe ASH-26E w/wing servos, excellent cond... $850.00; Rowing LS-4 w/wing servos, excellent... $1300.00; custom EAGLE, RG-15, natural obechi, Arrow shaft hinges, nice, w/wing servos... $600.00; Alpina MAGIC, w/wing servos, fixed wheel, very good cond... $550.00; ASW-17, 3.5m, w/flaps, Quabeck 2.5/13... $350.00. Call Ray Franz @ (714) 362-5545 (E), (714) 830-8928 (days), Calif.

Wanted

DEAD NICADS OR SERVOS with Airtronics adapters. Will pay shipping. Will take anything and all! Jim Gell (810) 476-3506 (eve), (810) 358-0400 (days), Michigan.

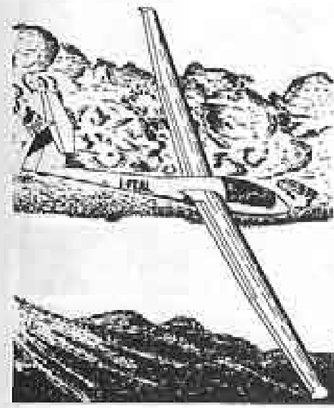
Advertiser Index

Advertising

Wanted

Need left wing for WIK Modelle Speed Astir. Jack Hilliard @ (615) 579-5917 (H), (615) 970-2299 (W), Tennessee.

Craft-Air Viking MK1/MK2 fiberglass fuselage, Sailaire kit NIB. Bob Parker (408) 997-6940, N. Calif.



SPECTRUM

A NEXT GENERATION THERMAL DURATION SAILPLANE

SLIP ON NOSE CONE
PRE-SHEETED WINGS AND STAB
KEVLAR REINFORCED FUSELAGE
PRE-CUT AILERONS, FLAPS, AND ELEVATOR
Wings and stab have control surface capping material installed prior to sheeting, which provides additional strength for the control surfaces.

Specifications	Spectrum Open	Spectrum 2M
Wing Span	104"	78.5"
Wing Area	855 sq. in.	554 sq. in.
Airfoil	S3021/SD7037/RG-15	S3021/SD7037
Aspect Ratio	13:1	11.2:1
Weight	60 Oz.	40 - 43 oz.
Wing Loading	10 oz/sq. ft.	10 oz/sq. ft.
Price	$295.00	$195.00

(Price does not include S&H or New Jersey resident sales tax.)

SLEGERS INTERNATIONAL

Route 15, Wharton, New Jersey 07885
(201) 366-0880 - FAX (201) 366-0549
9:30 A.M.- 5:00 P.M. (**Closed Sun. & Mon.**)

High Quality Electric & Non-Electric Sailplanes, Radios, and Accessories for the Sailplane Enthusiast

Now there are three locations to serve you better! Our sailplanes are available direct from us or from:
KENNEDY COMPOSITES, 1304 Cullen Ave., Austin, TX 78757 • (800) 890-6173 • FAX (512) 206-0772
CALIFORNIA SOARING PRODUCTS, 1010 North Citrus, Covina, CA 91722 • (800) 520-SOAR, FAX (818) 966-7815

★ VISA ★ MASTERCARD ★ AMERICAN EXPRESS ★ DISCOVER ★

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Route 15, Wharton, New Jersey 07885
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High Quality Electric & Non-Electric Sailplanes, Radios, and Accessories for the Sailplane Enthusiast

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CALIFORNIA SOARING PRODUCTS, 1010 North Citrus, Covina, CA 91722 • (800) 520-SOAR, FAX (818) 966-7815

★ VISA ★ MASTERCARD ★ AMERICAN EXPRESS ★ DISCOVER ★

PRISM

UNLIMITED THERMAL DURATION SAILPLANE

PRE-SHEETED WINGS AND STAB
TRIPLE TAPER WING PLANFORM
SERVO BAYS ROUTED & WIRE CHANNELS CUT
ROUTED HINGE LINE W/PLYWOOD ROOT RIB PRE-INSTALLED
FIBERGLASS W/CARBON FIBER KEVLAR REINFORCED FUSELAGE
SLIP ON NOSE CONE
3/8" TITANIUM WING ROD
COMPLETE INSTRUCTIONS & HARDWARE

Specifications	
Wing Span	117"
Wing Area	910 sq. in.
Stab Area	102 sq. in.
Airfoil	SD7037 or RG-15
Aspect Ratio	15:1
Weight	60-65 oz.
Wing Loading	9.8 - 10.5 oz/sq. ft.
Price	$295.00

(Price does not include S&H or New Jersey resident sales tax.)


