R/C Soaring DIGEST

March, 1993
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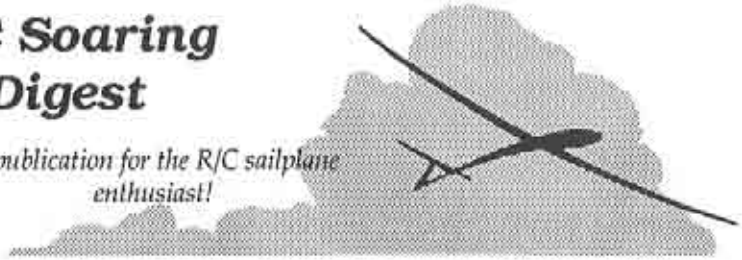
Wildey Johnson & Jupiter

His "Fuselage Replacement" method is on page 34

(Photo by Carolyn Johnson)

R/C Soaring Digest

A publication for the R/C sailplane enthusiast!



Advertiser Index

Table of Contents

Other Sections

Special Interest Groups

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

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The Soaring Site

RCSD Database

Lee Murray has been summarizing the information in *RCSD* into a reference listing of *RCSD* articles and advertisers since the first issue was prepared in January, 1984. The database files were available from a BBS, Bears Cave, until recently. Lee says, "Regarding the *RCSD* database, you know that Bears Cave, the electronic repository of that information, is now history and the BBS host computer is now doing other things. The sysop, Andy Meyer, provided a disk with all the *RCSD* database files. I would like to make those files available to soaring associated BBSs as will be willing to have them and post them. I have been thinking also of becoming a subscriber to CompuServe and posting them there. Anyway, system operators can write me for a free disk for their BBS." Lee Murray's address is 1300 Bay Ridge Road, Appleton, WI 54915; (414) 731-4848.

Lee has also sent in a chart depicting the growth in articles over the years. Thanks, Lee!

How many subscribers, now?

We have updated the subscriber map to show you the number of subscribers as of February 1, 1993. The total distributed copies each month is approximately 2000, now! And the size of *RCSD*? Well, you are once again holding 16 more pages with this issue. We're still calling it a bonus issue *(for the fourth month in a row)*. Good grief! Can we keep this up? We'll let you know...

Where is Dale Willoughby?

If you happen to be talking to Dale, will you ask him to get in touch with us. His copies are being returned by the post office in Barstow, California. Thanks!

"Uplink Performance"

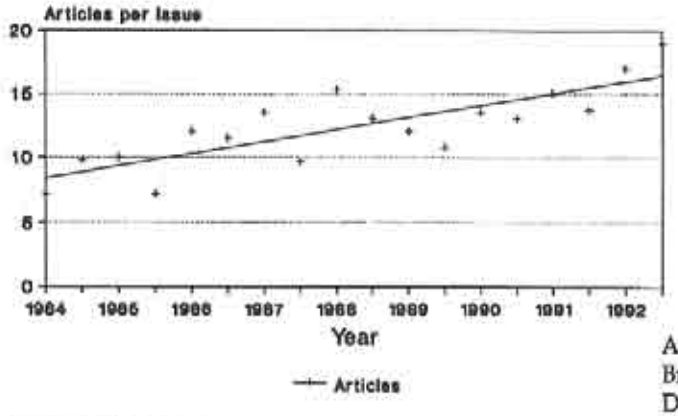
We received a telephone call and a letter from a subscriber in Indiana who is inter-

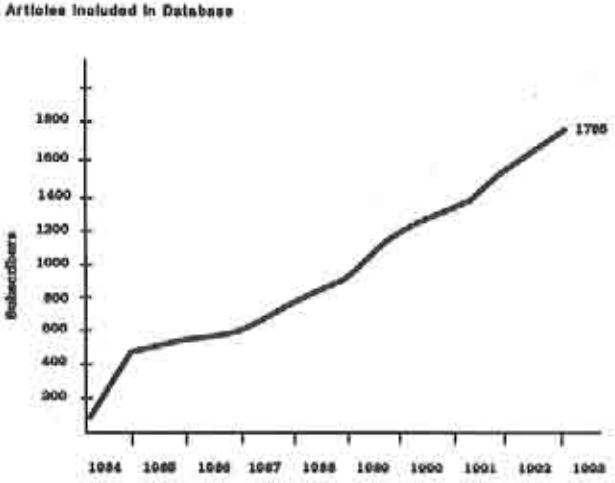
ested in finding out more about this subject. David Flanigan says, "I first came across the term "Uplink performance" in an article in *RCM* May 1992 - a product review of the Airtronics Infinity 600A by Stu Richmond. The article credited the Central Florida R/C Think Tank (a non-official organization) with originating the term. I would very much like to know where I may obtain as much information about this subject as possible. Testing results of various R/C equipment (different manufacturers and models) would be most helpful."

We dropped a note to Kale Harden in Florida to see if he knew about this group and what they were doing. Kale says, "I have questioned everyone in the Pelican club, including Walt Good and no one remembers the articles. I called a couple of friends in Orlando, including Jim Smith, but got no positive response there, either. All of these people are sailplane builders and perhaps the guys in the "Think Tank" are more than likely power fliers. Sorry."

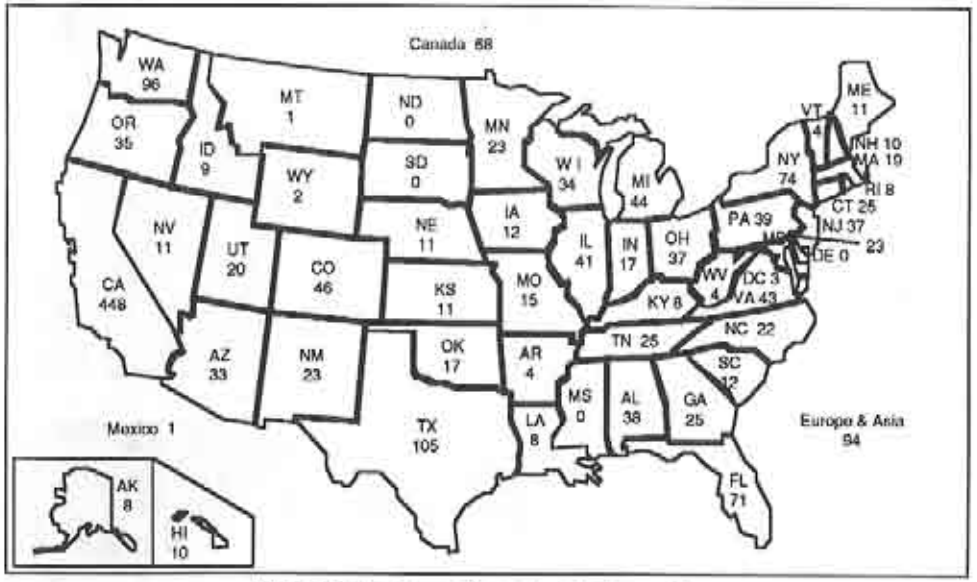
If you can help on this subject, please let us know. ■

Growth in Number of Articles
Radio Control Soaring Digest





Australia	26
Brazil	1
Denmark	2
England	29
Finland	1
France	1
Germany	8
Italy	3
Japan	6
New Zealand	4
Singapore	1
South Africa	6
Spain	3
Sweden	1
Switzerland	2
Total	94
Canada	68
Mexico	1
U.S.A.	1622
Total	1785



***R/C Soaring Digest* Subscribers**
(February 1, 1993)

Jer's Workbench

Mold Making Part III

Well, for the past two months we have been making a mold. It's now time to lay up the epoxy fiberglass fuselage. If you have made a mold, this last part, laying up your first fuselage, should be easy, hopefully. One of the things that I want to share with you is how I do a lap seam when joining the two halves of the fuselage together.

Before we get started, there are a few things that you will need. Looking at picture #1 you will see mixing cups, mixing sticks, brushes, a roller (This is something that you will have to make yourself.), and three pairs of scissors. The top pair are regular type scissors, while the middle one is off-set, which was done by bending them between the pivot point and handle. The last pair is curved. They were all purchased in a cutlery store at a local mall. There is one more item not shown, however. You will need a piece of 1/64 inch plywood, cut to 1x6 inches. Keep this piece of plywood handy and I will explain its use later on.

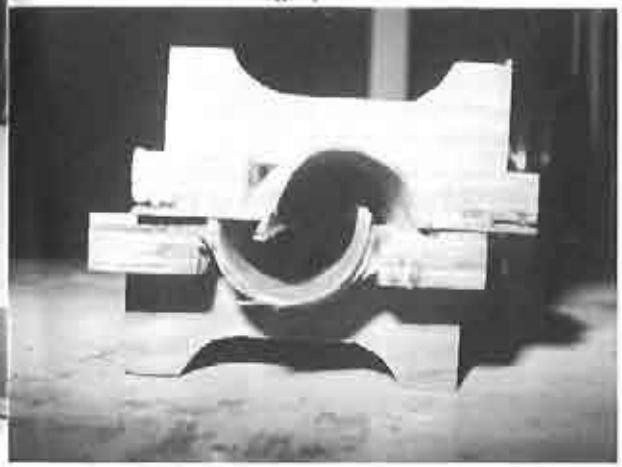
Now, we are ready to start the lay-up of the fuselage. Since most modelers only have a few hours each day or night that they can devote to model building, let's do the lay up in two parts.

#1 - Tools required for lay-up: mixing cups, mixing sticks, roller, brushes and scissors.

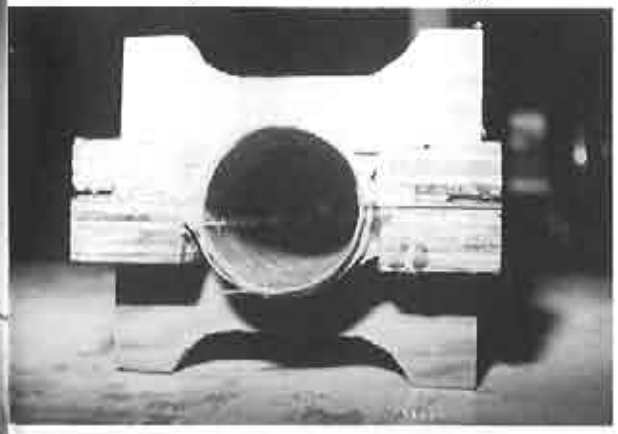
#2 - Parting wax, PVA mold release and soft clean rag.

#3 - Nose cone - Note how they are trimmed.

#4 - Note bead of epoxy resin on tail and at the edge of the mold.



#5 - When joining the two halves together, start with the mold halves off center and the tails sticking free and clear.



#6 - Carefully slide the two mold halves together and the tails should be laying flat to make a clean flat seam.

Part I

The first night is dedicated to waxing and buffing the mold; when completed, a coat of PVA mold release is applied. It is important to use a good mold release or parting wax. I'm using #11 Parting Wax from Fiber Glast Developments Corp.

Then, using a clean, soft rag, wipe on a thin layer of wax; be sure to include the edges of the mold. Now, using another soft, clean rag, buff and polish the inside of the mold until it shines.

The PVA mold release, also from Fiber Glast Developments Corp., can be somewhat of a problem for some people to use. I apply it as follows:

- Pour a small amount of mold release into the mold, again using a soft clean rag. (I use a **lot** of soft clean rags.)
- Wipe the PVA around inside the mold. It will want to bead up like rain on the hood of a car, but just keep wiping. Cover all parts of the mold including the edges and very soon it will start to dry. The PVA dries in a matter of minutes.
- Set the mold aside and **keep you fingers out of it!**

Next, cut out the fiberglass cloth. It's best to pre-cut and stack the fiberglass cloth as it is used. The fuselage that I will be doing is only 45 inches long. The fiberglass cloth that I'm using is 50 inches wide so I will only have to cut strips. To make things easier don't cut the fiberglass cloth to fit; rather, cut it oversize as it is much easier to handle. You can trim it **after**

you lay it into the mold.

For this project, I'm cutting two strips of 7 1/2 oz. fiberglass cloth into strips 7x47 inches for the fuselage, and two 5x9 inch strips for the rudder. Stack them neatly one on top of the other. The fuselage will be reinforced with Kevlar, so I will cut two strips of Kevlar 1x38 inches and lay these on top of the stack. The next layer will be 2 oz. fiberglass cloth, which will help eliminate most of the pin holes; all of the pin holes may not be eliminated as each fiberglass fuselage is different. Cut the 2 oz. fiberglass cloth the same as the 7 1/2 oz fiberglass cloth and lay these pieces on top of the stack. Now we can stop here because you will need about two undisturbed hours to do the lay-up of your fuselage.

Part II

OK, ready to go? Start by mixing 3 ozs. of epoxy resin and thicken it with some silica. How much silica? How thick? Thick enough so that when you brush the epoxy resin into the mold it doesn't run off the sides and puddle in the bottom of the mold. With the epoxy resin that's left, add some more silica and build a fillet into any counters that you may have inside the mold. Now, lay in the 2 oz. fiberglass cloth. Note how the epoxy resin wicks up into the cloth. Using a brush, brush the fiberglass out smooth. Double check that the fiberglass is all wetted out; if not, brush in some more epoxy resin. Using the curved scissors, trim the fiberglass cloth right to the edge of the mold. Now, mix a new cup of epoxy resin, no silica this time, and brush a small amount into the mold. Next, lay the Kevlar strips into the mold; using a brush, wet out the kevlar and make sure that there are no air bubbles trapped under the Kevlar. Again, brush another coat of epoxy resin into the mold and then lay in the 7 1/2 oz. fiberglass cloth; see how it wicks up into the cloth? Now you can see if there are any dry spots. If you need more epoxy resin, brush in as much as you need to.

Trimming

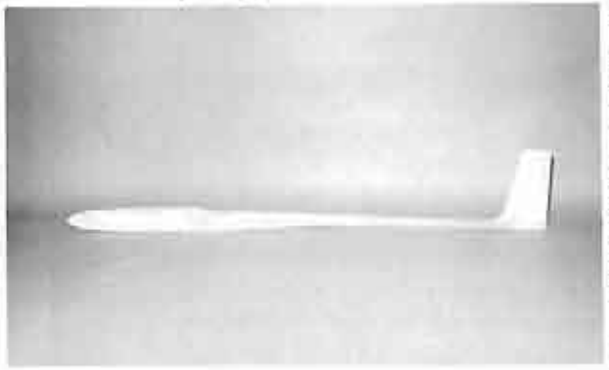
With this last layer of fiberglass cloth, be very careful. Look at picture #7. Note how the right half of the mold is trimmed. The top of the right mold is trimmed flush to the edge, and the bottom has a tail sticking up about 1/4 inch. The left half of the mold is trimmed flush on the bottom with a 1/4 inch tail on the top.

Next, using the curved scissors, trim the top half of the right mold half and the bottom of the left mold half. With the off-set scissors, trim the tail on the bottom part of the right mold half and the tail on the top part of the left mold half. The off-set in the off-set scissors will help to keep your thumb from hitting the tail and unraveling the cloth.

Still with me? Now we will do the tricky part of joining the two halves of the mold together. First trick is to stand the two mold halves on their edges. You can lean them against the wall of your tool box or whatever. Take the left mold half and turn it over so that the tail is on the top and lean it against something and do the same thing with the left mold half. Next, mix about 2 ozs of epoxy resin and add some silica to about the thickness of whipped peanut butter. Pour this into a plastic bag, tie the top and cut a small hole in one corner. (Or, you can use a small brush.) Like a cake decorator, run a bead of epoxy resin along the top of the tail and edge of the mold as seen in picture #4. Take the right mold half and put it on the work bench and don't worry about the epoxy running off. Next, take the left mold half, holding it just above the right mold half, and move it a little off center, so that the tails are sticking into the center part of the mold halves as seen in picture #5. Now lower the left mold half onto the right mold half and slide the halves together, like in picture #6. Install two bolts, but do **not** tighten them yet. Look inside the mold and check that the tails are laying flat; if they are not flat and

#7 - Lay-up completed, and ready to join together. Note how the different halves are trimmed.

#8 - Fuselage removed from mold, and flashing to be removed.



#9 - Completed fuselage at 7.4 ozs.

you have a snag, take a mixing stick and slip it in between the mold halves near the snag. Remember the 1/64 inch plywood stick I told you to keep handy? Use it to push the tail out from between the mold halves until it pops into place. Remove the 1/64 inch plywood and mixing stick, and bolt the two mold halves together. Using the roller, roll the seam. Don't forget to do the top seam after doing the bottom seam. Satisfied that you have completed your first fiberglass fuselage, stand the mold on its nose and let it cure for the next 24 hours. By standing the mold on its nose, any excess resin will drain from the tail into the nose.

Clean-up

Use acetone to clean the scissors and roller. Otherwise, you will never be able to use them again.

While the fuselage is curing I will tell you about the two fuselages that I made. The first one was completed using 2 oz. and 6 oz. fiberglass cloth with a strip of Kevlar and the second fuselage was completed using 2 oz. and 7 1/2 oz. fiberglass cloth with a strip of Kevlar. The 7 1/2 oz fiberglass cloth may sound like an over kill for a 2 meter size fuselage, but it was only .3 of an ounce heavier and much stronger than the fuselage made using the 6 oz. fiberglass cloth. The weight of the two fuselages are 7.1 and 7.4 ozs.

Removing from mold

After the fuselage has cured, it is time to remove it from the mold. First, trim the access holes using a hand grinder with a drum sanding tool and block sand the rudder post. Remove all the

bolts holding the two mold halves together, and using a small wedge split your mold halves apart. One half will come off easily, but the fuselage will probably stick in the other half of the mold. Squeeze the fuselage where you can to break it loose from the edge of the mold and you should be able to pull it out of the mold. If you think that you have to use a hammer, use a rubber one and only hit on the wooden edge of the mold. After the fuselage is removed from the mold, use an X-Acto knife and cut the flashing off as seen in picture #8. The last step is to go out into the back yard and use a garden hose to wash off the PVA mold release.

If you have any questions about my process, please feel free to give me a call. One thing I should stress is the importance of a well ventilated area. Safety comes first. I wear gloves, as well.

Over the years I have found that a perfect fuselage does not come out of the mold every time for a variety of reasons. However, I can usually keep imperfections to a minimum on my part by simply taking a little extra time to make sure I've done each step right.

