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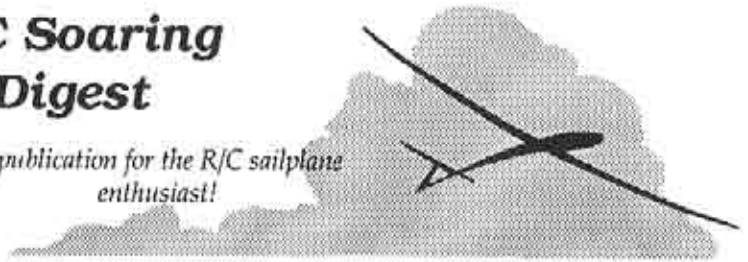
R/C Soaring Digest

A publication for the R/C sailplane enthusiast!



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

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The Soaring Site

About the Cover

The cover photo was sent in by Cordy Stahl of Milwaukee, Wisconsin. He says, "Pictured is my son Derek (15!) on Wisconsin's "Mega" slope in Platteville, Wisconsin. Thought you might like to highlight the "next generation" some."

Weather Reports

The following note on obtaining weather information was received from Ted Off of Oxnard, California.

"In the July issue, George Siposs suggests calling the tower service (ATIS or automatic terminal information service) at an airport for wind direction and magnitude. A few comments: This number can be obtained from the FAA in your area. Then, airports and pilots use a magnetic compass, so wind directions are stated from magnetic north, not true north. Thus, in Orange County, California, one must add 18 degrees to the stated value to obtain true wind direction.

"There are a couple of other things in this transcribed information that also could be of help to a R/C glider flier. Air temperature and dew point are usually given. Outside of telling how hot it is at the airport (This is being written during a heat wave in Southern California.), the difference between the two divided by 5.4 is the approximate height of the cloud base in thousands of feet. And, of course, if they're too close together, the fog will probably roll in before you get out to the flying field.

"Then, barometric pressure is given in inches of mercury. This might be of value in trying to guess when the weather might get better (or worse).

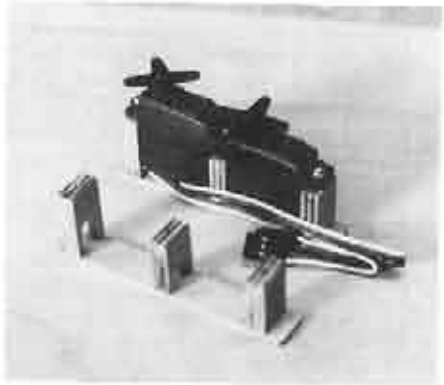
"As a pilot, I hate to call this number and find it busy, so don't call unless you need the information."

Happy Flying, Jerry & Judy

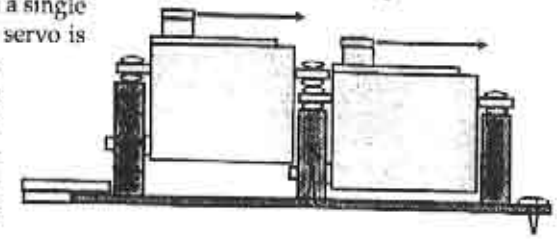
My Micro-Mount

...by John Lightfoot, Editor of the Southern Soaring Club newsletter, *Southeaster*
Rondebosch East, South Africa

(The sketch and photo of John's "micro-mount" show how to "fit a pair of micro servos in a slim HLG fuselage using just one screw"!)



Between the photo and the sketch it should be self-explanatory except for the assembly and installation. The two end "pillars" are glued to the base, leaving about 6 mm of base protruding beyond each pillar. The central pillar is removable and is held by a pair of very small wood-screws upward from the bottom. The two servos are mounted on the central pillar with a single screw. The lead from the higher servo is then fed through the high pillar, the combination is swung onto the base and the end servo screws and the centre pillar screws are installed. A ply step under the battery is enough to anchor the front end of the mount while a single self-tap screw through the rear lug into a ply insert in the bottom of the fuselage holds the whole assembly firmly in place. ■



The Eighth National Sailplane Symposium

October 24 & 25, 1992
Ramada Inn, Madison, Wisconsin
...from Al Scidmore

(From 1983 through 1989, the National Sailplane Symposium was held each fall in Madison. The 1989 meeting featured the Selig, Donovan, and Fraser team describing their research, the results and the application to soaring.)

The Madison Area Radio Control Society (M.A.R.C.S.) has heard your requests for another National Sailplane symposium and so the eighth Symposium will be off and flying on the 24th of October. We have a terrific faculty and a really fine program covering a wide variety of interesting subjects. This year's Symposium will closely follow the format of the past meetings with an opening trip to the EAA Museum at Oshkosh on Friday, the 23rd, leaving the Ramada at noon. Gene Chase will take us on a conducted tour of the facility. Gene is an aviator of vast experience and will be our banquet speaker on Saturday evening.