TURBO
New For 1994
The Turbo has been redesigned for better performance, durability, and faster building. The kit now comes with a Fiberglass fuselage and full wing sheeting which makes kit building faster. The Turbo's trademark high performance capabilities have been further improved with increased speed and energy retention. An exciting new option offers a fully symetrical SD-8020 wing which gives you the same performance inverted as rightside up opening up new aerobatic possibilities.
Composite ARF $249.95
Kit Price $119.95
Pre-Fab Price $199.95
Composite ARF
· Ultra Strong Carbon/Glass RG-15 Wings Vaccum Bagged On Blue Foam Cores
· Bolt-On Tail Surfaces-- Fits In 2"x7"x 36" Case For Traveling
· Push Rods Installed
· Optional SD-8020 Symetrical Wing
· Optional Radio Installation
· Optional 600mah Battery Pack
Kit Features
· High Quality Wood And Hardware
· Epoxy/Glass Fuselage
· Feather Edge Foam Cores
· Optional SD-8020 Symetrical Wing
· Assembled Wingeron Linkages
Pre-Fab Features
· Vaccum Bagged Balsa Skinned Wings
· Removable Pre-Built Tail
· Push Rods Installed
· Optional SD-8020 Symetrical Wing
· Assembled Wingeron Linkages
Specs Span: 60"
Airfoil: RG-15 or SD8020 Symetrical
Wing Area: 320 sq.in.
Kit Wt. 18-22 oz. Comp. 23-29 oz.
Wing Loading: 10-15oz.sqft.
Control: Wingeron/Elevator
Standard or Micro Radio Gear
CLIMMAX
High Performance 60" Span Hand Launch Thermal Glider
Climmax Takes 1st & 3rd At World Soaring Jamboree Hand Launch Contest
Kit $59.95
Pre-Fab $169.95
Fiberglass Kit $99.95
SPECIFICATIONS
• Airfoil: SD-7037
• Wing Area: 400 sq. in.
• Two Channel: Rudder, Elevator
• Flying Weight 12-14.5 oz. (FG)
• Machine Cut Balsa, Spruce, And Plywood
• Quality Feather-Edge Foam Wing Cores
• Flying Weight 14-16 oz (all wood kit)
• Bolt-On Wing
• Full Size Rolled Plans - Detailed Instruction Book
• Standard or Micro Compatible
• Optional 150, 270, or 400 mah Battery Pack
RAIDER Racer
Raider Racer $419.95
New F3B Raider $519.95
Highly Prefabricated Plane Requiring Little Assembly
Raider Racer
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Call For Your New 1994 Catalog Of Sailplanes And Accessories
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The top three winners of the World Soaring Jamboree 60" Slope Races
Eric Larsen 3rd
Charlie Richarson 2nd
Steve Neu 1st
60" Span Glass Slope Racer
ARF Kit $269.95
RENEGADE
The Renegade is the new "Bad Boy" on the Slopes of California, winning everything in the new 60" span racing class. The RG-15 airfoil gives the Renegade a blistering speed range and the ability to carry a massive ballast load if needed. Its flaperon system cranks the plane through high-G pylon turns with little energy loss. Don't let Renegade's bad attitude scare you off because it is very stable at all speeds and has remarkable light lift and thermaling ability. This rugged plane gives you big plane speed at a small plane price.
Highly Prefabricated Requiring Little Assembly
High Quality Molded Epoxy/Fiberglass/Kevlar Fuselage With Slip On Nose Cone · Installed Elevator Cable
Vacuum-Bagged RG-15 Composite Wings Featuring Blue Foam Cores Skinned With Carbon Fiber And Glass
Pre-cut And Hinged Ailerons
Bolt-On Wing And Tail Surfaces · Optional Ballast Kit
The Contender is designed for those who desire the ultimate in speed and aerobatics, featuring three channel control with wingerons, elevator, and full flying rudder. Contender's long tail moment and stabilizer design give it hands off stability even at extreme speeds. The airfoil and wing design allows for an incredible speed range with the ability to turn or climb sharply with unmatched energy retention. Wings are constructed with blue foam cores, Carbon Fiber and plywood wing skins and spars. The fuselage is designed with a large ballast compartment over the C.G. where up to 20 ounces of ballast can be placed for high lift conditions or slope racing. At the standard flying weight of 50 ounces, the Contender is very fast and will fly great in winds averaging as low as 5-7 m.p.h.
SPECIFICATIONS
The Ultimate Aerobatic Speed Machine
FiberGlass/Kevlar Body Now Available !
CONTENDER
Glass Body Kit $149.95 · Composite ARF $289.95
Contender takes Novice Slope Racing Class at World Soaring Jamboree
The Renegade kit has all of the high performance flying ability of the composite version but at a lower price. Each kit features precision cut foam cores, full hardware kit, full size plans, and can fit any type of radio gear. The Renegade is one of the most versitile slope planes anywhere and can be built very light to accomodate those small slopes or thermal flying areas.
FEATURES
Wood Kit $65.95
Pre-Fab $159.95
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