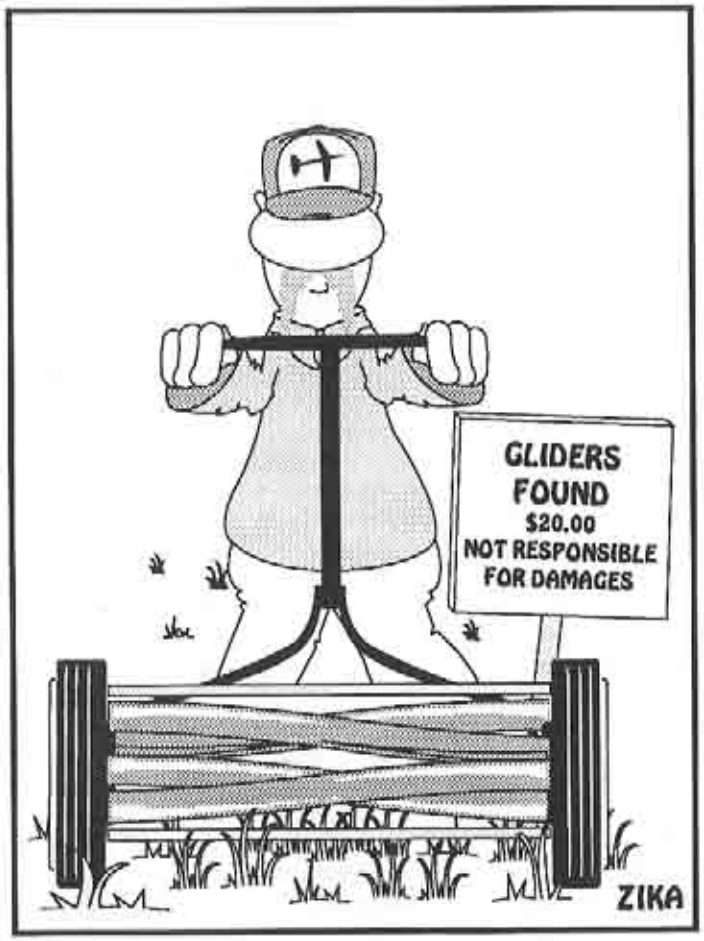
Material used

West System Epoxy Resin 105
West System Hardener 206
406 Colloidal Silica

Gougeon Brothers, Inc.
Bay City, MI
Tel. 517-684-7286

2 oz. fiberglass cloth
6 oz. fiberglass cloth
7 1/2 oz. fiberglass cloth
1.8 oz. Kevlar
#11 Parting Wax
PVA Parting Film

Fiber-Glast Developments Corp.
Dayton, Ohio
Tel. 800-821-3283 ■



Understanding Sailplanes

...By Martin Simons

13 Loch Street, Stepney,
South Australia 5069

Flying in Wind & Weather

In the thermal

A sailplane entering lift will almost always react immediately. One of the difficulties at the beginning is that the inexperienced pilot is not always sure when the model is responding to something significant in the air, and when it is merely some clumsiness on the controls that is upsetting it. Providing the model is correctly trimmed and balanced for stable flight, the best results are obtained by leaving the controls alone as much as possible. This does not mean merely letting the model wander about at random, but it does mean giving it time to settle down to its trim, and not shifting the sticks unless there is some good reason for doing so. Study the hand movements of an expert pilot and notice how small the control movements required are. When the sailplane does behave in an unexpected way you will be more confident that it is the air itself that is responsible.

The indication may be a wing suddenly rising, or the model pitching about, where before it was flying steadily. If a wing pops up, it may be caused by a thermal on that side, so bank the other way, against the raised wing, and investigate. Do not hesitate about this, and if the model seems inclined not to obey, be firm. If a strong thermal is really trying to tip the model over, this is the time to take command at once. Do not be afraid to increase the airspeed in order to get more control, and positively insist on turning the model about 90 degrees towards the wing that was lifted. Full control movement may be necessary for a short time but once the turn has been made, level out, let things settle down again, and **watch**. If the thermal is there, the model will visibly rise and the pilot can then start circling. Experience and a development of 'feel' is required to avoid the well-named 'stick thermal' which is caused by the pilot twitching the elevator and so causing an illusory climb. This is especially likely after returning to straight flight after such a sharp turn. As mentioned in a previous article, **whenever coming out of a turn, down elevator is required** to prevent the otherwise inevitable upsurge. (Nothing to do with wind direction!) If the thermal is of useable size, the model will not instantly fly out of it, so there is usually time to sort it out and restore level flight.

To remain with the thermal, once it has been found, keep on circling. To maintain a steady rate of turn, concentrate on keeping the wings banked all the way round every turn, at the same angle. The airspeed should be kept constant too. A stable sailplane will do most of the work itself, if permitted to do so. An astonishing number of pilots will get their models into a thermal, do a few turns visibly gaining height, and then, inexplicably, straighten up and fly out of the lift. It may be that someone has misled them about turning in windy weather, so that they think they must compensate for the drift. This has been explained in a previous article and is mentioned again only to emphsise that it is wrong to judge airspeed and rate of turn by the sailplane's motion over the ground. A correctly flown circle has its centre in the air.

Deciding whether the model really is climbing is not easy. When the sailplane is coming towards the pilot, it always seems to rise. When flying away, it seems to be sinking. Most of the time these are illusions. If the sailplane is correctly trimmed, and if the controls are not being waggled about, these apparent rises and falls are mere tricks of perspective.

Do not, therefore, be misled into thinking that the model is alternately rising and falling. It takes several complete turns, as a rule, to decide, unless the thermal (or sink) is very strong. If, however, as it turns away, the model rises, it is almost surely in lift, because in this position the perspective normally works to make it appear to be losing height and if does not appear so, it must be rising! If, each time it turns, it seems to be visibly getting smaller, it is probably gaining height. After some practice, the pilot begins to know the model well enough to perceive its movements more accurately.

If the sailplane is ascending, or at least not losing height, continue circling but be ready to shift the centre of the circles a little this way or that for better lift. Again, do not merely let the glider wander, but try to decide where the stronger lift is. This, too, may require several complete circles. If it seems that the sailplane climbs faster on one side of the circle than the other, the best lift is almost certainly in that direction. Make deliberate move that way. Come out of the turn with the model facing the way you want it to go. Down elevator to kill the usual surge (nothing to do with wind direction). Fly on for a few seconds, perhaps five or six, perhaps counting them off slowly, then re-enter the turn and **watch!** If the rate of climb obviously improves, the decision was a good one and circling should continue, but again, note if there is better lift on one side or the other, and if there is, make another move. If, in the new position, the sailplane does not improve its climb, or even, perish the thought, starts coming down, another deliberate move, back to the known lift area, must be made, re-establish the circling in lift, and again, look out for the better side of the circle. Don't give up too soon. Models circling steadily in lift do not often fall out of it, but if the pilot has no clear idea of what to look for and what to do, the sailplane will before long wander off into bad air.

Once in a strong core, there will be no doubt and then, with a **stable** model, it may hardly be necessary to do anything with the controls at all. Settled into a steady turn, trimmed with constant angle of bank and a little up elevator, the model will remain in the lift and go up rapidly.

Pilots will quite often complain that thermals which gave a good rate of climb to begin with, became weaker and died after a short time. This can happen, especially if there is an inversion. There is no rule about it. If the sailplane is flying in steady circles relative to the air, once centred in the core, the model will tend to stay there. It is true that a very turbulent thermal, and some are rough, may upset the model and even spit it out altogether, but this, too, is unusual. Usually it is the pilot who, by mishandling, flies the model out of the thermal into sinking air.

Getting home

Climbing in a thermal soon finds the aircraft a long way from the landing area. Circling invariably finds the glider drifting laterally. The pilot must judge whether the height being gained is enough to enable the model to reach base again in a long, straight glide back with, probably, some sinking air to be penetrated on the way. If the rate of climb is rapid, there is not much danger of the glider drifting so far away that it will not be capable of gliding back. If, however, the climb is slow, the decision to turn back has to be made in good time. As usual, experience helps, but providing the pilot understands what is required to make headway against a wind, there is rarely any need to abandon a reasonable thermal before it has yielded a climb of several hundred feet.

To return to the flying field after following a thermal downwind for some distance, the model must fly fast (Figure 28). The elevator trim should be moved forward and the airspeed allowed to increase quite substantially. Many pilots

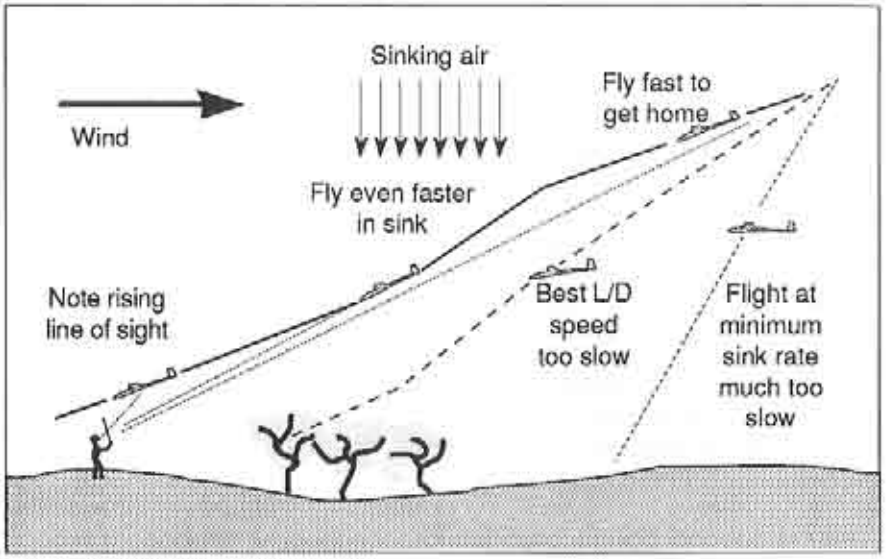


Figure 28 Getting home after following a thermal

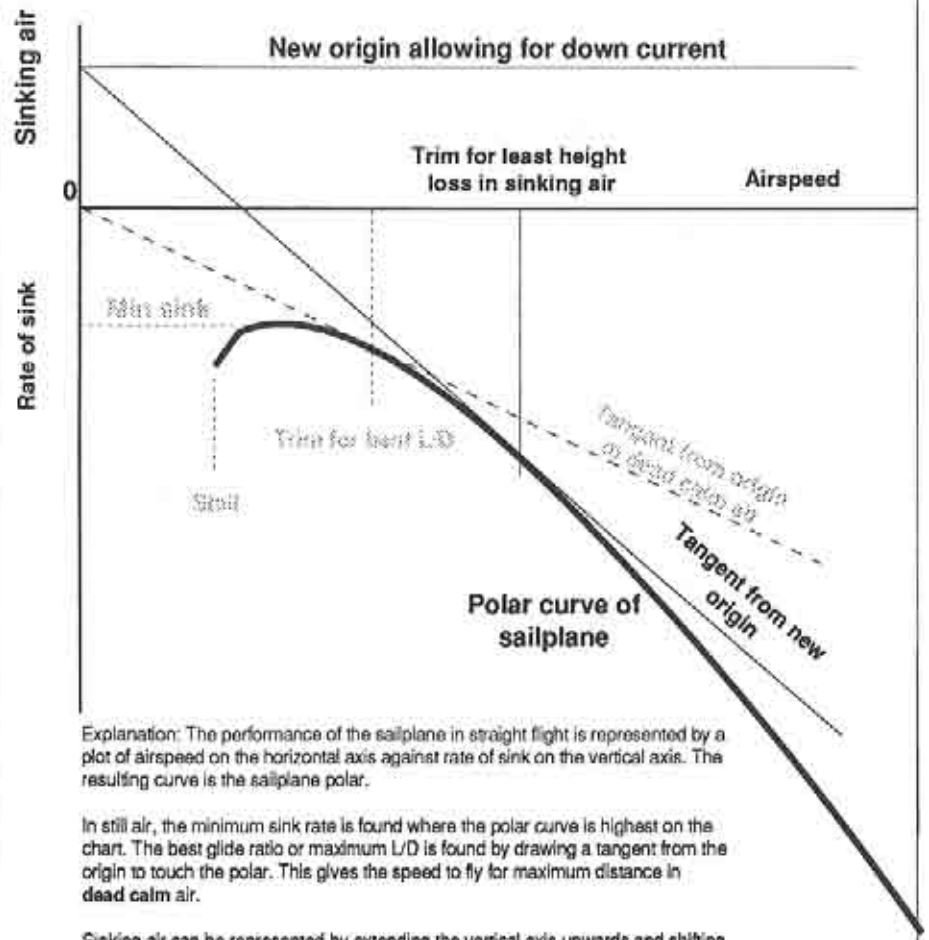
are reluctant to do this because the sailplane does come down faster. As the speed picks up, the model will visibly lose height for a few seconds and many beginners see this, panic, and trim back again. But flying slowly often means landing far away, possibly out of sight. Imagine a situation in which the model is heading into a wind which is equal to the airspeed, say 10 knots airspeed into a 10 knot wind. Since, when heading into wind, ground speed is airspeed minus wind speed, the glider makes **no progress over the ground** at all and simply descends vertically. Flying slowly into wind may actually have the glider moving backwards relative to the ground, so more airspeed is essential to cover distance. The light type of model which a beginner is likely to fly, may find itself in this situation fairly often. The only possibility of getting back to base then is to fly faster. Certainly, the rate of descent will be high but some progress will be made over the ground in the direction the model needs to travel. Thus, in a wind of 10 knots, the model flying at 20 knots will move at 10 knots over the ground towards home. It may well have to land sooner, but when it does, it will be nearer to the pilot than if it had been allowed to wallow. Even the slow, light model will do better if flown fast in this situation.

It is a common mistake to think that gliders should be trimmed for their theoretical best L/D or flattest 'still air' glide angle when trying to make progress over the ground into wind, or through sink. The best L/D trim, although somewhat faster than that for minimum sink rate, is still quite slow. The required trim for penetration is invariably faster.

Penetration through sink and against the wind often requires an airspeed about twice or three times the stalling speed (Figure X).

It is fairly easy to judge when a model is flying fast enough to get home from a downwind excursion. If, when the model is heading back towards base, the line of sight from the pilot's position is steadily falling, the glider is undershooting and will not get back. Against the wind, the only hope then is to **trim forward for greater airspeed**, even though for a few seconds this will cause the model to lose more height. This probably seems wrong to the inexperienced pilot but the increased airspeed, although steepening

Figure X. The performance polar of a sailplane in sinking air



Explanation: The performance of the sailplane in straight flight is represented by a plot of airspeed on the horizontal axis against rate of sink on the vertical axis. The resulting curve is the sailplane polar.

In still air, the minimum sink rate is found where the polar curve is highest on the chart. The best glide ratio or maximum L/D is found by drawing a tangent from the origin to touch the polar. This gives the speed to fly for maximum distance in **dead calm** air.

Sinking air can be represented by extending the vertical axis upwards and shifting the origin up by an amount proportional to the strength of the down draught. The new best glide trim, at a much higher airspeed, is found by drawing a tangent from the new origin. The stronger the downcurrent, the faster the best airspeed has to be.

When making headway against a wind, a similar consruction may be done, by moving the origin horizontally along the speed axis proportionally to the wind strength. The result is a new tangent giving the best speed to fly to make progress over the ground.

In many actual situations, an airspeed about twice the stalling speed comes close to the best figure. **Never fly at 'best L/D'** unless in totally calm air.

the glide relative to the air, will help the ground speed and may be enough to bring the sailplane back safely.

If the line of sight is consistently rising, the model will get back with height to spare.

In sink, **more airspeed still** is required, with, as before, an initial frightening loss of height. In sinking air, it is much more important to get through the bad air quickly and emerge into something better, than to wander slowly too long and so never penetrate at all. ■

Ridge Writer

...by Wil Byers

RT. 4 Box 9544, W. Richland, Washington 99352; (509) 627-5224 (7:00 PM - 10:00 PM weekdays, after 9:00 AM weekends)

An Interview with Joe Wurts

There are a whole lot of "GOOD THUMBS" on the soaring scene these days. One of the recognized best in F3B soaring is Mr. Joseph (Joe) M. Wurts as he is the 1991/92 World F3B Champion. As well, he the Open class AMA Declared Distance and Open Distance record holder for R/C soaring with an impressive accomplishment of 140.67 miles. It can be said that Joe's thumb is certainly one of, if not the finest, we have seen in soaring.

It may come as somewhat of a surprise to a few pilots, but it really shouldn't, that this super R/C soaring pilot is also an avid slope soarer. In fact, Joe has quite an impressive list of accomplishments in the area of slope racing. Joe has won many slope races including the much coveted International Slope Race in California and the Mid-Columbia Cup in Washington state. Therefore, this month we are going to share with you comments from a telephone interview I recently had with this master of R/C soaring. In this interview, Joe shares some of his secrets of success with us. During the course of the interview he also explains some piloting as well as building techniques that he and others have employed to let them lead the pack in any slope race.

The interview begins by my placing a call to Joe and he answers the phone (HA HA)! There is a skosh of small talk and how ya doing stuff and have you been flying lately. Then, we move into the interview with the basic:

Wil: Anybody who's anybody in R/C soaring knows that you are the current F3B World Champion; but not a lot of people know that you are also a slope racer. So, what many of us would like to know is, "How did you become interested in slope racing?"

Joe: I got into slope racing quite sometime ago. In fact, the first slope race I flew in was probably in the late 1970s. I started flying first by myself. I flew for about a year and a half before I even knew there were organized clubs. Then, about the time I was fifteen, I tied in with a club that hosted a contest about every month; one month it would be thermal, then maybe hand launch, then a slope race. They basically did everything. I would go to a slope race that they hosted maybe once or twice a year and fly whatever I had. I got into slope racing and enjoying racing and finally figured out what it took to have a good airplane for racing. I really enjoyed just going out slope flying because the way they hosted races it was just as much fun flying on the slope as it was racing.

Wil: What was slope racing like during that period in time?

Joe: It was a lot of fly what you had! In the first couple of races I flew a polyhedral ship that had an airfoil that was thin and had really low camber for the times. The camber was only 2.5% or 3%, wasn't a fast airplane, but I had a lot of fun just going out and playing. There were maybe two or three dedicated slope racers at the time. Mike Bame had a real good slope racer with an Eppler 374 airfoil. That club really got me into slope racing!

Wil: And typically what was the wing loading like then?

Joe: Some of them got extremely high! I remember Blaine Rawdon flying his Handgen which was a high aspect ratio design; it had maybe a 20 to 1 AR. That airplane, I think, was well beyond the FAI limit a few times. (The FAI wing loading limit is 24.32 oz/ft^2.) I think he got up into the 30s a couple of times.

Wil: What kind of speeds were they turning in?

Joe: That's a hard one to say because I don't know the length of the course. They were going quite fast. Some of the airplanes flown back then would be quite comparable to the intermediate airplanes flown today.

Wil: I think people would be interested in your aviation background and how you have come to understand airplanes and the technical side of aviation. What is your educational background?

Joe: My educational background stated simply is: I have a Bachelors degree in aeronautical engineering and a Masters degree in engineering specializing in aeronautical engineering. I got that at Cal Poly located in San Luis Obispo which by some strange coincidence has a number of good slopes located close by. I would spend three or four days a week flying after school. In fact, during school was when I got most slope flying during my flying career.