The faculty this year are an outstanding group. Walt Good will discuss Frequency Analyzers, Terry Edmunds and Steve Metz will compare full-size sailplanes and model sailplanes, Al Doig — newer kits and construction methods for the average modeler, Maynard Hill will tell of his recent world record attempts; Lee Murray, Dave Beck and Al Scidmore — sailplane telemetry and instrumentation, Steve Neu — Electric Sailplanes and the Electric World Championships, Martin Simons on aerodynamics, George Sparr on composites and their use, Professor Roland Stull on Meteorology for model sailplanes, Tim Renaud will give the latest on computer radios, and Peter Waters will give a Muncie update.

The ladies threatened to hold their own symposium so that they could have another "Teddy Bear Clinic" and Dolly Wischer has graciously agreed to do it again. Please contact Dolly direct for information: Mrs. Dolly Wischer, S221 Lapham Peak Road, Delafield, WI 53018; (414) 646-2406.

For those who come in early, the EAA trip will start from the Ramada at noon on Friday followed by the usual Early Bird get together at the Ramada on Friday evening, a chance to tell and hear tall tales of past achievements by some of the "world's greatest sailplane flyers". Then, early Saturday morning registration will start at 8 A.M. along with the usual coffee and doughnuts. Walt Good, our traditional first speaker will start at 9 A.M. and will be followed by a new speaker and a new subject every hour. We will lunch at the Heritage House next door (included in tuition) and then return for an afternoon of stimulating talks and discussion. Saturday evening we have a banquet at the Ramada (optional) and Gene Chase will entertain us with his wide experiences in full-scale aviation. Sunday morning we start early with the table clinics and show and tell, followed by more talks and discussions, winding up at 3:00 P.M. All-in-all, a full weekend of good fellowship with some of the finest people we'll ever know. Plan now to join us.

The fee is $20.00 (includes Saturday lunch). The Ramada Inn is in Madison at 3841 East Washington Ave., Madison, Wisconsin 53704; (800) 356-7476 or (608) 244-2481. Motel 6 (3 blocks east of Ramada) is at 1754 Thierer Road, Madison, WI 53704; (608) 241-8101.

For information, contact Co-Chairman Carl Mohs, 5024 Lake Mendota Dr., Madison, WI 53705; (608) 238-2321. Or, Al Scidmore, 5013 Dorsett Dr., Madison, WI 53711; (608) 271-5500. ■

Flying in Wind and Weather

...By Martin Simons

13 Loch Street, Stepney,
South Australia 5069

The morning calm

If the general weather pattern is one of gales, or even hurricanes, a windy night is likely to be followed by a nasty morning and model fliers stay at home. The same with general rains, large storms and other major disturbances. But on days when model flying looks possible and often even when fairly strong winds are forecast, in the early hours the air over level ground is often quite still or moving very gently. Not every such day begins calm but a great many do. Getting out early then has its rewards if calm air is required. Balloonists usually take off, and land, very early. Inflating, taking off and landing in a balloon in strong winds is difficult and dangerous. Evenings also tend to be calm. Balloons may well be flown in almost still air towards dusk.

The early riser opening the bedroom curtains or blinds may notice clouds moving overhead. Middle and low level clouds are useful as wind indicators when we are in doubt about how the day will develop. Clouds are suspended water droplets, or sometimes fine ice crystals. They are part of the river of air which happens to be visible. There is usually some wind a few score or a few hundreds feet above the ground. Perfect calms at these heights are rare although they can occur. Hill tops will often be breezy while on the lower ground hardly a leaf stirs. This can be important for hill soaring, since a windless morning at home does not necessarily mean there will be no breeze on the soaring slopes. Cirrus clouds far above indicate the direction of jet stream winds at very high levels, but they have more to do with the weather we shall have tomorrow or next week, than with operations today.

Very often, even when the clouds are moving quite rapidly, there is no early morning breeze at all in the local trees, or only a very slight motion. On arriving early at the flying site and erecting a small, light windsock, some sluggish movement of air will be discovered but it may be in a very different direction from that indicated by the clouds.

The main cause of the calm is the cooling of the lowest layer of the atmosphere during the night. The air is both warmed and cooled from below.

The sun's rays, which are of short wavelength, pass through the air relatively easily without heating it much. (Certain wavelengths are filtered out. The high level ozone in the atmosphere, for example, removes much of the harmful short wave radiation, which is why depletions of the ozone are causing concern.) If the sky is clear, the ground receives a great deal of energy and heats up during the day. If heavy clouds cover the earth, the cloud tops reflect some of the sun's radiation back into space, but some light and heat get through even on the gloomiest day.