The reason I went into aeronautical engineering is because of the hobby. I was very interested in aviation and particularly model aviation. So, I decided to go out and become an aeronautical engineer.

Wil: So, where has your education taken you now?

Joe: I work as a design engineer. I am in aircraft conceptual design for Lockheed Aerospace.

Wil: Joe, you've won the World's and you're flying slope a lot so you have an idea of what airfoils are good for both F3B and slope racing. Can you tell us, if you had to go out and build a new airplane today what you would pick as a winning airfoil? In fact, could you tell us four airfoils that are among the best?

Joe: Ooh... That is a good question! The tried and true airfoils seem to be the best. The four airfoils that I would pick in no particular order are:

The SD-7003, it is a very good performer both in a straight line and in the turns.

The 2055, primarily because of its straight line performance. I am a bit unsure of its turn performance.

The RG-15 just because it encompasses the full range of soaring, light air slope racing and heavy air slope racing.

My old sentimental favorite, the 374.

Wil: Your saying the 374 is your sentimental favorite. Is that the stock E-374?

Joe: Yes, it is!

Wil: OK, that's great. Joe, if someone wants to get into slope racing they need to have some idea of what size model to buy or build. So, they need to know what to purchase; whether they will be racing intermediate or unlimited, how do we decide what is best? Can you give us some ideas?

Joe: Ah! What the rules drive you to for maximum performance on the unlimited racing is an airplane that meets 11 pounds at the maximum surface loading, which drives the model to have about a 6.5 ft^2 wing area plus the horizontal tail area. This will push the model to a little over 7 ft^2 of wing area or about 7.2 ft^2 or something; so that at the maximum surface loading the model weight is at 11 pounds. Anything smaller and the model is giving up performance because the Reynolds is reduced for the same wing loading. (This is to say that the chord will shorten because the area is reduced. WB)

Wil: This tells me that the span of the model must be somewhere between 110 and 120 inches. Is that right?

Joe: Right. What we are flying in F3B

seems to be a pretty good compromise for slope racing. The 112 to 114 inch seem to be just about right for slope racing as well as F3B.

Wil: Is there any distinct advantage to a greater spanned airplane over one with a shorter span? Understandably, the longer span will have a higher aspect ratio, but may suffer somewhat in roll rate. What is your feeling with regards to this design relationship?

Joe: Models such as the Nova from RnR, with a shorter span, are good racers when the lift is strong, but as soon as the air starts getting soft and light the airplanes that have a little bit more span and can fly a little more efficiently at the low flights speeds can win! Thus, the shorter spanned airplanes are at a definite disadvantage in the lighter air.

Wil: Wind speed plays a big part in slope racing. What do you like for a wind speed that makes the racing both fun and allows for a very competitive race?

Joe: I like the range from 10 mph to 20 mph!

Wil: (Surprised) YOU DO?

Joe: Ya, because that makes the race a flier's race. In my opinion, wind speeds above that starts getting to be extreme flying. It's fun but it starts too much of a premium on nailing the turns. And, it starts to increase the likelihood of mid-air collisions because you can't scan the air ahead of you as much because your model is moving so fast. Therefore, the pilot does not have time to look ahead and see what the opposing traffic is.

Wil: How do you think thermals impact a pilot's racing style and the outcome of any particular race? For example, at a coastal site the air can be much more dense with less thermal activity while at an inland site it can be something quite different. How do you think that should impact a pilot's strategy?

Joe: The strategy is always similar; the more energy you can build into your model by climbing the better off you are. There is some strategy involved to look for a thermal and if you use that thermal to "Sky Out" before a start you should use that energy wisely. My personal opinion is that if you thermal up above 500 feet you shouldn't use it all up during the start dive because if you use up all the altitude the model has gained during the start the model will be going in extreme speed and will therefore bleed off the speed quite rapidly. So, you probably want your model to enter at some fairly high altitude and use that energy during the first couple of laps.

The worry about an inland site is that if there are thermals present it presents an advantage to the person that launches first because they can get to the thermal and start climbing first resulting in a higher start altitude. Also, the thing about thermals present on a race course is that it tends to make the F3F format somewhat of a crap shoot.

Wil: Interesting! So your race strategy is to try to get somewhere above 500 feet and then save that energy for the first few laps of the race. Is that right?

Joe: I'd say that for every foot I climb above 500 feet, I will enter the race course that much above 500 feet.

Wil: Let's for grins sake say the wind is blowing your optimum wind speed of 20 mph. How do you know when to add ballast and when not to add ballast? Wouldn't you say that is kinda a part of the art of slope racing?

Joe: (Laughs) There is some definite deep dark secrets there! When to add ballast is dependent on both the amount of lift and the length of the course. The simulations I have run on slope racing show kind of a cliff for course length at 500 ft. If the course length is below 500 feet no matter how much wind there is you shouldn't ballast up above a certain value. That depending upon the aspect ratio of your airplane (if it) is between 16 oz/ft^2 and 19 oz/ft^2 and the number gets lower as the course shortens in length. If you step above a course length of 500 feet, then if your model can fly and climb it is not heavy enough. If the course is long, especially like a course of 700 feet, you want to load the model so that it just barely climbs so that when it is time to race your model it is flying at or near its best L/D speed. ■

LIFT OFF!

...with Ed Slegers
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Wharton, New Jersey 07885
(201) 366-2525 Day
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Saturn E

I don't think there is any question that electric powered planes are growing rapidly and are here to stay. Almost every model publication has at least a few manufacturers advertising their products for electric flight from planes to accessories. Most leading kit manufacturers now offer something in the way of electrics, the latest being Layne/Urwyler.

Layne/Urwyler produce the Saturn 3.0 and the 2.9T sailplane. Dave Layne called me a few months ago and asked if I would help in the development of a prototype electric sailplane and I said, "Yes." Research and development is the part I like most about this sport. After many phone calls and diagrams sent back and forth from California to New Jersey, Dave came up with the prototype that I will call the Saturn E. As of this writing, the plane has not been officially named.

The Saturn E is a little different from most electric sailplanes in that it is a little larger than most other 7-cell planes on the market. The wing span is 85 inches, and has an HQ 2.0/9 airfoil. The wing has a flat center section and turned up outer panels. The outer panels plug into the main panel in the conventional wing rod manner. The servos for the ailerons are in the main panel and push rods go to the ailerons in the outer panel on a slight angle. This makes taking the wing apart for transportation easy. The wing is white foam and covered with obechi, and has a main spar that is covered with carbon fiber both on top and bottom. This makes for a very strong wing. As it turned out, the wing was way too strong and heavy for electric flight. The new wing is lighter and probably still much stronger than it has to be.

The fuselage is glass and Kevlar and also a little larger than most other 7-cell planes. This was done on purpose so that the intermediate flyer would have more room for batteries and radio gear. The canopy is large enough to remove the batteries without removing the wing. The nose of the fuselage takes a 40 mm spinner (the most common size) and the tail is a T-tail. The stab is white foam covered in obechi that bolts to the top of the fin with two 6/32 bolts. The rudder is all balsa. In keeping with the concept of the Saturn E (an intermediate to advanced model), an Astro Flight FA105 on 7-cells was used and a Simprop S90 BEC.

It was decided that two prototypes would be made: one for Dave on the west coast (Dave having very little experience), and the second one for myself on the east coast. This way we could compare notes on what we were doing to get the best possible combinations for the intermediate to expert flier. As it turned out, this worked very well. It's a credit to Layne/Urwyler that they went through this much time, effort and expense to produce a very good flying plane. A few manufacturers, unfortunately, do not go through this extreme.

Prototype work can be very fun but at times can also be very frustrating, time consuming and expensive. In the case of the Saturn E, it was a little bit of all of these. The Saturn E did not fly as they say "right off the building board". Both Dave and I spent many flights getting the CG and incidence correct. In a non-powered sailplane it is not too difficult to get the incidence correct, but in a power glider it is much more difficult trying to get a happy balance between power on and power off. In power we also have the down thrust to contend with. This is the frustrating and time consuming part and

this is after taking the time to build two planes. In trying to adjust the down thrust, Dave put a shim under the bottom of the motor which, unfortunately, made the spinner bind against the fuselage. When Dave turned on the motor, the motor could not turn and he had a melt down in the speed controller. Dave said he could still smell it hours later. Expensive barbecue!

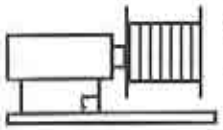
After all the time, effort and expense, I think Layne/Urwyler have come up with another nice airplane. The Saturn E would make a nice 7-cell plane for the intermediate flyer. For the more advanced flyer there is plenty of room for a larger motor and 10 cells.

I think the plane will sell for around $175 as a kit and an additional $100 if you prefer a pre-sheeted wing. I also think that by the time you read this the Saturn E will be available. Please call Layne/Urwyler for correct prices and availability. When you call, ask Dave about his experience with speed controllers.

Electric Products on Video

Model Electronics Corp. 6500-6th Ave. N.W., Seattle, WA 98117 is a company that does not have anything at the moment in the way of electric power gliders, but they do have a nice assortment of motors and speed controllers. Model Electronics has a video tape that was taken at their flying field showing their electric products. Get the tape, if for no other reason to see what can be done with electric power. The tape is very interesting and well worth the money. Also, ask for their catalog. Model Electronics has one of the smallest speed controllers with a BEC that I have seen. I'm going to try to electrify a hand launch using their set-up. If it works, I'll let you know.

Good flying! ■



Winch Line ...by Gordon Jones

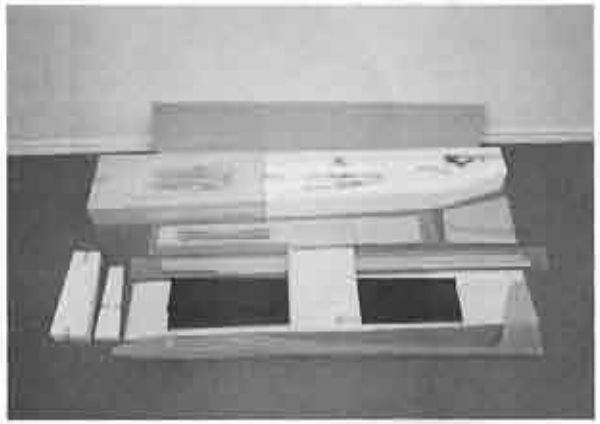
Gordon Jones, 214 Sunflower Drive, Garland, Texas 75041; (214) 840-8116 After 5:00 P.M. CST

Shadow 118

The Shadow 118 was designed by Roger Chastaine around the airplane that his son Blayne had been flying for the last year or so. Blayne has obviously done well with the design as he won the NATs Senior class with it; plus he attained the overall high score at the NATs the year before with the Shadow prototype. The idea of a kit started when several of the folks that saw it fly wanted to get a fuselage and a set of plans in order to build their own. (I have seen the original and it does fly nice.) The numbers grew until Roger just bit the bullet and decided to put out a kit. Roger is an engineer so the scope and planning were not a real problem. Roger designs and manufacturers auto accessories for the major manufacturers (Ford, GM & Chrysler) and has a Q1 quality rating so quality was a paramount part of kitting the plane. It was getting the time between his real job and other activities; well to make a long story short the Shadow was born.

The design takes the best design ideas from Blayne's ship and some prototypes that were built to validate the design. The SD 7037 was chosen to provide some reach during contest flying and the 118 inch wing span was selected due to the visibility at altitude and for that far out reach in search of thermals. Obechi was selected for the foam covering as it is one piece, easy to apply and provides additional strength in the wing.

The real differences in the wing design is the use of a rib/subrib combination for the carry through which takes some ideas from the glassbagged wing arena with the use of multiple layers of carbon fiber for the actual spar system. I must admit I had to call Roger and ask about this system in an obechi wing as I was skeptical to say the least. I have done a few glass wings and understood the idea, but on an obechi wing. I mentioned the reported wing failure at the LSF Nationals and that turned out to be a prototype that was not used in the finished design. Roger assured me that the wing was up to the task with that design, and Joe Wurts seems to have validated the concept in competition at the LSF Nationals by winning the F3J Thermal Duration event.



The Kit

When you open the box the first thing that strikes you is the carton within a carton to prevent shipping problems; I call this beating the system. From there you will find wing cores in two colors (blue inner panels and white outer panels). Numerous plastic wrapped packages of hardware and the smaller wood pieces hold all the essentials in a form that withstands shipping. The fiberglass fuselage and canopy are of excellent quality and don't require nearly as much work as some I have seen in recent years.

The coupe de gras is the three rolled CAD drawn plans that show every detail in a clear format. One plan depicts the wing with a complete layout that is very accurate. A side view of the fuselage has some interesting details that assist in the building effort. The most interesting sheet is one that shows the cut out detail for the fiberglass and carbon fiber. This makes cutting these pieces easier and you won't over cut either.

The box is completed with a really nice set of building instructions that have obviously had some time put into them. Roger has seen fit to explain steps and procedures along the way that will aid the novice or intermediate builder. One note, as you follow the building instructions refer to the plans along the way to insure that things are as they appear.

Building the Shadow

The construction of the shadow is rather straightforward in most respects; however there are some interesting techniques and ideas that will be of interest. The wing construction while being a normally sheeted obechi wing has a root/subrib arrangement for the carry through that is worth considering in other designs. In addition, there is a slick method of installing the servo wires in the wing that I found to be easier and less trouble than my current method.

First, the carry through arrangement. The inner

blue foam panel comes to the builder with a pre-drilled hole to accept the brass tube that connects the root rib and subrib. First cut a slot in the end of the wing at the location of the incidence block. Cut the hardwood incidence block to fit the correct curvature of the wing and install with gap filling CA. Next trim the pre-drilled holes in the root rib and subrib to allow a tight fit for the brass tube to pass through. These holes are intentionally undersized so don't be surprised when the brass tube doesn't fit.

Once this has been accomplished, insert the subrib in the pre-drilled slot in the wing. (I keep saying pre-something don't I; yes there is that much already done for the builder.) Slide the brass tube through the root rib and gently slide the brass tube into the wing. Move the subrib around a little until the brass tube has gone through the hole in the subrib. This gives you an idea of how the procedure will go when you glue it all together. This trial fit procedure is not in the instructions, but I wanted a warm fuzzy feeling prior to the glue phase. The alignment and fit were right on the money which says something for the jigs that have been built to aid in all the pre-something efforts of the kit maker.

Remove the brass tube and root subrib assembly. Rough up the brass tube with some coarse sandpaper so the glue will adhere to the tube. Next apply some carpenters glue to the subrib on both sides and insert it into the slot. With the brass tube still through the root rib apply some more carpenters glue to he brass tube and the wing side of the root rib. Slide the brass tube into the wing and mate it with the subrib again. When you have mated the brass tube with the subrib, slide the root rib into position at the wing root. Use some masking tape to hold the root rib along the wing panel and let dry over night.

Once the ribs are dry cut a valley about 1/8" deep and 1/8" wide at a 45 degree angle around the subrib and on the wing panel next to the root rib. Seal the lower side of both the root rib and sub rib with a good grade of scotch tape. This will provide a smooth surface for any of the epoxy and micoballoons that reach the bottom of the wing through the slot or behind the root rib. Mix the epoxy resin and microballoons and then fill the valleys to the top. If you use epoxy resin with a pretty good cure time the resin mixture will filter down through the slot and inside the root rib making a super strong arrangement. I sealed the ribs on the top of the wing which meant that the epoxy resin/microballoons would flatten out on top of the wing saving trying to sand to the contour of the wing which can be trouble for some folks.

When the resin has dried repeat the process on the other side of the wing. I did not over fill the valleys as the plans suggest opting instead to fill to the very top and taking my time watching the fill and adding as required. But I hate excess sanding and I will try to avoid it at every opportunity. When the filling is complete mask around the filler and sand the epoxy resin/microballoons to the contour of the wing. Be very careful to not sand into the wing so that the airfoil shape is not disturbed. A little time and patience here will go along way.

The next item of interest is the stabilator. This was a totally new experience as the idea is to melt the two cavities for the pivot and actuator pins in the foam with a soldering iron and then filling them with spackle. This is a unique way to quickly and accurately install the pin tubes in the stab.

First mark the location of the pin tubes on the stabilator. Then using a small soldering iron and a piece of wood about 3/4" thick wood move the soldering iron along the line at a constant rate while the foam melts away. It will take a couple of passes to get it melted away enough for the pin tubes to sit in the foam at the half way point but take your time. Be sure to practice a bit on some scrap foam prior to melting the cores.

Once the two grooves are complete assemble the pivot and actuator pins with tubes on the bellcrank with the plywood root ribs and mount the whole assembly in the stabilators with the stabilator halves spread apart. Be sure that the whole assembly is level in the grooves and when you are satisfied remove the assembly. Next wipe in a layer of spackle being sure to work the spackle into the foam. Re-install the bellcrank assembly and pins into the groves. Then add more spackle and create a mound above the core working the spackle around the tubes to avoid any air pockets.

Once the spackle is dry (give it about 24 hours to be sure) sand the spackle to the wing contour. With this done prepare the balsa sheeting in the normal manner and then sheet the stabilator halves. Add the leading edge stock and tip blocks; then sand them to shape and you are done. It is a very fast way to build a set of stabs and it is very strong to boot.

As I stated earlier the remainder of the kit is straight forward and will hold no surprises for the builder. The quality of the parts in the kit is very good and I didn't run into any problems along the way. Roger even provides Dave Acker's finishing tips at the back of the instructions for those that want a wood grain finish. Dave uses water based varathane and I followed his instructions just to try out this method. You can either do a wood grain clear finish or you can hide your mistakes with pigment to add some color to finish the wood surfaces. This method is quick and it even looks good. By the way I even used it on the balsa covered surfaces as well and they turned out nice.

Flying the Shadow

After installing my trusty JR X-347 it was time for some fun after all the building stuff. I set the throws up initially at 5/8" up and 1/4" down and the flaps at 1/4" up and 90 degrees down for crow with some down elevator compensation. I also put in quite a bit of rudder to help move the tail around in the turns. I suggest that you start with the CG forward, and move it back once you have a few flights on your Shadow. The CG on the plans is about right on the money, but I did end up moving the towhook a little forward only as a personal preference.

After a few initial test glides to get the stab set pretty close it was time for the winch. Even with no flaps dialed in and a light touch on the pedal the Shadow climbed out at a nice steep angle for an excellent initial launch. Even though I had moved the towhook forward a bit the angle was pretty steep, but provided a great launch. With some altitude I set the trims pretty close on a couple of cross wind passes. Then I started to look for some lift.