The ground passes some of its warmth to the air by direct contact but the ground radiates heat on long wave lengths too, which directly warms any water vapour in the air. There is always some moisture in the air, even in desert regions, so the long wave radiation from below helps to raise the general air temperature near the ground.

As the sun sets, the rays strike the ground at more oblique angles and their heating effect is lessened. The ground begins to cool as the evening draws on. This cooling in turn affects the air near the ground. The air low down cools as the earth does. Clouds above, if any, reduce the rate of cooling, somewhat like a blanket, whereas clear skies at night are often very cold, even frosty, since nothing prevents the escape of heat into space.

If the general weather pattern changes to bring a mass of warm air into the district from the tropics or the desert during the night, the general temperature will rise but even so the hot air moving in over cold ground becomes somewhat cooler in the lower levels. The reverse can happen; a burst of cold air from polar regions, or a katabatic wind from ice-covered mountains, may alter the pattern on the large scale but still the low level air at dawn tends to be cooler than that immediately above.

The temperature inversion

On the large scale of the general atmosphere, the temperature falls with height above the ground, but night time cooling near the ground causes a temporary reversal, called an 'inversion'. The air temperature actually increases with height for some distance, cold near the ground, warmer at some relatively small height.

On the right hand side of Figure 22, a typical early morning graph of temperature against altitude is sketched. Meteorologists usually measure air temperatures at the height of the standard *Stevenson Screen* instrument housing, four feet above the ground. Night cooling in this example has produced a temperature of only 2 or 3 degrees C at screen height. Below this, the temperature will usually fall further. The grass will probably be wet with dew at dawn and there may be localised pockets of frost. Cold air is denser than warm, so there is often a general flow and settling of the coldest air into low lying places. (Fruit growers may protect their plants with smoke pots or try to drive the cold air away with engine driven fans.)

As the thermometer is raised to higher levels, the temperature rises. In the example of Figure 22, it reaches 15 or 16 degrees C at about 1500 ft. Anyone who has ever flown in an open cockpit aeroplane or glider in the early morning may have become aware of this in the most direct way. The air on the face a few hundred feet above ground, on a typical morning, will actually be warmer than that felt during take off.

Above the inversion the normal drop of temperature with height prevails. There may be higher level, large scale inversions caused, for instance, by a warm air mass riding up over cold air, forming a 'warm front'. This indicates a major weather change coming, probably with rain, which may affect model flying prospects tomorrow or later in the week. It is not relevant to the immediate argument.

The effect of the morning inversion is to create a marked division in the atmosphere. This is often visible without instruments. For instance, over a city the inversion tends to trap smoke, car ex-

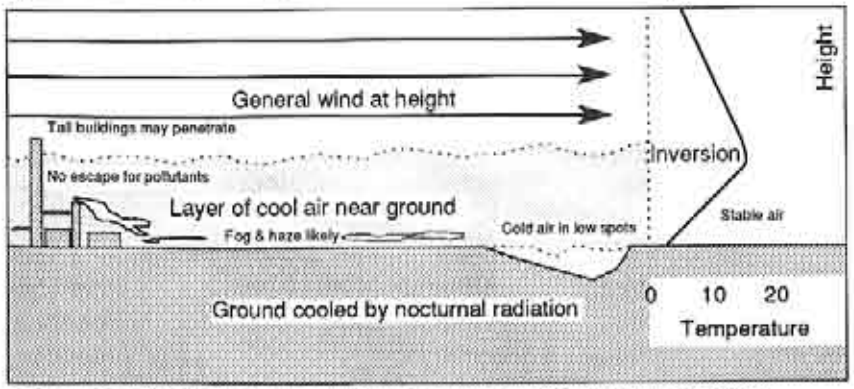


Figure 22 Early morning temperature inversion

hand at all times. Upon arrival at the beach house we unpacked, turned the dining room table into a modeling bench and then headed for town. We each bought a case of our favorite beer, a bag of avocados, some salsa, chips and other goodies. That night we charged up, pored over the map and made our planes ready.

Saturday morning was as gray and overcast as it has been on the California Coast all summer. There wasn't a hint of wind until 11 am. We decided to take the free road (Highway 1) down to Ensenada instead of the toll road (1-D) so we could examine the possibilities along the coast and where the highway turns inland. At La Mission the free road breaks away from the coast and climbs 2,000 feet before dropping back down to the coast and Ensenada. (The cliffs that the road runs next to there looked great, but we couldn't find access to them without trespassing on ranch land.) Then, on Sunday, we would hit places I had seen closer to home. We figured that by the time we got to Punta Banda it would be around 2pm and the afternoon sea breeze should make for some fine flying.