The week end for the initial flights was perfect as Saturday provided great lift and little wind; just the ticket when trying out a new bird. The Shadow responds very well in lift with the ability to tighten up the turns and really get to the core of a thermal. I was extremely impressed with the SD 7037 airfoil. I had heard many stories both pro and con about it and was pleasantly surprised with the performance in both light lift and strong lift conditions. At the end of the first day the lift had flat gone away and the Shadow would cruse across the sky virtually losing no altitude what-so-ever. The landings were extremely slow with no tendency to tip stall or do anything strange. (I may do better in landings at coming contests.)

Sunday proved to provide the other end of the spectrum, with the winds from 15 to 20 with gusts in the mid-20s. An excellent opportunity to try out the Shadow in some not-so-nice conditions. Plus we hold contests in these conditions during the early spring and fall so now

was a good time to see what the Shadow would do. I was surprised with the penetration in these windy conditions as I could reach out a good ways in search of a bit of wave lift off an apartment complex across the highway. The flights of the day were more than enough to get my times in a contest and I was able to move around at will with a nominal loss of altitude.

The Shadow is a solid airplane that will provide the builder with a good solid platform for either contests or sport flying. It has a speed range that provides a wide range of options when looking for lift. And it will slow down to a walk when you bring it in for landing. A real nice combination in a well designed and great flying airplane.

The Shadow will start coming with pre-sheeted wing, stab and rudder to speed the building process along. This will make building a piece of cake for those that are short on building time. In addition, TEKOA is offering a light weight carbon fiber wing rod and a solid stainless ballast rod as options. The Shadow 118, and the new 2 meter Shadow are available from Northeast Sailplane Products. ■

The same plane flying quite well. I wonder if that generous Penn. modeler recognizes it?

The OLY 650 which came from Valley Forge now uses a TECHNIPLUS radio.

European Souvenir

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

Recently, I visited modeling clubs in Hungary and Slovakia. I had been corresponding with some of their members for awhile because I had been building models there, starting in 1940. During my visit, they demonstrated R/C gliders, A/2 freeflight gliders, electric, diesel and glowplug type engine-powered planes as well as powered gliders. Here are my observations and impressions.

Modeling used to be controlled by the Communists with materials being doled out to "reliable" members of state operated clubs. Recently, as free enterprise entered the picture, clubs still exist but members have to pay for materials and some advantages such as club-owned trailers in which they live when they go to far-away contests on the European Continent. Today, there are three hobby stores in Budapest where model airplane kits can be purchased.

In Hungary, modeling was developed to a high degree in the 1930's and 40's by two physics teachers: Frank Cavalloni and Julian Nagy. (One glider achieved an altitude of almost 10,000 feet during the war but the record was disallowed because the FAI did not recognize records set during the Nazi occupation.) One of their disciples was George Benedek, the developer of highly undercambered airfoils for freeflight slow-flying gliders. He used to win just about all contests that he

entered. Still active, Benedek these days specializes in CO2 powered models.

The Hungarian F3B models I saw seemed to be of fairly high quality and ably piloted. They placed some of their models in the top ten of the recent European F3B Championships. I was impressed with the lack of control horns as flaps and ailerons are actuated with barely visible control rods and snap-on ball joint fittings (i.e., no servos or control horns stick out under the wing).

I was told that in Europe the internal resistance of the winch motor is regulated so as to equalize all winches. We tap the foot switch, they stand on it as their motors are noticeably slower than ours. They did not use mechanical retrievers, the young members of the club walked the line back to the winch. Senior

This V-tail 3-channel glider opens its canopy to act as airbrake. I flew it, works nice and smooth!

members gladly instruct young ones who are coming up fast in the ranks.

The Cavalloni Model Club in Budapest has a club house with some power tools in the workshop, a large drafting board and a cabinet full of trophies and cups won during their years of operation. They organize several local, regional, national and international competitions, under the leadership of Mr. George Pinkert, traveling in the club truck and trailer. (You can write to him in case you plan to visit Hungary at Cavalloni Model Club, P.O. Box 16, Budapest H-1625 HUNGARY.)

Their radio frequency regulations are

The famous TRABANT car has two aircooled cylinders and max speed of 60 mph but... it swallows up many models.

Most models in Hungary sport the red-white-green national colors on the rudder. Vince Zsolt prepares to launch his F3B model called "Kormoran".

Youngsters are encouraged, and helped by seasoned modelers.

Slovakian modelers Lajos Semsei and Mikulas Bajkay with the stock glass fuse and Sagitta 900 wings.

Modeling looks the same anywhere you go, doesn't it? Julius Sogor looks on as the Semsei family assembles their models.

different from USA and their transmitters are larger than ours, though not necessarily more sophisticated. Most modelers prefer two-stick operation even for two-channel gliders. (One stick up-down for elevator, the other stick, sideways, for rudder.) Because of the high cost of radio equipment, they move receivers from plane to plane, using the same transmitter. The transmitter is held on a wire frame hanging from the pilot's neck so that both hands are free to control the sticks.

I met a young boy who had recently returned from a visit to his uncle in Philadelphia. While there, they visited an R/C field in Valley Forge and the youngster climbed a tree to rescue someone's plane. As a reward they gave him an old Oly 650 which he took home to Hungary and is now flying it very successfully .

In Kosice, Slovakia (a town of about 250,000), I saw a similar group. We were using the city's commercial airfield, Sunday being reserved for sports. There were parachutists and full-size gliders on the far end of the tarmac. They are well acquainted with our magazines and planes. Slovakian modelers produce a fairly conventional fiberglass fuselage to which they fit a variety of wings... I saw one with a Sagitta 900 wing. Again, radios are switched from plane to plane during the flying session. As an example of the high prices that exist, car gasoline costs $3.20 per gallon in Hungary and $2.50 in Slovakia. Imagine what a full-house radio must cost. They use Futaba and German equipment, mainly. There is a high-class modeling magazine produced in Prague which deals with planes, boats and cars.

I renewed acquaintances with some modelers with whom I used to fly almost five decades ago! It seems to me that perhaps there is a way for us to ship some of our old equipment (radio, planes, etc.) to these struggling countries. They have the knowledge and patience to work on them, including radio technology, they just lack hard cash to pay for it. ■

Futaba 4 Channel Transmitter Modifications Aileron-Rudder Coupling And Battery Cycling

...by Ed Jentsch, 2887 Glenora Lane
Rockville, Maryland 20850
(301) 279-7611

(Ed tried to write an instructional (dry) article on this subject but, in the dead of night, Bunky struggled for the keyboard and, with tears in his eyes, begged Ed to let him write this article, instead. So, Ed, being kind hearted and tired from lack of sleep reluctantly agreed... The humorous antics of Bunky continues... ED)

Hello? ••••!

Who is this? ••••!!

Bunky? ••?

What's wrong? ••??

What? ••••???

Hold it! You woke me at 5 A.M. for what? ••••!

Aileron-rudder coupling for your radio? ••!!

You can't sleep trying to figure out how to do it? ••! (*You're dead Bunky...*) ••?

Of course, I do, at least for Futaba radios. ••?

No, I can't give you a reference. I found out how from someone else in the club, who probably got it from someone else, who... ***wait*** a minute! You don't even **own** an aileron ship! ••••?

No, I agree it's a good idea to prepare in advance, but 3 years? ••! (*at least ...*) ••?

I was joking, Bunky! I'm sure you'll be ready much sooner than that. •••?

OK, OK, I'll help you out! Do you have a pencil and paper handy? Good. Start writing. Here's what you'll need:

- One micro-mini SPDT toggle switch (A Radio Shack # 275-625 is a good bet.)
- Approximately 15 inches of 26 gauge 3-conductor twisted hook-up wire. ••?

Yes, you can use individual wires and twist them together yourself. •••? No, they don't have to be particular colors, just three different colors. ••••!!! OK, don't get blue if you don't like it! Can we go on now? ••!

- Small diameter self-fluxing solder
- Small heat-shrink tubing

•••? Yes, that's all, except for tools, which you probably have already. Let's run down the list just to make sure:

- Small soldering iron
- Small phillips head screwdriver
- Small adjustable wrench
- Wire cutter
- Wire stripper
- Drill press or hand drill plus a sharp drill bit (Diameter depends on the size of the switch.)

••••? No, I don't think Suzy Goose is open yet. (*Who'd believe a name like that for a hobby store?*) •••?? Yes, I'll write down the instructions and bring them over after lunch.

Now, can I get back to sleep? •••!!

Thanks, see you later ZZZZZ....

✂ ✂ ✂ ✂ •••?

Well, Bunky, did you get everything? •••!

Good! ••?

Ummm, nice choice of colors. ••?

No, Bunky, the name of the theory you're thinking of is Quantum Chromodynamics, and it's quarks that come in different colors, not electrons. ••?

Right, electrons are color-blind; they'll zip around just fine inside those nice pink, purple and chartreuse wires you picked out for them. Are you sure you really want to do this? You realize it will void your warranty, don't you? ••??

Oh, yeah, I see. Definitely no warranty problems with this radio...are you even

sure it's a Futaba? ••??

No, don't bother cleaning the grime off; I'll take your word for it. *(Besides, that could be an all day project by itself.)* You know, you could couple the aileron and rudder inside the plane? ••••?

I understand. You want to be in complete control. *(Meaning, he wants to play with the switch while the plane's flying - can't wait to see that.)*

One other thing you should know, Bunky *(and remember for 3 years)*. With this mod, when aileron-rudder coupling is activated, the channel 4 (rudder) servo reverse switch is disabled. It works normally with coupling deactivated, but not when it's activated. ••?

Well, if the rudder doesn't move in the right direction, all you have to do is remove the servo arm and re-install it 180 degrees from where it was. Why don't you go to work on this, and I'll just sit over in the corner out of your way and read the latest issue of *RCSD*. ••?

Right, the instructions - here they are. Hope you can read my handwriting. By the way, this is a Mode 2 radio, right? ••?

Because, that's what I assumed in writing the instructions. ••••!

Then you're all set to go!

Aileron-Rudder Coupling Instructions ("You realize it will void your warranty, don't you?" So, if you don't want that to happen, contact the manufacturer, instead!)

(See Figure 1)

1. Drill a hole for the SPDT switch in the transmitter case. A good location, for a small enough switch, is on top of the case next to the antenna.

2. Remove the 4 phillips head screws holding the back cover on the transmitter. Remove the cover and rotate it off to the side.

3. Slide the charging jack out of the transmitter case and move it to the side,

4. Unscrew the antenna and remove it from the case.

5. Carefully unplug the battery pack from the power switch.

6. Loosen the nut holding the antenna mount to the case.

7. Using your fingers, pry up the circuit board located at the rear bottom of the case just enough to get at the wiring underneath with wire cutters, etc.

8. Locate the yellow wire running to the center of the channel 4 servo-reverse switch. (It's twisted together with 2 other wires going to the switch.) Cut this wire, leaving enough wire on either side of the cut to work with.

9. Strip both yellow wire ends and two of the wires from the 3-conductor hook-up wire. Splice and solder one hook-up wire to each of the yellow wires. Use heat-shrink tubing to cover the splices.

10. Route the hook-up wires under the loose circuit board up and left past the bottom of the aileron-elevator gimbals. (Twist them together if using untwisted wire.)

11. Press the circuit board back in place making sure it seats properly and that the transmitter crystal is completely seated in its socket on the board.

12. Locate the trim pot for the aileron control. Looking at the transmitter case from the rear, it's on the bottom of the gimbals on the left. You should see 3 blobs of solder on the trim pot. Strip and solder the remaining wire from the 3-conductor hook-up wire to the blob in the middle.

13. Twist and route the 3-conductor hook-up wire along the sides of the case up to the hole that was cut for the switch. Trim and strip the wires.

14. Solder the 3 wires to the switch. The wire going to the channel 4 servo-reverse switch is soldered to the center post. Solder the other wires to the end posts, one wire to each post.

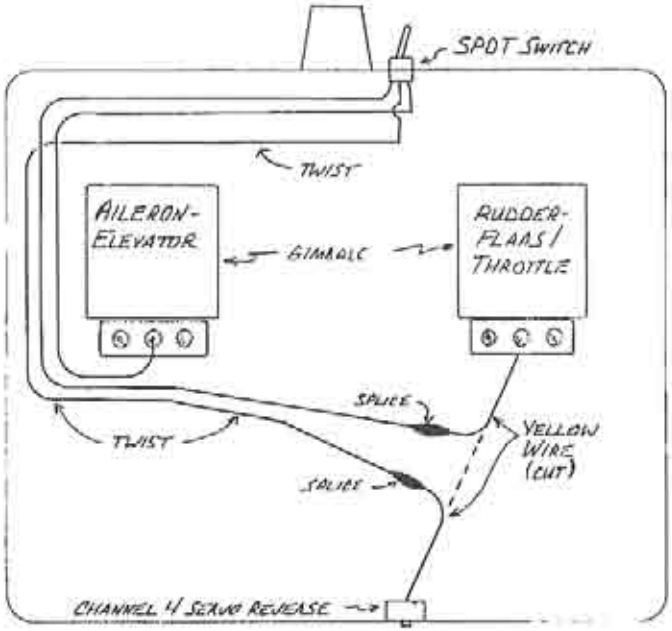


Figure 1 -- View from back

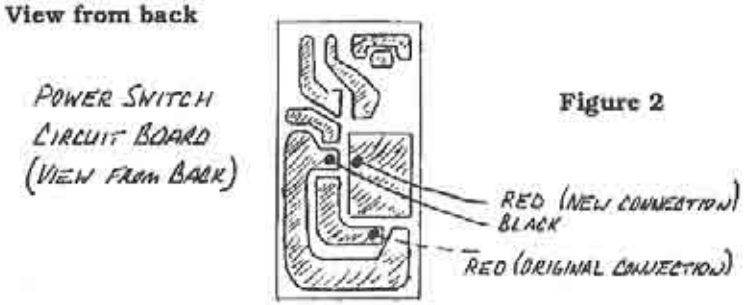


Figure 2

15. Install the switch in the hole. Orient it to suit your preference (e.g., mine points toward the aileron control when coupling is activated, and toward the rudder control when deactivated).

16. Re-assemble the transmitter.

17. Test the modification. Double/triple check that the rudder movement is correct both with and without coupling activated.

18. Test fly your plane and adjust the rudder throw as needed for a well coordinated turn.

How are you making out Bunky? ••••.... *(Just finishing step 14.)*

Let's see? Not bad for someone using pipe solder with an antebellum soldering iron. •••??

Really, it's a good job! *(If you admire big globs of lead and dripping flux.)*

Before you go on, I notice you have a battery cycler. ••?

Nothing's wrong. It looks like a nice one. But, have you ever tried discharging your transmitter batteries with it? •••?

Right, you can't! That's because Futaba uses a diode in the transmitter battery circuit to protect against accidental shorts. Unfortunately, the side effect is that you can't maintain the batteries properly. ••?

Sure, we can fix that, and it's actually a very simple change *(for most people)*. Here, let me sketch it out for you (Figure 2). See, nothing to it. Look, it's getting late and I have to get home *(and catch up on some sleep)*, so I'll just leave you to finish up. ••!

Right, just like a skilled surgeon closing the body after an operation *(or a pathologist working over a cadaver)*. See you around, and next time make sure the sun's above the horizon before you call. *(Please!)* ■

on the Wing

B²
P.O. Box 975
Olalla, Washington
98359-0975

Proposed LSF Tasks for Tailless Sailplanes

A rather exciting letter from Bob Champine showed up in our post office box in late December. Bob, to fill in some background, has been involved in aeromodeling for decades. Recently he contributed airfoils for use in the Princeton wind tunnel tests conducted by Michael Selig, John Donovan and David Fraser. Bob is the only person to have completed the League of Silent Flight program twice.

Bob's letter focused on a LSF (League of Silent Flight) program proposal which provides tasks and achievement levels for pilots of tailless RC sailplanes. This proposal is still in its formative stages, and so feedback is requested. The proposal in its final form is to be presented to the LSF for acceptance as a program separate from the one already in existence.

We would like to draw your attention to a couple of major points:

First, there are no contest points or contest requirements in this program. The main idea is to foster interest in tailless planforms as viable RC soaring machines and attract "grass roots" sport flyers in a task environment rather than a competitive one. The idea is to accomplish goals rather than "to win". The tasks would, for the first time, make it possible for independent souls in remote areas to document their skills without having to find a tailless sailplane contest where none is ever likely to occur. The tasks of the program are themselves formidable and will reasonably challenge the abilities of anyone who attempts them.

LSF Proposed Tasks

for flying wing enthusiasts

Tasks are to be performed with flying wings, that is models having no horizontal surfaces other than the wing itself.

Witnesses must be 15 years of age, unrelated to the flier, and a member of a national aero club (i.e., in the United States, the AMA, LSF, or SFA).

Task accomplishments will be recorded on a task form by the flier and the witness(es). A copy of this form will be filed with the LSF when each succeeding level is completed. However, any task at any level may be logged before the flier completes lower levels of the Task Chart.

No two tasks in a vertical column under different colors on the Task Chart may be accomplished on the same day. However, other tasks in horizontal rows on the Task Chart may be combined and accomplished within a single flight. For example, a thermal duration, X-C, and landing task could be accomplished on the same flight for the red or white level.

Second, all tasks noted in any horizontal row must be completed before the designated level award is given. This is in contrast to the LSF program now in place, where there are some task choices available. Additionally, in this tailless program, a more difficult task in another row may be recorded before a lesser one, but the lesser task must still be completed on a separate flight.

Bob has been working with Dan Morrison on this project, and Dan has accepted responsibility for its coordination. Any comments or suggestions you may have are welcome and may be sent to Dan at his home address, Rt 4 Box 296-B, Quincy FL 32351; you may also call him at home during the day at (904) 627-1308. ■

Task Chart

Level	Thermal Duration	Slope	Landings	X-C	Altitude Gain
Red	5 mins. 2x F	30 mins. M	within 3m 5x	1 km G&R F	N/A
White	15 mins. 2x F	1 hr. M	within 1.5m 10x	2 km G&R F	N/A
Blue	30 min. 2x F	2 hr. M		3 km G&R F	700' 2x
Silver	1 hr. 2x F	4 hr. M		4 km G&R F	1000' 2x
Gold	2 hr. 2x F	8 hr. M		5 km G&R F	1500' 2x

2x = task to be accomplished twice
5x = task to be accomplished five times
10x = task to be accomplished ten times
F = Flat land
M = Mountains
G&R = Goal & Return - Course of required length is to be determined before flight. Takeoff may be at any point along the course, but landing will be within 600 meters of takeoff point and will not shorten the course.

Figure 1 Jupiter & original fuselages

Fuselage Replacement

...by Wildey E. Johnson
954 Lakeside Blvd., Boca Raton, FL 33434
Phone: 407-483-6449
Prodgy: NXHD60B

The Original

One of my favorite flying sites is Art Matthews's private airport near Chattanooga, Tennessee. The main activity there is full scale sailplanes (Sequatchie Soaring Society); however, RC sailplanes and hang gliders are also supported. This airport is a sanctioned AMA flying site and is the home of the "Sequatchie R/C Flyers". I think of this place as soaring heaven. During the summer months, Art keeps a winch at both ends of the field. It was here during July that I broke the tail boom of my LASER. It broke off just behind the 122" wing. No other part of the plane was damaged. Since the fuselage had survived much more violent impacts, I probably had damaged it by squeezing the fuselage while stretching the HI start.