Trying to make sense of all the jumping around we did for two days would be hard to record and harder to read, so rather than telling you about the sites we tried in chronological order I'll take them in a North to South order. On the free road and the toll road from Tijuana to Ensenada there are Kilometer markers which give you the distance you've traveled South from Tijuana. For example, our beach house is near KM 27, Rosarito is at KM 33. These markers are very helpful in locating some of the more rural (more like desolate) sites we found.

Points South

The Sand Dunes at Cantamar.

Located off the free road at Km 46, the sand dunes here are very big and stand out quite easily from the dusty brown coastal terrain. If you can only spend a few hours across the border from San Diego, the dunes are where to do it. South on the free road from Rosarito you pass endless curio stands, the conspicuous arch at Popotla and a number of new condominium projects. Cantamar is a dusty strip of village that lines the West side of the highway, and getting to the parking and camping area of the dunes requires a severe U-turn back up the dirt road in front of the businesses of Cantamar. Turn left down another dirt road and you will see the entrance to the dunes. The owner wants $3.00 for you to park or camp there which may seem unreasonable, but your car will be safe and I wouldn't advise parking along the highway and leaving your car unattended. If you have a 4 wheel drive vehicle with the appropriate tires you can drive out onto the dunes. But be warned! The sand is deep, very soft and slippery. There are many spots suitable to fly from out on the dunes, along the cliff above the shore line, or further back on the high dunes. My favorite spot was not on the highest dune but on a very steep one mid way back from the shore next to a old barbed wire fence that runs East to West through the middle of the dunes. It had excellent lift and didn't require too nasty a walk to get to. Although the ocean breeze is quite cool, the sun and sand are extremely bright and warm so bring plenty of sun block, a hat, sunglasses and something to drink. Slope soaring sand dunes is different from cliff soaring. The lift seems to have more depth and is smoother. You can fly down the side of the dune, inches from the sand, pull up and regain altitude easily. I chased my 6 year old son around this way until he was exhausted. The best thing about dune flying is landing. The soft sand cushions a fast or hard landing and you can land anywhere you wish. On the down side is walking in it and getting it out of your plane, particularly if you have tape hinges on your control surfaces. We flew at the dunes as early as 11 a.m., but the afternoon winds are best.

You can't miss this building on Punta Banda. Give this man a dollar, and fly all day.

The free road South of Cantamar

At several points along the free road south to where it turns inland at La Mission there are flyable cliffs facing the ocean. We stopped at many but could not find one with all the necessary ingredients of a good slope site. Either the cliff face was too short or eroded, or the landing area was too marginal. We did pull off the road near Punta Mesquite at the ruins of an old building that had a cliff so sheer and high that your heart stopped when you peered over the edge. The wind was very light, but the high cliff still held Dale's Questor up for a test flight. Landing there would be rough on anything but the smallest slope planes. Rocks, cactus, and knarly chaparral cover everything but the narrow dirt road. Still, with a decent wind it might be worth it if you don't worry about your plane going down. There is absolutely no way to recover a model if it went down to the rocks below. This may not be a prerequisite for many of you, but with the abundance of heart stopping cliffs we became a little more picky.

Punta Salsipuedes

This location could also be called "Casa de Cruz". It is just south of the point and requires another hair pin turn off the South bound Toll Road. Slow down after you pass Km 86 and are descending from the high part of the point. There are no signs, only a widening of the shoulder as the dirt road down to the flat area below joins the toll road. The dirt road runs back parallel to the highway and down to a expansive plateau between the toll road and the sea. You'll pass gated roads leading toward the ocean, but don't turn until the fence ends and the road turns to the coast. We were very conscious of trespassing and never went through property without getting permission or paying a fee. In this case a cold bottle of Dos Equis made us fast friends with Cruz, a local who claimed to own the land we flew from. There were other travelers there who had stopped to picnic at this scenic bit of coastline. We were able to park the van about 20 yards from the cliff and had all our planes in the air within minutes. It should be noted that this is a South facing cliff and shouldn't be bothered with when the wind is blowing in its normal Westerly direction. We were lucky for a while, but an abrupt wind change sent us scrambling for the edge. With a "Adios" to Cruz we went on our way.

Punta Banda

The most distant slope area we visited was at Punta Banda. It's located about 20 miles South of Ensenada on highway 23. This is as far south as you can go without a visa or tourist card. Follow the road signs to La Bufadora, a small tourist trap at the other side of the point. At La Bufadora there's a blow hole that shoots sea water high into the air when the waves come in at high tide. Unless you wish to see the "snort of the bull" or run

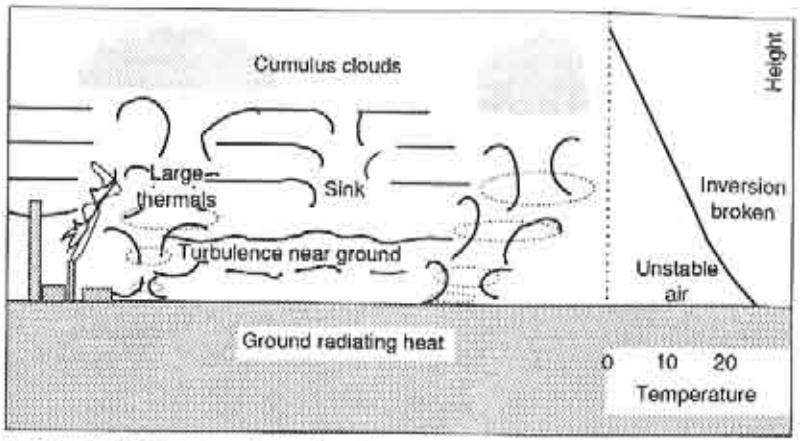


Figure 24 Inversion broken

launching direction or runway in the early hours, glider fliers often find themselves exasperated by these unpredictable changes. Every now and then a thermal breaking away can cause quite a strong breeze to blow from an unexpected direction for a few minutes. By the time the launch direction has been changed to suit this, the wind has died and a new zephyr may be blowing. A little way up, the 'sandwich filling' air remains much as before, but above this again the main atmosphere moves along in its general way, different again.

Breaking the inversion

At last, and sometimes not till the afternoon, indeed, sometimes not at all, heating brings the lower air to such a temperature that the inversion is 'broken' (Figure 24). All the air that cooled during the night, has been warmed to such an extent that there is a fairly continuous drop in air temperatures with height. The air was stable previously, now it becomes unstable. Any thermal that starts, although still itself cooling 3 degrees C for every 1000 ft as it rises, will meet no layer of air warmer than itself and will continue upwards, perhaps forming a cumulus cloud when the water vapour it contains condenses. Full-sized soaring contests often cannot be started until the inversion has broken, by which time fliers of model gliders may have been enjoying themselves under the inversion for hours! (More will be said about thermals in a later article.)

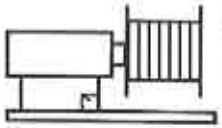
The hot air from below now finds its way upwards into the whole mass of air, so modifying it. Dust, pollution and smoke also can now rise into the higher atmosphere. In complementary fashion the upper level pressure pattern and wind now extend their influence down to the ground. The pool of low lying cold air has been warmed up and carried up into the general circulation. Wind direction and strength at the model flying site is thus likely to be closer to that expected from the general weather map for the day. The general stirring of the air produces a good deal of turbulence at circuit flying heights, with all the consequences this has for models in flight (Left side of Fig. 24).

It is also at this time of day that, in regions near the coast, sea breezes will begin to develop, cool air coming in off the water to replace the rising warm air inland. Often there is a distinct 'front' where the cool sea air cuts under the warmer land air and lifts it, possibly producing distinctive lines of ragged clouds. The model flying field that comes within this influence may experience a sharp change of wind direction and strength and a drop in temperature as the sea air comes through. There is no guarantee that such a front will behave predictably. It may easily shift back seawards to come forward again later, thus causing several changes of conditions at the flying field. Late in an afternoon a sea breeze front may have moved in a surprisingly long distance, so again changing the local wind direction to something different from the general pattern.

As the sun goes down

As the sun sets the land steadily loses its heat and gets colder. The lower atmosphere chills. At dusk the inversion tends to re-form and strengthens through the night, especially if there are no clouds and the radiated heat is free to escape.

If there is any high ground nearby, local katabatic winds may form and cause yet another local change of wind direction in the evening. Cold, dense air pours down slopes, concentrating, somewhat like a water stream, along deep valleys, to rush out from their lower ends in directions determined more by the shape of the ground than by the general weather pattern. Such effects are very common in all hilly and mountainous districts and along foothill zones. Eventually, the bulk of the cold air reaches its resting place, the katabatic breezes fade, and the morning finds all calm again. ■



Winch Line ...by Gordon Jones

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

Composite Wings Part 3

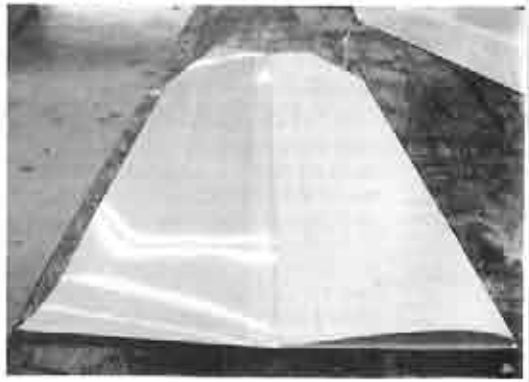
With the layup of each wing decided, we will move to the construction phase or where the rubber meets the road as they say. The first order of business is to prepare all the support pieces for the bagging process; this includes getting the bags ready, preparing the mylar and cutting the cloth to size. I am going to assume for sake of this discussion that the builder already has a vacuum pump set-up and it is ready to go with switches and hoses in place. If not, there are several available from the composite distributors that will fill the bill.