I had built the LASER as a poly ship and wanted the additional tail boom length provided by an open size fuselage. Bob Sealy offers a replacement PULSAR fuselage, but I ordered Bob's generic open class JUPITER fuselage. This is available from NSP or directly from Bob at 1941 North Dixie Ave., Cookeville, TN 38501; (615) 526-4770. Bob ships the JUPITER in three parts: tail boom with fin, front section, and hatch (Fig. 1). Being a generic fuselage, there are no wing fillets.

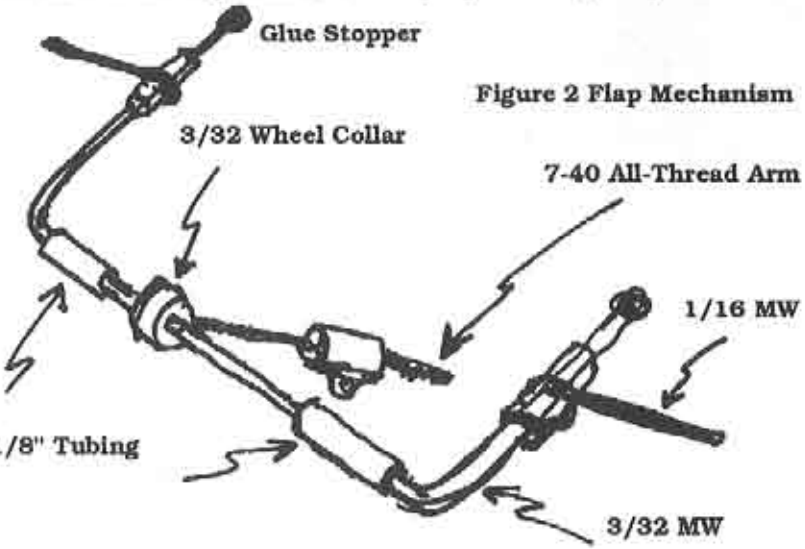


Figure 2 Flap Mechanism

Reinforcement

I reinforced the fuselage by gluing 1/4" x .007" carbon fiber strips on the inside of the tail boom and the front section. This took more epoxy than I had expected because of the roughness of the inside surface. I put lots of thick epoxy on one side of the carbon fiber strip, slid it inside, and flipped the strip over. An arrow shaft was used to apply pressure to the strip from the inside. If I had it to do over, I would pay Bob a little extra to reinforce the fuselage when molded. That would have resulted in more strength and less weight.

Joiner Tube

The location of the joiner and alignment tubes were carefully transferred from the old fuselage. The joiner tube was removed (uncut) from the old fuselage and installed. By inserting the joiner rod and measuring to its tips, I aligned the joiner tube without installing the wing.

Wing Fillet

My original plan was to butt the wings to the sides of the fuselage; however, two things prevented this. The sides of the fuselage are not parallel, and the old wing rod would be too long. The wing fillet was constructed from a series of 1/8" and 1/16" balsa sheet with a plywood outer rib. This technique was a lot more time consuming than I expected. A solid block of balsa would have been lighter and easier.

Alignment Tube

After the fillet had been roughed out, the alignment tube was glued in with the wing mounted. Access to the inside of the fuselage was by the flap hatch mentioned below. The back portion of both wings (flap hinge) were adjusted to be an equal distance from a table surface.

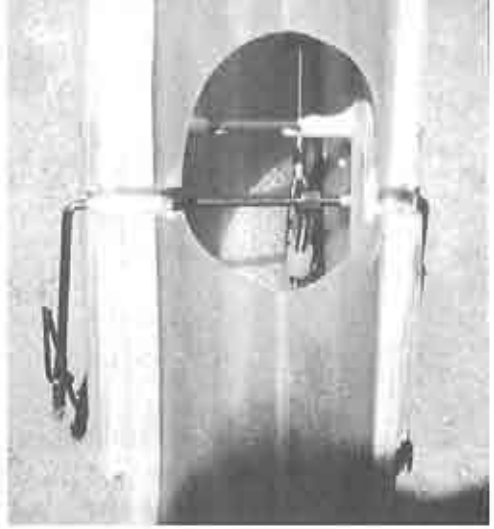


Figure 3 Flap hardware & wing fillet installed

Flap Hardware

I had experienced considerable frustration with the flap hardware on the original plane. There the engineering of the flap mechanism was compromised due to the closed nature of the fuselage. I decided that it would be worth the effort to cut the fuselage open. I could then use a solid U mechanism (Fig. 2). A 4-40 all-thread section was used as a combination arm and set screw. CA glue locked the all-thread rod after firmly tightening on a flat spot in the U mechanism. An oval hatch was cut in the top of the fuselage above the flap hinge line (Fig. 3). Slots were then cut in the sides of the fuselage down to a point even with the bottom of the wing. The flap mechanism was positioned in the slots with the wing mounted. After the flaps were adjusted to the neutral position, the mechanism was epoxied from the inside. Carbon fiber strips reinforced the remaining slotted portion of the fuselage. The CF strips were glued between small pieces of thin ply. Lightened epoxy applied to the ply sandwich bridged the slots on the inside (Fig. 3).

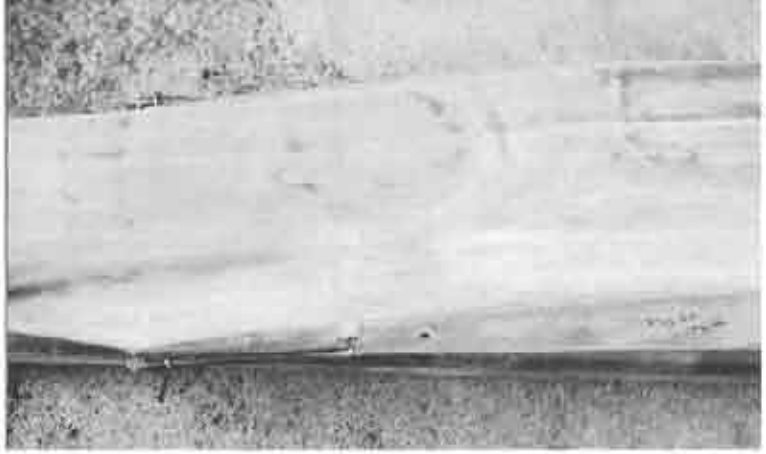


Figure 4 Completed flap hardware & wing fillet

Rudder

The only design decision was the size of the rudder. I consulted the "SAILPLANE DESIGNER'S HANDBOOK" by Eric Lister. It stated that a high wing configuration has much lower lateral stability than a lower wing placement. The handbook called for a vertical area of about 100 square inches. Long wings and low poly angles contributed to the large area. Since the fin came as part of the fuselage, this meant the rudder would make up about 65% of the vertical area. This looks a little unusual, but I had read that you can't have too much rudder on a polyhedral ship.

I had used E-Z hinges to attach the original rudder. It required considerable force to turn, and the fin - rudder joint was far from aerodynamic. Hinge tape holds the new rudder. This is air tight, free swinging, and aerodynamic. However, this left a large gap between the fin and rudder on one side. Trim tape held a strip of Lexan plastic to the fin. The plastic strip covers the rudder gap.

Controls

The control rods for the elevator and flaps are fiberglass arrow shafts. The rudder connection is a Sullivan semi-flexible push rod. A tapered stick was jammed in the tail boom (from the front) to hold the tubing against the side for gluing. I applied glue (Goop) to the plastic tubing with a short length of music wire taped to a wood dowel. The plastic tubing was glued down one spot at a time over a series of evenings.

Surface Preparation

The tail boom was epoxied to the front portion of the fuselage with the wing and stab in place. The tail boom was rotated to achieve perfect alignment between the wings and stab. The flap access hatch was replaced and filled with finishing resin. The wing fillets were shaped, filled, and sanded. The wing fillets, the flap hatch, and boom joint were covered with light fiberglass and finishing resin. Considerable sanding of these areas resulted in a very smooth, continuous surface (Fig. 4).

Hatch

The main hatch supplied with the JUPITER fuselage is stiff enough not to require any frame or internal supports. Figure 5 shows the mechanism that I used to attach the hatch. A dowel at the back and 1/16" plywood at the front were used to secure the hatch. The dowel and vertical ply were epoxied on separate nights with the fuselage inverted. To achieve a near perfect fit, the hatch was epoxied to the fuselage wrapped with Saran Wrap. The epoxy was lightened with micro-balloons and applied to the lower sides of the hatch as well as the edge. This allowed the hatch to be fared to the same width as the fuselage. A 1/16" section of ply was epoxied across the fuselage just in front of the servos. This acts as 1) a structural member, 2) a switch mounting plate, 3) a hold down for the front part of the hatch, and 4) a place to attach the rubber band hatch keeper.

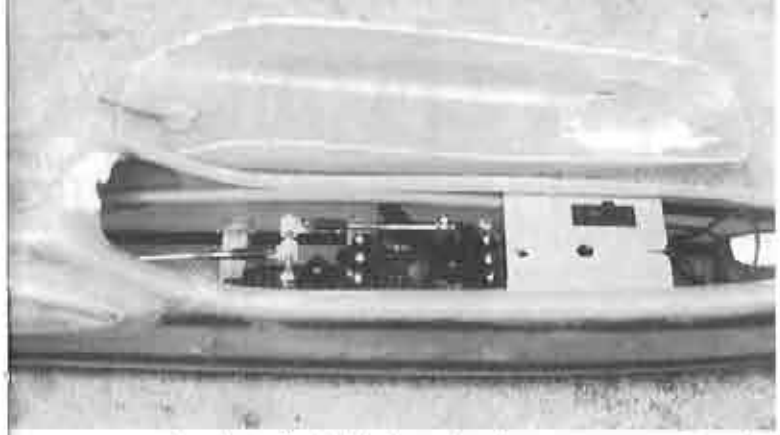


Figure 5 Hatch attachment

Flying

The longer fuselage provided a significant improvement in rudder authority and pitch stability. In fact a rudder throw of + - 45 degrees made the plane over sensitive. Jon Weyl, another RC soaring enthusiast, and I discovered that quick rudder inputs resulted in excess yaw followed by an over correction (by the fin) in the opposite direction. This was fixed by reducing the rudder throw. The increased pitch stability allows me to hold a more steady airspeed (so important while turning in lift).

Conclusion

This has been a learning experience. Working without written instructions has got me more involved in the building process. I now realize that if there is something I don't like with what I am flying, I don't necessarily have to replace the whole plane.

So if you have a good set of wings laying around, consider a new fuselage. You could end up with an improved version of the original plane. ■ Wildey Johnson flies RC sailplanes in southern Florida with the Glades Soaring Group and the Browed Hill Flyers. He is a member of the Sequatchie R/C Flyers in Tennessee. He has 700 hours in full scale sailplanes. ■

Dad, what's a Chuperosa?

A conversation with Stan and his four year old son, Alex:

Well, it's the smallest in a family of high quality sailplanes offered by Uncle Sal and Dad at Northeast Sailplane Products.

Family? Do sailplanes have brothers and sisters?

Umm, sort of. I guess that you could call the open-class Alcyone the Dad, and the Alcyone 2-meter the big brother. The new Dove could be thought of as the Chuperosa's sister. It's really a 2-meter Chuperosa with a beautiful fiberglass fuselage.

Is there a Mom? Why are they a family?

Oh, they have a Mom. The open-class Alcyone with the fiberglass fuse is the Mom, and the wood fuse version is the Dad. The real reason they are a family is that they all feature the same high level of kit quality, design excellence, and superb flight performance.

Is there a dog?

No Alex, there are no dogs in this family. The flight performance of the Alcyones, Chuperosas, and Dove is outstanding. The airfoil that Uncle Sal designed into the Alcyone works especially well. Its 7032-7037 trans-foil thermals very well, yet also penetrates great. The 7037-based Dove is a joy to fly, and the Chuperosa history of very high customer satisfaction speaks for itself. Couple the flight characteristics of this family with the kit quality and you have a group of sailplanes that represent super values in R/C soaring.

Do people that buy them like them?

Absolutely. People who buy sailplanes from this family have been so consistently satisfied that we offer a money-back guarantee on each purchase..even after the airplane is built. Anyone looking for a new kit who has not considered this family should give them a try. We feel confident about this because of our own experiences and the experiences of our customers over the years. People love 'em!

You sound like an adbatizement on TV, Dad.

Sorry, bud, but I get excited when I talk about these kits. It's easy to sound like an ad when you really believe in the quality of a product.

Uh huh...can we go get a Ninja Turtle video now?

Sure, pal.

Take home a member of the family. Call NSP today.

Chuperosa Combo

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- SD7037 or E214 airfoils
- Gentle and stable flyers
- Like two airplanes in one
- Great for slope or hand launch

Alcyone

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- 7032-7037 transitional airfoil
- Only requires 3 servos!
- Ailerons, Flaps, Elevator, Rudder
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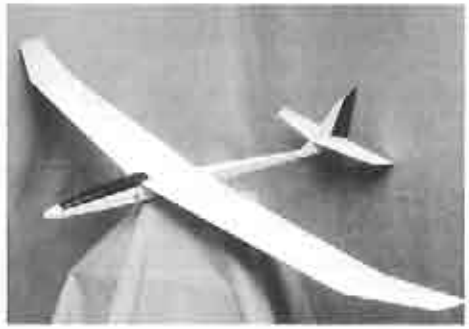

Alcyone 2-Meter

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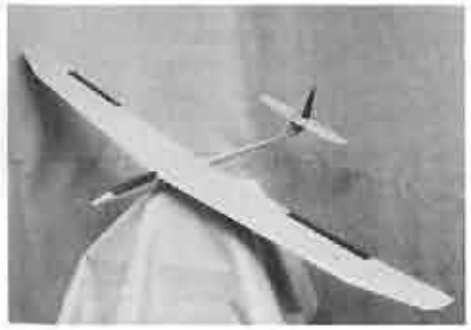
- Honey, I shrunk the Alcyone!
- Same great performance as big bro
- Standard servos are OK (only 3!)
- Takes a mean launch
- Also lots of fun on the slope



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Seminars & Workshops

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

Fall & Winter 1 day seminars on composite construction techniques. Free with purchase of Weston Aerodesign plan set ($35.00) or kit. Frank Weston, 944 Placid Ct., Arnold, Maryland 21012; (301) 757-5199

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Reference Material

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

BBS

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

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

Contacts & Special Interest Groups

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

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

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

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

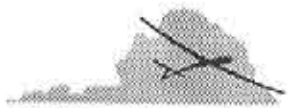
Maryland - Baltimore Area Soaring Society, Al DeRenzis (President), 5003 Wetheredsville Road, Baltimore, Maryland 21207 U.S.A., (410) 448-0808.

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

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

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

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



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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

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

T.W.I.T.T.

(The Wing Is The Thing)

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

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

The Vintage Sailplane Association

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

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

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.

For Sale - Business

DON'T YOU HAVE ENOUGH TROPHIES??* ATTN: CONTEST DIRECTORS!!!** Award your winners w/shirts, caps, jackets, bags, individualized w/screen art (incl. place & class). Designed by fine artist and past Natl. Champion, Tom Jones. Golf shirts from $20.00, T's from $10.00. For more info. send S.A.S.E. to: **Zoomit Creations,** 16 S. Woodstock Cir., The Woodlands, TX 77381; (713) 363-3384.

GREETING CARDS, humorous, assortment package in groups of 10 for the sailplane enthusiast. We have a card to fit any occasion. Send $10.95 plus $2.50 postage (CA residents please add 8.5% tax) to Curt Nehring, SOAR TOONS, 469 N Central Ave. Ste. #261, Upland, CA 91786; (714) 920-1261. Please allow 3 - 4 weeks for delivery.

SILENT FLIGHT CLASSIFIEDS, and more each month! List the gliders and electrics you no longer fly in our free ads. Radios, winches, snifflers and accessories, too. List it free in SFC. Subscriptions are 1 issue @ $1.00, 1/2 year @ $5.00, yearly @ $9.00. SFC, 329 Little Ave., Ridgway, PA 15853.

BIDIRECTIONAL FIBERGLASS, 3 oz/yd^2 CLOTH IN 60" WIDTH. Conforms to compound curves. Supply limited. $4.00 per linear yard, postage paid. B^2 Streamlines, P.O. Box 976, Olalla, WA 98359-0976.

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.

For Sale - Personal

CATALINA X-C, SD 6060, 2 ch, 8.5 lbs. unballasted, never contest flown... $400.00; FALCON 600, great contest flier, never damaged... $275.00; Lear Jet, 1/8 scale (a chance to build your own corporate jet), includes 5 servos, E374, flies great... $500.00; Kraft 5-C series 80 radio w/4 servos on 53.400 mhz... $95.00. Call Gary Anderson at (509) 773-5257; 875 Maple Dr., Goldendale, WA 98620.

NIB: Pierce 970/120... $150.00; Southern KITE/144... $150.00; Nebula/120... $100.00; Airtronics OLY 99... $150.00; Titan 120... $125.00; Curio 100... $100.00; Wanderer 100... $75.00. Bob Parker (408) 997-3417 N. Calif. leave msg.

Multiplex ASW-22 w/JR PCM Centry VII, just refinished, clear canopy, retract, servos in wing, new batteries, 98% perfect... $1200.00/offer. Pictures & shipping avail. Bob Simmer (619) 549-4131 S. Calif.

LJMP COMET kit w/glass fuse; GEMINI kit; PARAGON kit. Contact Frank at (818) 790-1297 eve. S. Calif.

ASW-22, 4.5 m wing plus plug-in wing tips, very scale, beautiful... $800.00. Call Ray at (714) 362-5545 S. Calif.

Müller COMET 88-A, RG-15 airfoil, kevlar fuselage, excellent condition... $700.00 w/wing servos or $600.00 w/o. Call Steve at (714) 968-2451 eve. S. Calif.

NIB Müller 91T, HQ 1.5/8.5 airfoil, spar parts and paper... $800.00. Mark Child, 9530 E. Alondra Blvd. SP 36, Bellflower, CA 90706.

Quarter Scale SALTO, beautiful, all glass, Fiber Glas Flügel 4.25 Meter ship, immaculate condition. Will sell with six servos for $1200.00. Scott Condon at (619) 471-2453 S. Calif.

CAD CAT 7 cell electric pylon racer w/Keller 22-5 racing motor, Becker on/off relay 1400 SCR Sanyo flight pack, two S-133 servos, very fast, everything brand new, flown 8 flights... $325.00 or will consider trade for open class thermal sailplane kit. Call Jack at (215) 547-4243 Penn.