The bagging material that I use is the standard bags from Composite Aircraft Engineering, the Sucker Kit folks. It is 4 mils thick and just the right size for the wings that I work with. Plus, it comes in 10 foot lengths by 16 inches wide in a tube shape so that I can cut it to length and have enough for several wings thus cutting down my bag costs some. The tube configuration also means that I only have to worry about sealing the ends rather than having to seal a long side as well. This equates to less chance for leaks which is an important consideration.

With a vacuum bag there are many ways to "wick" the bag so that the air gets pulled out and the bag sucks down in a uniform fashion. There are several wick materials that are available from the composite dealers like CST or Aerospace Composites. Personally, I use a layer of paper towel cut length-wise under the cores with a layer of waxed paper between the core and the bag. This method is easy to use and provides sufficient wicking to get the air out. To make the installation of the "wick" in the bag I tape the towel to the waxed paper and then just slide it into the bag using the end of the core.

During the course of this project I did some experimenting along the way, trying new techniques and products. One item that I found to be most useful is a bag clip from Aerospace Composites. This handy gadget allows you to leave the bag open on both ends until the core is in position, and with the process not going exactly the way you would like at times, this is a handy feature. Aerospace also has a valve setup that fits into the bag as a permanent fixture that allows you to use the bag clips at both ends of the bag. With the clips I have not had a leak and they have saved a great deal of time and aggravation.

The next item on the agenda is the mylar for the "sandwich". Most folks I have talked with or read about use 1 4 mil mylar as it is strong enough to withstand the bagging pressure and retain the proper shape. Mylar is available from a number of sources, but can usually be obtained from a local graphics or plastics distributor. Here in Dallas, A-1 Plastics fills my needs very nicely and I can get it when I need it, too. Be sure you get enough for the planform of the wing you are bagging.



The mylar has to be cut so that you have two pieces that cover the core like when you are sheeting a wing with balsa or obechi. That is, it must come together along the trailing edge line where it is joined (with about a 1/8 inch gap) with masking tape or duct tape. The leading edge, allowing for the length of the core at the trailing edge, should come to the very front (leading edge) of the core or just a little past it.

Use the core to mark the mylar for cutting and use a felt tip pen to mark the cutting lines. Be sure to roll the core some when marking the piece for the top of the wing as it is somewhat larger than the bottom. A note of caution here; cut the mylar with scissors do not use an x-acto knife or razor blade as the knife will leave a ridge along the edge of the mylar that will show up when the wing is bagged.

There are several methods that are used along the leading edge of the wing to alleviate voids and provide good strength. Some folks allow about a 1/4 inch between the leading edge and the end of the mylar so that the mylar is just short of the leading edge. Others prefer to have the mylar end at the leading edge of the core while others cut theirs to go over the leading edge a little bit. I have used all three and have found that with the mylar at the leading edge or a little over the leading edge you avoid voids and have less sanding to do once the core is bagged. This will also depend on how you are doing the layup.

When the mylar has been cut to the appropriate size a release agent needs to be applied to the side that will receive the cloth. There are several options (I keep saying that don't I.) for a release agent to not adhere the cloth and mylar. Mold release agents are available in both spray and liquid form and can be obtained from any number of sources; again, the composite distributors can provide what you want. Personally, I use good old car wax; it make an excellent release agent and is cheap. If you want to paint the wings in the bag, a Carnauba wax (or pure wax) is required so the paint will release properly.

The paint-as-you-bag technique requires a little more time but saves a lot of the filling and painting later on. First, apply a release agent or Carnauba wax on the mylar and let it dry. Then, buff out the wax and apply a couple more coats in the same manner. When the wax has dried take each mylar panel and spray on a high tech paint. (Krylon works very well and it is cheap.) Multiple colors may be applied by masking the area that will have the base coat and painting the outer trim colors first; then, after this is dry, unmask and paint the base coat. Allow the paint to dry and then join the mylar panels with tape.

Now for the cloth. I find it easiest to cut the cloth as if I am laying up the wing (i.e., I cut the light outer cloth first then move to the subsequent layer(s)). This includes any carbon fiber or glass that will be used for particular areas, as well. Cut the cloth that will go over the entire wing leaving about three or four inches of excess all the way around. An easy method of measuring the panels is to lay the mylar down on the cloth to be cut and use it as a guide. But whatever method you use, be sure to leave the extra cloth. You don't want to have the cloth not covering the whole core.

After I have cut the major layers I then cut any reinforcement pieces that may be needed. I will usually cut the carbon fiber that I am going to use as the spar system or the spar cap first; then, move to some squares for over the carry through area to reinforce it for launches. In addition, I have started cutting strips for the leading edge to avoid voids and strengthen the leading edges. This piece will go over the leading edge wrapped around it back about two inches.

Prior to starting the actual bagging process, take a minute to run down a mental checklist of the required items that have to be ready. Are the pump and hoses ready? Are the bagging and wicking material ready? Is there an area set aside to put the bag and pump? (This is something that is sometimes forgotten.) Has the mylar been cut to the correct size and are there a right and a left? Is the glass/carbon fiber cut and separated into piles for each wing panel? Is there a sufficient quantity of resin ready? Don't forget something to mix the resin in. (I use cat food cans.) Plus, don't forget some

alcohol and paper towels for cleanup at the end of the bagging.

Another item that has come in very handy is a board to do all the glass work on as opposed to a table or newspapers. It doesn't move around and a little wipe off and sit it in the corner to dry until next time. Plus, once there is a big build up you can run an electric belt sander over it to clean it off.

Next we will finally get down to bagging the wing. ■

Gliding in Zero-G - The Results

...by Pete Young
6592 Belgrave Ave.
Garden Grove, California 92645

BACKGROUND: In the May 1992 issue of *R/C Soaring Digest*, Pete recounted some hand launch glider experiments conducted on board the Space Shuttle. Readers were challenged to submit answers to the following test questions:

A. For 25% credit, the student will describe how an airplane will fly in air, but with gravity absent.

B. For 75% credit, the student will derive the two dimensional equations of motion for the situation described above.

C. For 15% extra credit, the student has the option of describing the "zero-G" airplane's flight path in three dimensions if launched in a climb attitude with a yaw offset.

After sorting through all the entries received to the test, I have determined that two entrants merited co-equal first place awards. The winners are:

Ed Jentsch, Rockville, Maryland
John Lightfoot, Rondebosch East, South Africa

The "school solution" is as follows:

PART A. John Lightfoot's response is concise and accurate. "The wing will generate lift ... this will cause the wing to "climb"... (and) the plane will thus fly a loop - but, although there is no gravity to oppose the lift, there is still drag opposing the forward motion, so the plane will slow, creating less lift and causing the loop to 'open out'. Thus, depending on the lift/drag ratio, the loop will not finish quite where it started and the plane will follow a spiral path outwards."

Part B. Starting from first principles, the derived flight path equations of motion are given by the following expressions: glider's velocity V = Vo EXP (-Cd Rho Sw X / 2 M)

Vo = initial velocity
Cd = drag coefficient
Rho = cabin air density
Sw = reference wing area
X = distance along flight path
M = glider mass

GAM-DOT, rate of change of the flight path angle = K2 Vo EXP (-Cd RHO Sw X / 2 M)

where K2 = RHO ALPHA-TRIM (CL-ALPHA Sw - CL-ALPHA-T St) / 2M

and ALPHA-TRIM = wing trim angle of attack measured from zero lift coefficient angle of attack

CL-ALPHA = slope of the wing's CL vs angle of attack curve

CL-ALPHA-T = slope of the horizontal tail's CL vs angle of attack curve

St = horizontal tail reference area

As summarized by John Lightfoot in Part A, the glider's flight path is an expanding spiral in a plane normal to the wing while the velocity slows exponentially. The full derivation of these expressions will be sent to anyone who requests it. Please enclose a SASE.

PART C. If launched at an offset angle to the floor, the resulting flight path is an expanding spiral helix. The glider's velocity and angle of attack will be similar to the two dimensional expressions derived above.