Built & flown sailplanes: 2 meter DUCK, S-3021 airfoil, modified Scheumann wing planform, flying weight 55 oz., set up for Airtronics... $400.00; F3B MODI, glass/carbon bagged RG-15 airfoil, set up for Airtronics, flying weight 84 oz. with original stab, 79 oz. (for SMT) with included light stab... $500.00; Müeller F3B King, RG-15 airfoil, flying weight 100 oz., set up for Airtronics, includes 4-141 servos in the wing... $500.00; Thermal King, scratch built SD-8000 airfoil, flying weight 80 oz., set up for Airtronics... $250.00; FALCON 880, S-3021 airfoil, flying weight 67 oz., set up for Airtronics... $400.00; LEGEND, S-3021, 75 oz., Airtronics set up, has been only trimmed and test flown... $500.00. All include shipping. Contact Jim Thomas, (317) 497-3951 IN.

Two VS Sailplanes ROTORS. One is a wood kit NIB; other is built & flown. Two sets of wings, complete set of quilted transport/storage bags for wings, tail, fuselage. Clean K&B Superpoxy paint job. $125.00 for kit, $225.00 for built model. Steve Condon at (619) 594-7823 S. Calif.

Servos: 6 - JR 9201 NIB... $40.00 EA; 3 - JR 4001, used... $30.00 EA; 1 - AIRT 94732 NIB... $30.00 EA; 3 - AIRT 94141 NIB... $30.00 EA; 2 - AIRT 94141, used... $25.00 EA. MOKI 61 RC LS ABC-ring, Johnson HDR, new... $160.00. All items money back if not satisfied. Nat Penton at (318) 786-3871 or (318) 786-3112 (day) Louisiana.

Wanted

Jim Ealy Scale Kits (NIB), Craft-Air Viking fiberglass fuselage. Bob Parker (408) 997-3417 N. Calif. leave msg.

Getting out of the sport? Need some cash? I am looking for a used computer radio. Contact Bill West at (619) 222-5296; 1962 Willow St., San Diego, CA 92106.

Dremel table saw. Contact Frank Leppla, 144 Lamour Dr., La Canada, CA 91011;

House Cleaning Special

The following sailplanes are being offered at very low prices on a first come first serve basis. So, all prices are firm! Shipping costs will be in addition to the costs listed below unless you come and pick them up, of course. Unless indicated otherwise below, only one plane is available. Please call Ed Siegers in New Jersey during the day (except for Monday) at (201) 366-2525.

Müller Comet 91T, New in Box (NIB)	$1000.00
Surprise II Electric, NIB	$375.00
Banshee, 2m, NIB	$225.00
Evolution, RnR, NIB	$125.00
Thermal Modi, NIB	$250.00
Shadow, Tekoa, NIB	$300.00
Duck, 2m, NIB	$125.00
IO, Culpepper, NIB	$100.00
Mariah, 2m, NIB	$125.00
Alcyone, 2m, NIB	$75.00
Alcyone, open wood fuse, NIB	$100.00
Electric Breeze, NIB	$50.00
Vertigo H/L ST, NIB	$45.00
Weasal H/L, DCU, NIB	$40.00
Skeeter H/L, Dynaflite, NIB	$10.00
Raven, 1m, Mike Smart, NIB	$35.00
Arcus Electric, Robbi, NIB	$125.00
Arcus Pro, electric, NIB	$175.00
Calibra Pro, electric, NIB	$175.00
Biene w/motor, Graupner, NIB	$125.00
Sunfly Electric, partly built	$300.00
Montero H/L, slightly damaged in shipment	$25.00
Super Dragonfly, slightly damaged in shipment	$25.00
Weston 10 cell w/servos	$225.00
Flite Lite polyhedral 550E w/servos	$225.00
Surprise II electric w/servos	$595.00
Banshee w/servos	$425.00
Flite Lite Thermal Eagle, built, never flown	$500.00
Flite Lite Swift 800, flown	$375.00
Müller 89T w/servos *	$1200.00
Merlin, German, all glass w/Becker servos in wing	$600.00
(2) Weston 550 electric polyhedral, NIB	$150.00 EA
(2) Weston 7 cell V-tail electric w/servos	$225.00 EA
(2) Flite Lite Falcon 550E w/servos	$250.00 EA

* Plane was Daryl Perkins back-up plane for F3B World Championships.

NEW PRODUCTS

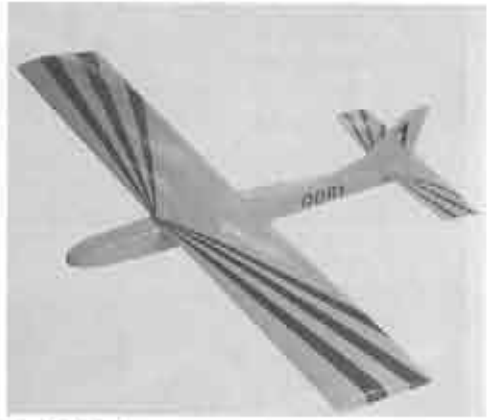
The information in this column has been derived from manufacturers press releases or other material submitted by a manufacturer about their product. The appearance of any product in this column does not constitute an endorsement of the product by the *R/C Soaring Digest*.

One Design Racer #1

...from Mike's Models

Mike's Models is pleased to announce the kitting and distribution of the ODR1, One Design Racer #1. This design has been flown in the Pacific Northwest for 5 years and we are now pleased to make it available to everyone else. The ODR1 sailplane is designed to be used as an introductory slope soarer and for one class racing.

This design is small enough to be carried in the car, assembled. The wing span is 48 inches with 360 square inches of wing area. The ODR1 sailplane uses 2 channels for aileron and elevator and has an unballasted weight of between 18 and 22 ounces depending on radio installation. Full size servos and receivers will fit and there is room for a 500 mAH square battery pack. Of course, smaller equipment can be installed. The kit features rapid construction, a pre-sheeted blue foam wing, precision cut parts and complete hardware. Excellent performance is achieved using the Selig 3021 airfoil and ballasting to 32 ounces all up weight has been seen in one design racing in the Northwest.



The ODR1 has an introductory price of $49.95 and should be available from your local hobby shop or directly from the manufacturer. Dealer discounts are available. Dealer inquiries are invited.

A 35 minute video is available which includes flying and building sequences. The cost for this video is $20, plus shipping, with a $15 refund for tapes returned in good condition.

Mike's Models is located at 1059 NW Darnielle St., Hillsboro, OR 97124; (503) 640-5926. ■

Salto

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

Viking Models, U.S.A. is pleased to offer the Salto as the second in a new line of semi-kits available for the scale enthusiast and scratch builder that wants to build their own slope or thermal glider. Salto means "Loop" in German. The original 13 meter glider was first flown in 1971 and was fully stressed for aerobatic and club use; additional features include a fixed landing gear with fairing, V-tail and a large one-piece canopy hinged to open to the side.

The semi-kit version of the Salto adds to 1/4 plus 10% scale in size with a 61 inch long fuselage. The drawings show a fully sheeted built-up wing with Ritz1 airfoil and four trailing edge airbrakes; the span is a 142.5 inches. Three controls are required: V-tail mixing, ailerons and airbrakes. This model is intended for the experienced builder.

Custom cut wing and stabilizer cores are also available.

Kit Features

- Epoxy fiberglass fuselage 61 inches long with a clear canopy, fiberglass canopy frame and drawings
- Does not include wood or hardware

Price is $135.00 without foam cores or $195.00 with foam cores (wings & stabs). S&H in continental U.S.A. via UPS is $20.00. Texas residents please add 7.25% sales tax.

For more information on our other products, please send for our new, free catalog. Or, if you're near Wylie, Texas, please feel free to drop in as visitors are always welcome.

Viking Models U.S.A., Jerry Slates, 2 Broadmoor Way, Wylie, Texas 75098; (214) 442-3910, FAX (214) 442-5258. ■

"Flying Buddy" Transmitter Support

...from George Zatloka

There is a new product available, designed specifically for glider pilots. It is the "Flying Buddy" transmitter support with feather weight ergonomic design for maximum comfort and precise control that is fully adjustable and supports any Tx. The form fitted shoulder piece distributes the weight evenly and holds the Tx rock steady, completely freeing up your hands and fingers to have perfect coordination of the sticks. It keeps the front of the transmitter free of buckles and straps, for easy cross-trimming and unobstructed reach of any control with both hands. The tray doubles as an ideal ground support by keeping the Tx off the ground and prevents it from getting dirty or wet, and provides a bench-top like accessibility on the field. It keeps your total concentration on flying by preventing the crick in the neck, tired, cramped muscles, the death grip, and by letting the breeze blow around your neck. The flex suspension allows you to hold the Tx in any position for launching, blocking the sun, or folding up for storage and transportation. It is proven to make your flying better and more enjoyable. For more information, contact George Zatloka at 12212 NE 66th St., Kirkland, WA 98033; (206) 827-1960. ■

Big Pink - Sky's The Limit

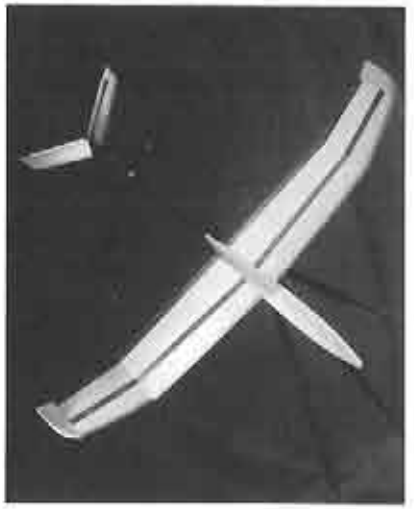
...from Northeast Sailplane Products

Here is a highly interesting offering from NSP. The Big Pink is an all-composite HLG in an all-new class. This is a high performance HLG in a one meter size. Why? Small size give you the ability to fly in very small places, throw it higher than a typical HLG, and turn in smaller, tighter thermals.

Start with a set of beautiful lightweight fiberglass and foam vacuum bagged wings. Add a fiberglass hull with a fitted nosecone. Add to that a specially tapered carbon fiber tailboom and a set of tail parts. Now you have the basic Big Pink. The V-tail is made of built-up balsa parts sheeted with contest balsa to save weight. A jig is included in the kit to help make installation of the tail as painless and accurate as possible. All pushrods, machine cut bulkheads, wing bolts, and even a mylar thermal detector are included in this kit, along with rolled plans (with very detailed instructions including launching and flying suggestions). Everything was designed with precision and weight savings in mind. For example, the boom is a multi-tapered mandreled epoxy carbon fiber composite designed by experienced free-flight competition builders. It has **no flex!** The wing is white foam with 3/4 ounce glass and carbon fiber reinforcement at the spar and at the trailing edge. The wing by itself weighs only 50 grams!

Being such a small glider, the Big Pink has very particular radio requirements. The battery is a four cell 50mah nicad (see accessory section); the servos must be sub micros (we recommend the Airtronics 501). The receiver should be one of the FM micro receivers with the case removed. No switch, because a switch can add 1/2 ounce to the overall weight. This truly complete kit even includes parts and directions to make a simple pocket-sized quick charger for the Big Pink.

Specifications	
Wingspan:	36"
Wing area:	198 sq. in.
Weight:	6 oz.
Wingloading:	4.5 oz/sq. ft.
Airfoil:	E387
Skill level:	INT/ADV



Launches are very high and it is not unusual to be able to achieve heights of 60 to 70 feet, about twice the height of a standard 60" HLG. With its very low weight the Big Pink will not only signal the lightest thermal but can easily map out for you the hot spots, those parts of the thermal that produce the most lift. This is **the** precision machine for small thermals.

Phil (designer): Brings back the absolute elements of pure fun. It makes me feel like a kid again!

Sal: Talk about micro weather conditions: how about thermaling off the heat produced by the hood of a car! No football field? A tennis court will do!

SKLBPK001, Sky's the Limit Big Pink, $184.95 from Northeast Sailplane Products, 16 Kirby Lane, Williston, VT 05495; (802) 658-9482. ■

Shadow Plus

...from Northeast Sailplane Products

We are very excited to offer this new version of the Shadow, a high performance thermal duration sailplane. Many subtle and evolutionary refinements have resulted in a sailplane that is truly superior in many aspects to any other competition sailplane available today. The Shadow Plus was designed to make the best advantage of the now-proven SD7037 airfoil. Starting at the wing planform, the taper ratio was improved to provide more area farther out on the wing, a semi-elliptical wing tip minimizes wing tip vortices. In combination, these give the Shadow very good thermaling characteristics and a high resistance to tip stalls.

The air in a thermal can vary wildly in both velocity and vertical component. Today's high performance sailplanes, with their high aspect ratio wings and critical airfoils, must be flown carefully to maintain efficient climb in a thermal. The tail moment on the Shadow Plus is long for one reason: to provide smooth pitch response. Smoothing out the pitch characteristics results in a sailplane that easily maintains an efficient angle of attack in tight high-banked turns. As we all know, when flying at high altitudes it becomes harder to distinguish what the glider is doing, with the Shadow Plus this task becomes much easier. The Shadow's ability to signal lift is exceptional offering the pilot an advantage in locating thermals.

There is not much building to do on the Shadow Plus. This version of the Shadow has a very strong composite spar (already aligned and pre-installed) able to stand the typical heavy metal zoom launch. The wings and tails are pre-sheeted with obechi and are very accurate with all fiberglass reinforcement around the root, servo wells and trailing edge installed. The wing has the root ribs installed, the ailerons and flaps cut out, and the elliptical tips are prefabricated from fiberglass. You simply attached the tips on the pre-installed fittings. The stabilators and rudder are pre-sheeted and the root ribs installed. The fiberglass fuselage is reinforced with Kevlar, and has the wing tube hole pre-drilled, so there is almost no fitting to mate the wing to the fuse. The bellcrank hole for the stabilators is also drilled. Overall quality of the Shadow Plus is very high - everything is included. Even the hardware is exemplary, with matching Anodized aluminum control horns, bellcrank and wing rod! Another fine touch is the special rudder control horn which locks the rudder hinge into the fuselage resulting in precise control of the surface with a simple tape hinge.

Specifications	
Wingspan:	118"
Wing area:	994 sq. in.
Weight:	69 oz.
Wingloading:	9.5 oz/sq. ft.
Airfoil:	SD7037
Skill level:	Int/Adv

What is most distinctive about the Shadow Plus is its wide flight envelope. Low drag design gives it a enormous speed range, especially with the use of trailing edge camber. The reliable, quick, and smooth handling of the Shadow Plus makes landing tasks no challenge at all. Even in light thermals it will climb very quickly, due to the low wing loading coupled with the SD7037 airfoil which exhibits the lowest drag of all airfoils tested at high angles of attack. The Shadow Plus is one of the few designs that satisfy pilots on either side of the country, giving both speed and low sink rate, and an ability to cover an enormous amount of ground.

We applaud the exceptional engineering and performance in the Shadow Plus and highly recommend it to the serious thermal pilot.

Price: $374.95 from Northeast Sailplane Products, 16 Kirby Lane, Williston, VT 05495; (802) 658-9482. ■

Saturn 2.9T

...from Layne/Urwyler

David Layne and Peter Urwyler, designers and manufacturers of the Saturn line of sailplanes are introducing a new unlimited class thermal duration sailplane, the Saturn 2.9T.

Those of you familiar with the current line of Saturn sailplanes know that Layne/Urwyler has, to date, only produced high quality, all composite/glass Saturn sailplanes which are priced accordingly ($450.00 - $500.00).

The new Saturn 2.9T incorporates many of the same unique components as all composite Saturns at less than half the cost. These components include: an ultra strong 3/4" x 36" T6 aluminum/alloy wing joiner tube, a molded glass rocker assembly for securing the stabilizer, a molded carbon fiber bell crank to drive the stabilizer, and pre-installed pushrod tubes in the fuselage which accommodate solid wire push rods.

The Saturn 2.9T kit features a one piece epoxy/glass/kevlar fuselage with an unfinished weight of only 8.5 ounces. The triple taper wings incorporate white foam cores, with a unique "pre-installed" PVC spar tube. The wing skins are obechi wood and can either be vacuum bagged or pressed over the foam cores. A combination of a layer of 1.5 ounce fiberglass cloth and 50K carbon fiber tow applied while sheeting the cores with obechi wood completes the wing assembly. An industrial strength finished Saturn 2.9T wing, ready for servo installation and your favorite covering material only weighs 11 - 12 ounces. A finished Saturn 2.9T ready to fly, only weighs 65 - 72 ounces (10 - 11 ounces per square foot wing loading).

The Saturn 2.9T utilizes the HQ 2.0/9 - 2.0/8 airfoils. The airfoil is nine percent thick at the root and transitions to an eight percent thickness at the tip creating clean aerodynamic washout which provides exceptional handling with virtually no additional drag. The HQ 2.0/9 airfoil has a speed range that cannot be fully appreciated when studying its specifications on paper. At a wing loading of 10 - 11 ounces per square foot, the Saturn 2.9T can fly so slow in light or marginal air that you won't believe you are flying an airfoil with only two percent camber. In windy conditions, the Saturn 2.9T cuts through the wind with ease and carries additional ballast very efficiently.

The Saturn 2.9T is a very fast building kit and is now available from Layne/Urwyler for a cost of $239.00 plus $15.00 S&H in the USA. Pre-sheeted wings are available for an additional $100.00.

Also, a standard class version of the 2.9T is now available (Saturn 2.5T). It has a 99" wing span, 825 square inches of wing area, and weighs 57 - 65 ounces.

For additional information or to place orders, contact: Layne/Urwyler, 1808 Applegate Dr., Modesto, CA 95350; (209) 529-8457, FAX (209) 549-1642. ■

Thermal Thing

...from Future Flight

For all flight flying fun, the Thermal Thing can't be beat! Designed for modelers that have built at least one plane, or first timers that will have a little help, this plane will give you more for your money than any other 2-meter class glider on the market.

You will find the Thermal Thing is a true joy to fly. Low wing loading makes for fast climbs on the lightest lift. Agile, yet stable handling allows it to outperform many more expensive models. And with Fast-Build™ construction, you'll be at the flying field in short order. These features combined with the options for powered flight make the Thermal Thing a sure bet for maximum flying fun. Try one today and we're positive you'll be telling all of your friends.

Kits available from: Future flight, 1256 Prescott Ave., Sunnyvale, CA 94089; (408) 735-8260 for $16.00 plus $4.00 for shipping. CA residents please add 7.25% state sales tax. ■

Announcement

1993 NSP Catalog

...from Stan Eames of Northeast Sailplane Products

The 1993 NSP catalog is now in production. Sal and I are working feverishly to create what we hope will be the biggest and best NSP catalog, yet. This year's catalog will contain over 160 kits, dozens of accessories, and many new articles. Featured in the 1993 catalog will be a new electric flight section, containing some of the finest electric sailplanes available. We will also have electric accessories such as motors, chargers, and batteries. This truly will be a publication worth waiting for.

The reason for the delay is that we are just now receiving information on many new products, and we want to include them in the first printing. We expect the 1993 catalog to be available in April, and it will be sold for the same price as the 1991 and 1992 catalogs ($5 + $2 S&H). Also, we will ship all 1993 catalogs via cardboard express mail packets, so our customers will receive them quickly, and in perfect condition.

Anyone requesting a 1993 catalog before it is ready will be sent a 1992 catalog to tide them over, and their name will go on a list to receive the 1993 version free of charge when it is released. We regret the disappointment this delay causes our customers, but our intent in taking the extra time is to provide an exceptional publication. Thanks for your patience! ■

F.Y.I. — Model Flight™

...from Dynamic Modelling

Dynamic Modelling is very proud to announce the availability of its new book, **F.Y.I. — Model Flight™** (**F.Y.I.** = "**F**or **Y**our **I**nformation"). A full-size softbound book over 220 pages long, it includes a wealth of information on EVERYTHING associated with models that fly. The book is intended to make the task of finding information on all aspects of model flying much easier. Even the cover is fluorescent pink so it may be easily found on the workbench!

At first glance, **F.Y.I. — Model Flight™** appears to be like a specialized "phone book," but really contains much, much more. The first section, the "Yellow Pages," contains ALL model aviation products sorted alphabetically into 265 different categories, and lists all the companies - **with** phone numbers - that stock products in each category.

The second section of the book is like the "white pages," but is packed with much more detail. For both the larger manufacturers and the small cottage industries who are just as important to today's modelers, FYIMF lists the name, address, phone & FAX numbers, list of products, catalog/brochure data, and ordering information. Over 1,500 - FIFTEEN HUNDRED - sources are listed, along with a comprehensive index. Never again do you have to search through a stack of old magazines to find the company with the products you need, and a list of their products!

The third section of **F.Y.I. — Model Flight™** contains information arranged in a way that cannot be found anywhere else. Fifteen tables compare vital statistics on six types of aircraft (control-line, free-flight, RC power, sailplanes, electrics, and helicopters), motors (glow, gasoline, diesel, CO_2, electric), and RC systems and components (receivers, servos, gyros, speed controls). Each table contains an enormous amount of information: for example, the kits sections list name, manufacturer, class, wing span and area, weight, (if applicable) motor size, radio required, brief notes, and retail price. The RC power models section alone contains information on over 600 different models!

The fourth and fifth sections of FYIMF contain lists of model clubs and hobby shops in alphabetical order by city - more than 2,500 of them. If you are traveling on business or moving to a new home, these sections make it easy to connect with the local modellers.

F.Y.I. — Model Flight™ has far more sources, entries, and useful information than any of the other directories, and includes very important items not to be found in the others! This important hobby reference should be part of every modeler's library, and clubs and hobby retailers will find it indispensable too! Retail price is $19.95 which includes shipping and handling (in US only. CA residents add $1.55 sales tax, first class mailing is $1.40 extra, foreign orders write for prices). Copies may be ordered (specify item DM102) direct from Dynamic Modelling (4922 Rochelle Avenue, Irvine, CA 92714-2941, 1-714-552-1812, or 72417,2067 on CompuServe), or your local hobby dealer. Clubs and groups: buy four copies and get one free, **a 20% discount!** ■

Informational Charts

...from Dynamic Modelling

Dynamic Modelling is very proud to announce a new line of informational charts to make it easier for the modeller to choose what products to buy. These charts were compiled by Don Edberg, *RC Modeler*'s Soaring editor, and are intended to help both beginner and advanced modellers choose what RC systems, servos, and airfoil plotting software would best meet their needs.

The new **Airfoil Plotting Program Comparison Chart** compares 12 different airfoil and wing plotting programs for both IBMs/compatibles and Macintoshes® in 28 different categories. The chart lists the name, address, cost, computer and plotter compatibility, number of included airfoil sections, manual length, plotting options, analysis capabilities, and notes and comments for each program. The chart sells for just US$1 or four US first class stamps (order DM105).

The **Sailplane Computer Radio Comparison Chart** answers questions about how the computer radios compare, and what types of sailplane mixing functions are available. This chart compares the Ace Micropro, Airtronics Infinity 600 and Vision, the CSL Vision Upgrade, the Futaba NEW 7UGFS sailplane radio, as well as the 9VAP and Super Seven, and JR's x-347. (By the time this is printed, it may also include the hitec™ MOM, Airtronics Infinity 1000, Futaba 9ZAP, and a new JR radio.) The comparison chart consists of four full-sized pages packed with data in 77 different categories and printed on a single 11 x 17 inch sheet, and comes with a separate one-page short written commentary with suggestions on how to evaluate the radios. This chart sells for US$2 or seven US first class stamps (order DM103).

The **Servo Conversion Chart and Instructions** tell how to swap servos between brands. (Yes, it can be done by slight modifications to the connectors and wires without soldering on new connectors.) This chart shows how to interchange servos between Airtronics, Futaba, and JR. This is invaluable information for those who mount servos in wings. A second bonus chart provides information on hooking up aileron and flap servos in wings. The servo chart is available for US$1 or four US first class stamps (order DM104).

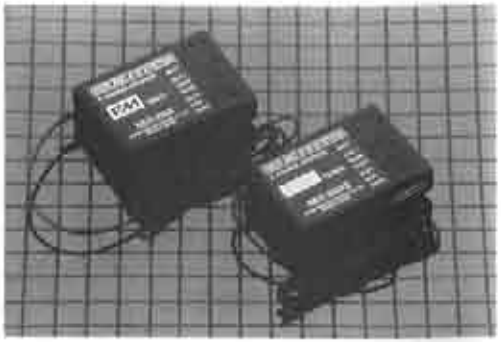
All of these charts are based on information taken from articles written by Don Edberg in RCM, but are updated continuously to ensure that they stay current. No serious modeller can afford to be without them, especially at these low purchase prices. The charts are shipped first class mail (foreign orders, please write for current prices).

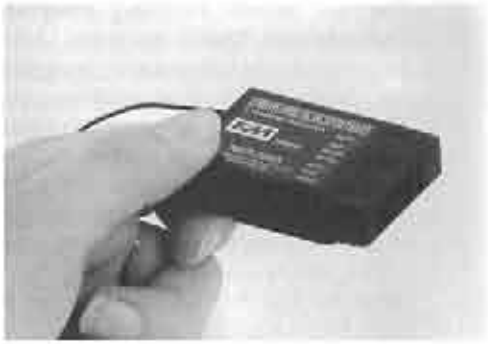
Dynamic Modelling, 4922 Rochelle Ave., Irvine, CA 92714-2941; (714) 552-1812. ■

JR Mini Credit Card Receivers

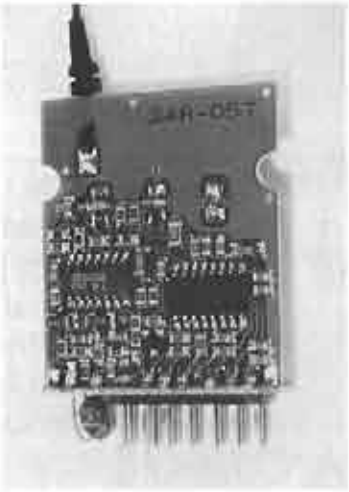
...from Horizon Hobby Distributors

With the new 226 and 236 Mini Credit Card Receivers, JR has produced cutting-edge receiver technology, in the smallest possible package. Independent laboratory tests rank these 6-channel receivers two of the best ever in terms of 3IM, 2IM, adjacent channel rejection, signal to noise ratio, and on-channel capture point.





"Each one of these small chips contains hundreds of components. SMT (Surface Mount Technology) adds reliability, vibration resistance, and reduces the size of JR's new receivers."



Both receivers boast an improved, more purifying version of JR's patented and legendary Anti-Blocking Cross Modulations and Window (ABC&W) circuity. The 236 (PCM) model features a dual-sided circuit board constructed of a new material that shields the Central Processing Unit from any stray interfering signals. The 226 (FM) version incorporates a special circuit that ignores stray signals outside the receiver's bandwidth when it's on while its transmitter is turned off. This prevents connected servos from violent glitching that would strip servo gears or bend linkages. Both the 226 and 236 are compatible with all JR FM and Z-PCM systems, respectively.

The 226 and 236 indeed live up to their "credit card" billing. At a scant .55" x 2.06" x 1.43" (HxLxW), the 226 and 236 are small enough to fit easily into the narrowest of radio compartments. They are equally suited for all limited-size helicopters.

The 226 and 236 are also extremely lightweight units. Weighing a mere 1 ounce, they are perfect for use in gliders, fun-fly planes and other weight-conscious aircraft.

JR radio control systems and accessories are available through hobby dealers nation-wide. JR is exclusively distributed by: Horizon Hobby Distributors, 4105 Fieldstone Road, Champaign, IL 61821; (217) 355-0022. ■

Unidirectional Carbon Fiber & Obechi

...from Kennedy Composites

The hot new one is **2.9 oz./sq. yd. unidirectional carbon fiber.** For the ultimate strong, lightweight composite wing, this is the solution. It is a 12 inch wide smooth glossy black ribbon only .0045" thick. Being so thin, it shows no ridge when used under 1/32" balsa or obechi. The C/F cuts into strips for spar caps or trailing edges with no fraying. List price is $4.50/ft.

4.5 oz./yd. unidirectional carbon fiber is available in 12 in. wide rolls and is .008 thick. Under a 1.4 oz. fiber glass cloth, the unidirectional c/f will produce a perfect open class wing. The c/f ribbon is also ideal for spar caps under obechi or balsa wings. List price is $4.00/ft.

I now stock 5,000 sq. ft. of premium **obechi** in widths 10, 12, 14 in. wide. The sheets are 10 ft. long and 1/42 in. thick. The obechi is cheaper than balsa and joining of sheets is no longer necessary, saving you time. The obechi provides a harder more durable surface than balsa and can be finished with your favorite paint or monokote. A sheet of 10" by 10 ft. obechi is $10.00. Quote for large quantities; greater than 100 sheets available.

Black obechi is also available exclusively from KENNEDY composites. Finish the bottom of your favorite sailplane like fine furniture. The color is forced under pressure into the wood. Not being a surface applied stain, any sanding of the wood will not remove the color. Price is $25.00 for a 14" by 10 ft. long sheet.

To thicken epoxy, we have **Aerosil.** Mix the Aerosil with epoxyy before spreading it out on wing skins. The mix prevents bleed through the balsa or obechi. Notch your scrapper every inch to leave neat rows of epoxy mix on the wing skin for minimum weight. List price is $5.00 per bag.

Kennedy Composites, 12416 B Deer Falls Dr., Austin, TX 79729; (512) 335-6450. ■

Tehachapi Mountain Slope Soarer

...from Scott Metze

The idea behind the Tehachapi Mountain Slope Soarer (TMSS) is to give the builder the basic airframe parts. Then, with the parts and instructions, the builder can make whatever they want. A person may want to make a Point Fermin slope racer, for example. We have three different versions: a "T" tail, Mid tail, and a "V" tail. Please give us a call if you want to know more about the T.M.S.S. or our seminar schedule on composite construction. Ask for Scott Metze, (805) 822-7994; or write to P.O. Box 1569, Tehachapi, CA 93581. ■

Press Release

U.S. R.C. Soaring Team Prepares for Israel

The U.S. R.C. Soaring team was recently informed that the World Championships will be held in Sava, Israel in mid August of 1993. The team of Joe Wurts, Larry Jolly, Randy Spencer, and Daryl Perkins have been preparing for the Worlds since the team selection in September of 1992, but were unsure of the location until just recently. The team has been rounded out by the appointment of Skip Miller as team manager, as well as Tim Renaud and Steve Condon as field support. With the strong showing of this same team of flyers as the previous cycle, and the depth of knowledge, the U.S. is in a strong competitive position. Flite Lite Composites has recently delivered an all molded "Team Eagle" that will have the European community taking a close look. The surface, strength, and weight have all exceeded what was anticipated. The model was recently unveiled at the I.M.S. show in Pasadena amid very favorable response by competitors and modelers alike. Airtronics, always a significant sponsor and supporter of the U.S. F3B soaring team effort, is supplying each pilot state of the art Infinity 1000 "Team Radios". The marriage of computer sophistication of the Infinity 1000 radio with the F3B Eagle sailplane demonstrates the technical achievement that is occurring in soaring through out the U.S. The team is practicing 2 to 3 times a month as a team, as well doing their own practice flying as individuals. An interesting note is that Joe Wurts, the defending world champion, has elected to compete as an Individual, allowing the U.S. to lay claim to a significant competitive advantage. (The U.S. will have four pilots on our team which allows us a tactical jump on the rest of the teams.) Fund raising efforts are now in full swing, with "Official Team Merchandise" of T shirts, embroidered patches, Cloisoneé pins, and stickers, all of which sport the "Official Team Logo". A raffle has been organized with tickets at an affordable five dollars each. The raffle operates on a donation basis from supporting manufacturers. We are receiving generous donations from radio manufacturers, kit manufacturers, and many of the suppliers of materials and related modeling items, with broad based exposure coming from the model magazines. All funds raised are used to support the team in travel, food and lodging expenses which are not covered by the AMA World Championship Team program. Although the program is quite significant, there is always a shortfall which is required to be funded by the traditional fund raising efforts of the team, all of which was kicked off at the I.M.S. show. The show organizers donated a booth which the team and fellow supporters manned for the three day show. There, Wurts, Jolly, Spencer and Perkins were on hand to answer questions, show videos and share knowledge for those interested in the cutting edge of R.C. Soaring. Steve Addis, my assistant team manager organized the logistics of the show and began the fund raising effort. The U.S. team is in lift and is climbing! Please help support our U.S. team effort by ordering our official team merchandise and raffle tickets. The order form can be found elsewhere in this publication. Thank you for your support.

- "For the Team", Skip Miller

1993 UNITED STATES OF AMERICA F3B SOARING TEAM

SPENCER • WURTS • JOLLY • PERKINS

Official 1993 U.S. F3B Soaring Team Merchandise Order form

☞ YES! I'd like to support our 1993 U.S. F3B Soaring Team. Please send me the following merchandise:

If your merchandise total (not including S/H) equals $25 or more we'll send you a free team pin!

Qty	Item Description	Cost	Extension
_____	Raffle Entry Ticket	$5.00	_____
	Official Team T-Shirts emblazoned on front in full color with 1993 Team Logo & USA F3B Team on sleeve. Shirts are 100% preshrunk Cotton.		
_____	Medium T-Shirt	$15.00	_____
_____	Large T-Shirt	$15.00	_____
_____	Extra-Large T-Shirt	$15.00	_____
_____	XXL T-Shirt	$15.00	_____
_____	Official U.S. Team Pin	$3.00	_____
_____	Official U.S. Team Patch	$5.00	_____
_____	Official U.S. Team Sticker	$2.00	_____
		SUBTOTAL*	_____
	Shipping/Handling (Add 10% of Subtotal)		_____
	Donation (Optional)		_____
		GRAND TOTAL	_____

Please fill out your name and address below, and send your check or money order payable to 1993 USA F3B Soaring Team, 15781 Empire Lane, Westminster, CA 92683. Please allow two to three weeks for delivery.

NAME _____

ADDRESS _____

CITY _____ STATE ____ ZIP _____

Rose Bowl Soaring Festival

...by Frank Leppla
La Canada, California

The Pasadena Soaring Society would like to invite one and all to attend the 12th Annual Rose Bowl Soaring Festival to be held on the first weekend of May of this year. Four rounds will be flown on Saturday May 1st with three more on Sunday the 2nd. Trophies will be awarded to the top ten fliers in open class competition and the top five in two-meter. A team trophy will be awarded to each of the top four fliers from one AMA sanctioned club. A large raffle will be held at the end of the contest. In the past this contest has averaged approximately 135 entries in open and two-meter with significant competition from many of the best fliers and clubs in the western United States.

This year's rounds will include two three-minute precision duration flights, a four flight add-em-up to make twenty-two minutes, and an eight minute precision duration. Landings, which will be announced at the contest, will be a variety of in-and-out targeted different sized boxes as well as measured tape landings within a 25' circle. Scoring will emphasize flight times.

We hope that you can attend the 12th Annual Rose Bowl Soaring Festival and will make it one of your annual events. Special arrangements have been made with the City of Pasadena for overnight RV parking. No hook-ups are available. An entry form has been provided to *RCSD* and is printed somewhere in this monthly edition.

Entry forms have been mailed to past participants and to a large number of other people in the RC soaring community. If you did not get an entry form - please contact the Contest Director Richard Burns at (818) 812-0491 or the Pasadena Soaring Society, c/o Al Zimmerman, 1328 Branta Drive, Glendale, CA 91208 or by phone at (818) 500-9019. The Pasadena Soaring Society may also be reached by mail at P.O. Box 745, Pasadena, CA 91102. ■

TWELFTH ANNUAL ROSE BOWL SOARING FESTIVAL.
MAY 1 & 2, 1993
SPONSORED BY THE PASADENA SOARING SOCIETY

This is an AMA sanctioned event and all AMA rules apply; radio equipment must comply to 1991 specifications.

LOCATION: Pasadena's Brookside Park Rose Bowl soaring field with seventeen acres of manicured grass.

CLASSES: Unlimited and Two Meter

TASKS:

SATURDAY - MAY 1	SUNDAY - MAY 2
Round 1 - 3-minute precision duration	Round 5 - 3-minute precision duration
Round 2 - 1st flight of add-em-up	Round 6 - 4th flight of add-em-up
Round 3 - 2nd flight of add-em-up	Round 7 - 8-minute precision duration
Round 4 - 3rd flight of add-em-up	

The add-em-up rounds will consist of four flights to make 22 minutes with no flight over 7 minutes. The landing area will be near the center of the field away from the trees and available for inspection prior to the contest. Scoring emphasis will be placed on thermal duration, penalty of flight times over will be 10 points per second.

TROPHIES: Unlimited - 1st thru 10th Place — Two-Meter - 1st thru 5th place
First Place Team - Top 4 dues paying members of a sanctioned club.

TIME: Pilots' meeting 7:45 a.m. each day / First Flight 8:00 a.m. each day

RAFFLES: Grand Raffle following last round.

Information: RICHARD BURNS (818) 812-0491 — **Scoring:** AL ZIMMERMAN (818) 500-9019

Entry Fee: First Class Entry: $20.00 — Second Class Entry: $10.00

OVERNIGHT R.V. PARKING FREE - FRIDAY, APRIL 30, SATURDAY, MAY 1 -- AT THE FIELD (no hook-ups)

Entry forms will be accepted on a first-come, first-served basis. The earliest acceptable postmark is March 1, 1993, and entries must be postmarked no later than March 15, 1993.

Entry Form: Please make checks payable to "Pasadena Soaring Society".

Name: _____

Address: _____

City, State, Zip: _____

Phone Number: (___) _____ AMA Number: _____ Require RV Parking? ☐ Yes ☐ No

Team Declaration: (Must be declared in advance) _____

Frequency Choices: Unlimited 1st _____ 2nd _____
Two Meter 1st _____ 2nd _____

NOTICE: CHANNEL 12 IS NOT USEABLE AT THIS FIELD

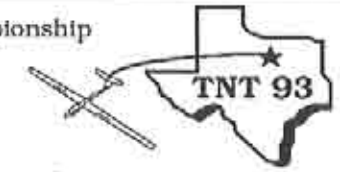
T-Shirts @ $12.50
___ M $_____
___ L $_____
___ XL $_____
___ XXL $_____
Entry Fee $_____
$_____
Total Enclosed $_____

MAIL ENTRY TO: Pasadena Soaring Society, c/o Al Zimmerman, 1328 Branta Dr., Glendale, CA 91208

Schedule of Special Events

Date	Event	Location	Contact
Mar. 14	F3J	Dallas, TX	Pancho Morris (214) 681-1098
Apr. 3	Model Airplane Flea Market & Auction	Mayville, NY - DART Airport & Museum	(716) 753-2160
May 1-2	Rose Bowl Soaring Festival	Pasadena, CA	Richard Burns (818) 812-0491
May 1-2	Unlimited Slope Racing I.S.R.	Torrey Pines, CA	Steve Condon (619) 565-4361
May 8	MASS Handlaunch Glider Contest	Memphis, TN	Max Hurst (901) 989-3508
May 9	F3B Benefit Contest- Inland Soaring Society	Riverside, CA	Joe Rodriguez (714) 924-9537
May 15-16	13th Annual Santa Maria Soaring Society X-Country Race	Santa Maria, CA	Steve Bircher (805) 928-3904
May 22-23	4th Annual Memphis in May Electric Contest	Memphis, TN	Bob Sowder (901) 757-5536
May 23	Davison Hilltoppers Spring Soar	Davison, MI	Gene Pastori (313) 636-7722
May 29-30	GVRC Spring Dual Meet	Nunica, MI	Cal Posthuma (616) 677-5718
May 28-31	Mid Columbia Cup Slope Races	Richland, WA	Roy Lightle (509) 525-7066
May 29-31	Sport & Vintage Glider/Sailplane Meet	Mayville, NY - DART Airport & Museum	(716) 753-2160
June 12-13	Lift Summer Soar	Traverse City, MI	Jim Johnston (616) 938-1272
June 13	Great Rocky Mountain Handlaunch Contest	Denver, CO	Lenny Keer (303) 737-2165
June 26-27	NASF/MASS Mid-South Soaring Champs	Huntsville, AL	Ron Swinehart (205) 883-7831
July 10-11	North American Scale Soaring Assoc. Rally	Richland, WA	Wil Byers (509) 627-5224
July 17-18	GVRC Summer Dual Meet	Nunica, MI	Cal Posthuma (616) 677-5718
July 16-27 Aug.	AMA NATS F3B World Championships	Vincennes, IN Sava, Israel	
Aug. 7-14	LSF NATS	Vincennes, IN	Mike Stump (616) 775-7445
Aug. 14	LIFT Aug. Soar In	Traverse City, MI	Jim Johnston (616) 938-1272
Aug. 28-29	GVRC 2-M Champs man-on-man	Nunica, MI	Cal Posthuma (616) 677-5718
Sept. 4	CAMS Northern MI Sailplane CH.	Cadillac, MI	Mike Stump (616) 775-7445
Sept. 11-12	Masters of Soaring (Sponsored by Weak Signals)	Temperence, MI	Art Slagle (313) 477-2228
Sept. 18-19	TNT Texas National Tournament	Dallas, TX	Henry Bostick (214) 279-8337
Oct. 9-10	5th Annual MASS Fall Soaring Tournament	Memphis, TN	Bob Sowder (901) 757-5536
Nov. 21	5th Annual MASS Turkey Shoot	Memphis, TN	Mike Kelly (901) 756-9410

The Texas State Soaring Championship



September 18 & 19 1993
Dallas, Texas

9th Annual Texas National Tournament

Task - Thermal Duration 3,5,7,9,11 w/FAI Landing

CLASSES:

2 Meter -Saturday
Open - Sunday
Junior, Novice
Sportsman, Expert

AWARDS:

1-5th place Sportsman & Expert
1-3rd place Novice & Junior
Overall Winner

INFORMATION: Henry Bostick (214) 279-8337
5517 Hidalgo Court
Garland, Texas 75043

Sponsored by

The Soaring League of North Texas

Pre-registration requested. AMA Sanctioned

TWO GREAT CLUBS SPONSORING ONE GREAT EVENT & TRADE SHOW

SECOND ANNUAL MID-SOUTH SOARING CHAMPIONSHIPS

The largest sailplane contest EVER held in the South will be held in
HUNTSVILLE, ALABAMA
Dates: 26 & 27 June, 1993

CLASSES: Unlimited Sailplane
Novice, Sportsman, Expert

AWARDS: 1st-5th both days
plus *HIGH OVERALL* all Classes

Juniors- Sponsored by RCSD: 1st - 3rd, both days only

COST: $ 15.00 1 Day/ $20.00 -2 Days.Jnrs: $6.00 1 day/ $10.00-2 days

Due to the anticipated attendance to this event, pre-registration & payment will be requested. For complete information, write or call:
Ron Swinehart (205) 430-0113 Day, (205) 883-7831 Evn -HSV
Rob Glover (205) 883-2988/HSV: Mike Kelly (901)756-9410/MPS
Bob Sowder (901) 757-5536/MPS

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NORTH ALABAMA SILENT FLIERS
& MEMPHIS AREA SOARING SOCIETY
AMA Sanctioned

EASTEX '93

SOARING CHALLENGE

MAY 1 -2
New Waverly, Texas

UNLIMITED
MAN on MAN (L-1)
6 Rounds EVERYONE,
Flyoff top 8 plus ties

ENTRY/ INFORMATION call:
Tom Jones, 713-363-3384
B&C Hobbies, 409-760-1986

Adv. Entry Deadline: APRIL 15
(free T-Shirts for first 25 entries)

2-METER
PRECISION DURATION (L-6)
4 Rounds, Flyoff top 8

CD, TOM JONES

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Please allow 4-6 weeks for delivery by Bulk & 3-4 months for surface.

Chuck with Swift 400, Alan with Chuperosa at north face, Point of the Mountain.

The Point of the Mountain

...by Chuck Auerbach & Alan Wasserman
Members of the Westchester Radio Aero Modelers (WRAMs), New York

For the past 4 years we have made pilgrimages to California for the sole purpose of doing some slope soaring. Here in Southern New York, we do not have (as far as we know) any cliffs, hills, or mountains which are bald or fuzzy-topped to allow us to land our craft with casual aplomb.

Our West Coast destinations have included San Diego (Torrey Pines), Los Angeles (Point Fermin, Bluff Cove, Hughes Hill), and San Francisco (Fort Funston, Coyote Hills, Mount Tamalpais, Stinson Beach, McClure's Beach, Sonoma Mountain).

Each of the above has intermittently fallen victim to one or more of the following detractions: public over utilization, nude beaches, over militarization, nude beaches, poor landing zones, fog, nude beaches, and the deadly wind ailments: WRONG DIRECTION and NOT ENOUGH. Imagine a 5 day flying vacation with less than an hour's stick time!

We needed something more reliable and we've found it.

The POINT OF THE MOUNTAIN, in Bluffdale, Utah is a 50,000 year old sand and gravel remnant of the shoreline of Lake Bonneville, rising a minimum of 350 feet from the valley floor. It is located just 20 miles south of downtown Salt Lake City. Winds are endemic to this area with a normal southerly prevailing in the morning, shifting to northerly in the late afternoon. To maximize flyability, nature built the Point in an east-west direction providing both North and South faces from which to launch. Winds range from 10 to 40+ mph. You can drive right up to the slope, mark your frequency and fly. There is plenty of flat, almost smooth area to land and a really nice group of guys. There is also a healthy crew of hang-glider and para-glider pilots who share the air.

We flew into Salt Lake City with 2 Chuperosas, 1 Hobie Hawk, 1 V-tail modified Rotor with three sets of wings, 1 V-Max with two sets of wings, 1 Impulse, and 1 Swift 400. These all fit comfortably into three double gun cases. The Shogun required its own custom carton. All gliders were checked through as baggage.

North face looking south, Point of the Mountain.

This particular Shogun is probably the most-traveled, least flown copy of Richard Jarel's creation. For three years, it has been carried from coast to coast with mere seconds of airborne experience. The 35 mph winds at the Point made the Shogun come alive. Mike Schow, one of the resident experts found the plane a handful but made it dance.

The local gentry include the members of the InterMountain Silent Flyers (IMSF) who are a joy to know. Bob Harman of B.A.T. (Basic Aircraft Tech Co-op) befriended us and showed us around his shop. He has some beautifully machined winch drums and winch mechanics with brakes and a new high-tech electronic winch control panel. A customized "New York Hay-Field" version of B.A.T.'s new turnaround is soon to leave the shop. It can only be described as sculpture. Bob also has wing cores and large scale and generic fuselages. Mike Schow has been helping Bob with some of his production.

"Red", Bob Harman, Terry Evans, and Alan at north face, Point of the Mountain.

Other members of the IMSF we happened to meet included: Arnie and Terry Evans, Mike Gibson, Dave Jones, Tom Lecheminant, Glen Bennett, Gary Larson, and a flying wonder named Russ. On our last day, Bob Champine of Newport News, VA arrived with a van full of assorted model aircraft.

The award for Philosopher-Sage of the Point of the Mountain has to go to "Red," who became our guide and stocked us with information about the local geology and meteorology, hang gliding in the surrounding Wasatch mountains, and, of most interest, life in general.

Our special thanks to Dave Barrett and the people at the M.R.S. Hobby Shop in nearby Sandy who provided us with assistance in making some unusual repairs. They run an exceptional shop with one of the best inventories we have ever seen.

We flew for six days. Wind speeds were in the 15-25 mph range for one day, 35 mph for one day, and 10-15 mph for the remaining four. Next year we plan to return a few weeks later in the season in anticipation of higher winds. Bob Harman has promised that weather permitting, he and Mike will take us up to Francis Peak (5000' above the valley floor). Until next year..... ■

IMSF FG/wing composite clinic.

Composite Clinics

...by Bob Harman
10424 Golden Willow Dr.
Sandy, Utah 84070
(801) 571-6406

We took a survey of all our IMSF (InterMountain Silent Flyers) members on areas of interest. The members wanted clinics on building composite fuselages, composite wings/tails, foam cutting & sheeting, how to winch your plane, setting up your computer radio & multi-task sailplanes, how to build your control surfaces - linkages - wing rods & joiners, slope flying. These were announced in our club flier which is distributed to hobby shops for the general public and through the mail for members.

We selected a club member to conduct the clinic in areas they excelled in. All were well attended by IMSF members and non-members (which included power plane pilots on the composite and control clinics). The pictures are of the fuselage and composite vacuum bagging clinics which were held in a member's garage.

We suggest this approach for any club. Not shown was a clinic on Mini-Mix and Thermal Sensor by Tom Hoopes, of Hoopes Designs. It is nice to have lots of local talent. Mike Forester has conducted clinics on hollow wing and composite construction. The success of the clinics depends on proper preparation with the time consuming steps already done and examples on hand. The clinics should emphasize the critical steps, only. Afterwards, clinic help is also offered by the demonstrators (i.e., where to get it [sources] and help in getting started). ■

Bob Harman with his first sailplane, Gentle Lady.

IMSF fiberglass composite fuselage clinic.

York Zentner's DC 600 1/4 scale all composite sailplane. Photo taken at the "Point of the Mountain", Bluffdale, Utah.

Below: Loren Mills "Parona" all composite 93", RG 15, fiberglass fuselage is very fast and versatile.

Mike Foresters "Hollow Wing" moulded 72" 2 meter. Flies great both thermal & slope.

Point of the Mountain Photos by Bob Harman

Tom Lecheminant's "50" 72".

Tom Hoops' "Coyote" is a "Mr. Mini-Mix" computer on board mixer for inexpensive non-computer radios. All his planes are immaculately built.

Gene Millerberg's "Hobby Hawk".

Lee Aston's "Condor" 8 foot tailless wing, all composite w/metal flake and out-of-the-bag colored and finished. Fiberglass fuselage.

Mike Schow's "Zen 116".

Dave Hansen's Falcon 880. He has three of them and a warehouse full of Comets and other quality sailplanes.

A Structurally Sound Hinge

...by W.D. Williams
Pendleton, Oregon

Last spring I decided to adopt a pull-pull linkage for controlling the rudder. That choice forced me to think again about how to hinge a surface. I'll describe a method that has some advantages for larger planes where structural weakness and excessive play in surfaces can result in flutter and the loss of a plane. Understand that I am following in the footsteps of "Yule Buster Upgood". See his account of "Teaching Yourself to Slope Soar". (July 92 *RCSD*) Slope soaring has a tendency to expose structural, and other inadequacies.

However carefully it is done, cutting a slot in a surface to insert a hinge creates concentration of stresses which in effect paints an arrow on the surface saying, "Please, break here." Film or tape hinges are superior in spreading the load. However, I didn't think a tape hinge would be a good combination with pull-pull linkage. (Now, I'm not so sure that this is necessarily true. Perhaps with the right tape the two methods might work well together. At the time I didn't think so.)

I thought about the hinging methods used in aircraft. The steel tube tail surface often used on homebuilts is similar to a spruce and balsa ladder frame. With steel it's easy to transfer loads. You can make a hinge by welding a thick wall tube to the rear of the fin and the front of the rudder. A couple of these welded on tubes are connected with a pin. Thinking about it, it occurred to me that I could do almost the same thing using different materials. Tack glue short lengths of small diameter tube (K & S distributes tubes and matching solid rod which nest) to a spacer on the rear of the fin and front of the rudder. Epoxy a layer or two of fiberglass fabric over the tube lapping it over the fin and rudder spars to handle tension loads. (See diagram.)

Now, after severely testing such a hinge in hard use in three planes and in sixty hours on the slope, I'm satisfied that the configuration is as good or better than the alternatives.

1) The combination of pull-pull wires and the hinge provide accurate centering, freedom from slipstick friction and the resulting double neutrals. As long, that is, as the wire used as the hinge pin is not bent. When the wire has been bent, I've experience some mild problems with double neutrals. But, replacing the wire has always cured the problem.

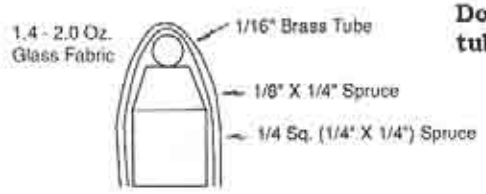
2) The configuration is durable. I've broken the nylon coated steel Proctor wire, the half-A nylon hinges, and bent the hinge wire, but the hinges themselves and their mounting to the structure have come through undamaged.

3) The cost is minimal.

4) In combination with the pull-pull linkage the weight behind the C.G. is low.

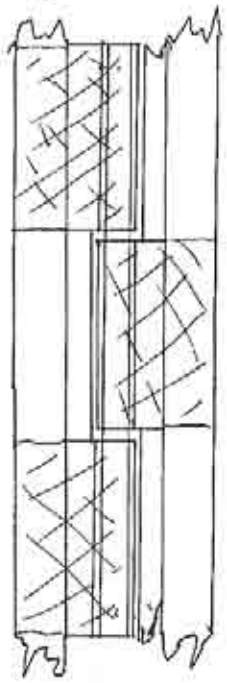
5) The hinge has two disadvantages that I can see. The hinge line is not sealed. I've installed the hinge with as small a gap as I can fit and let it go, but mylar shrouds might be installed. The main drawback is the time it takes to install the hinge. However, I don't consider the extra time excessive. For my purposes, especially on the slope, the extra time required to do the job in a structurally sound way ends up saving time by avoiding time spent later in repairs.

In constructing the hinge, as usual, care must be exercised to maintain alignment. After tack gluing the brass tubes to the fin and rudder test the alignment by inserting the hinge wire and checking for free movement. Getting the fiberglass tape to wrap around the hinge without voids is a problem. The fiberglass has to, in some way, be forced against the tube and spars. Measures must also be taken to keep the resin out of the tube. (I haven't tried it but I suppose cyanocrlic could be used to attach the fiberglass tape.) The method I've used is to first cover the



Door-type hinge reflects 3 brass tubes.

outer ends of the tubing (about an 1/8 inch) with electrical tape or something similar. Then I wet the fiberglass fabric out making sure it is fully even some what sloppily saturated. At this point, if you try, you will see that the fiberglass won't wrap around the hinge and stay down. Using thin cloth and cutting the fabric so that the threads run at a 45 degree angle as it goes around the hinge helps, but doesn't solve the problem. To force the glass against the tube and spar, I use a strip of thin peel ply cut long enough so that I can pull from both sides while a third hand holds the structure. I use a dacron sold by Fabric Land under the name "Hang Loose". It's intended for use as a lining for suits. You probably would have trouble with the fiberglass coming apart if you tried to pull it tight, but it is possible with the tightly woven peel ply layer. When I've pulled everything into contact, I clamp the whole mess together and leave it until the resin is cured. Masking off the rest of the structure might be worthwhile to protect it from stray resin. Excess resin in the glass fabric is forced out through the pores in the peel ply. When clamping, all that's necessary is sufficient pressure to generate enough friction to maintain the tension holding the glass in tight contact with the hinge. When cured to a stiff but not entirely hard state, the peel ply layer is ripped off. Excess glass overlapping the spar is trimmed with a sharp razor. After the resin has fully cured to a hard condition the glass which laps over the protective tape is sanded down and the tape pulled off. I use a colored rather than a transparent tape so I can see how I'm doing while sanding down the edges



of the fiberglass.

There are any number of variations on the use of a tube and pin hinge strapped to a structure with fiberglass. In the future, I plan to try hinging flaps and aileron on foam and fiberglass wings. To avoid some of the fussiness in the method described above, a 12" length of tubing could be bonded to a spruce strip using a vacuum bag or a press to hold the glass in contact with the tube and spruce. Then the assembly could be cut into short lengths and attached to a surface using small patches of fiberglass on the sides. I haven't tried this yet, but I'm confident that it would be structurally sound and less trouble.

I haven't experienced radio problems, however if there's an objection to the metal to metal contact in the hinge, a larger diameter tube could be used with a nylon rod as the pin. The nylon pin might also increase the hinge's capacity to withstand shock. ■

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