Postscript: congratulations to John and Ed - their entries showed lots of diligent effort. A copy of the analyses, and a souvenir from the STS flight during which these tests were performed, is being sent to them. Both gentlemen will also receive an extension to their *RCSD* subscription. ■

on the Wing

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Olalla, Washington
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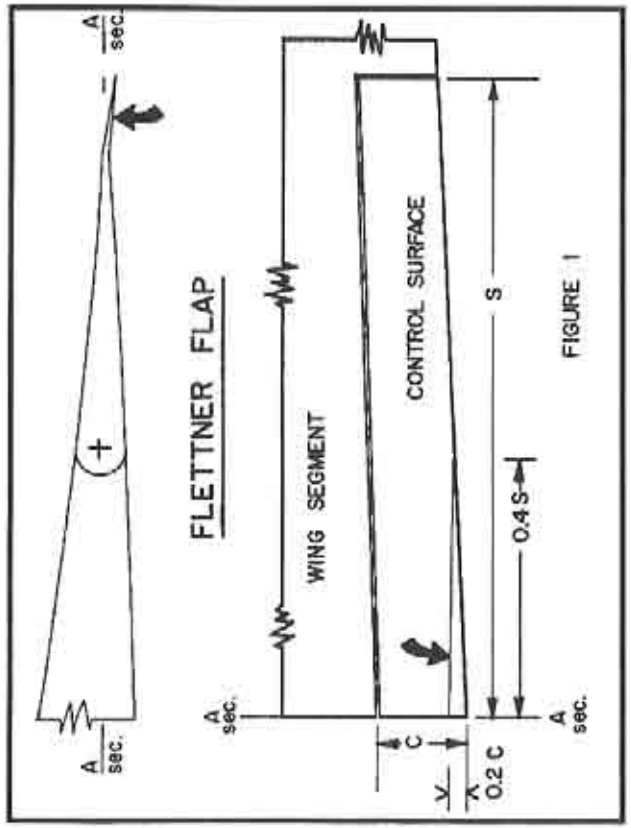
The Flettner Flap

One of the side effects of reflexed airfoils is a substantial down force on any control surface mounted near the trailing edge of the wing. This is caused by the reflex itself, and is indicative of the down-load which makes the airfoil dynamically stable once the CG is properly located.

At high speed, this force can easily overpower a servo, thus reducing the reflex. With less down force at the trailing edge of the wing, the sailplane pitches forward and steepens its glide angle. A vicious cycle then ensues, with greater speed, even larger loads on the servo, greater reduction in the reflex, and an ever steeper plummet to the earth. If the pilot realizes what's happening, remains calm, and has the intestinal fortitude to push forward on the elevator stick, an outside loop may be possible before contact with the ground occurs.

We first heard about the Flettner flap through *The White Sheet* "Flying Wings Special", Sean Walbank, Editor, where it was seen on Dieter Paff's 9N9f design. Dieter had lost three models due to overloaded elevator servo prior to incorporating it into the design. We have since seen its use on several tailless designs, both full-size and model.



The Flettner flap is a simple mechanical device which reduces the down load on the control surface by acting as an aerodynamic balance. The size of the Flettner flap should be directly related to the size of the control surface as shown in the diagram.

As you can see, the flap is not large. Its effect on overall drag is probably negligible. An additional bonus - it can usually be installed as a retrofit on an existing design.

Whether or not you install a Flettner flap on your design, remember to always arrange elevator servos and control linkages to PULL for UP! ■

Carving Helical Pitch Propellers

...by Bill Kubiak
Minnetonka, Minnesota

In this article on carving helical pitch propellers, I'll give the method for carving any size and pitch propeller and at the same time will give an example for one propeller to illustrate the method.

I learned this method of carving propellers with helical pitch from Fred Youngren when we were both in Los Angeles in 1947. (We needed a lot of propellers when we were flying free flight.) When I first got into electrics in 1978 there wasn't much information available about propellers for electrics, especially geared or belted versions, so I carved a whole family of propellers before I found the best diameter and pitch for my motor and model.

I believe everyone should carve at least one helical pitch propeller, if for no other reason than to see how the helix is developed on the back side of the propeller. This will help in evaluating store-bought propellers.

I view propellers as frangible fuses that break before the motor burns out. I have carved propellers for direct drive 05 motors running in the 12,000 rpm range out of pine, spruce, mahogany, basswood, aspen (poplar) and maple. I prefer aspen or white pine. The others are too grainy or too hard. All of the propellers for belt drive 05 motors running at 5,000 rpm or so have been carved from balsa. The balsa ranges from very soft to firm/hard.

Despite popular legend about the need for great strength in propeller blades, I have never had a balsa prop fail from flight loads when used with an electric motor. Even the softest balsa, which has been so soft that it's almost impossible to carve, has held up to flight loads.

On impact, the soft balsa shatters with nice clean breaks across the blade. I pick up all the pieces and Hot Stuff® them back together, sand off the rough glue, put a coat of sanding sealer on the light blade, sand the whole propeller down a little, and I'm ready to go again. The hard/firm balsa tends to splinter when it breaks. The splintered ends are difficult to put back together again, so I have quit using the heaviest balsa for propellers. Most of the balsa I use now is about midway between soft and hard. It carves nicely, takes a good finish with minimum work and breaks clean.

Despite the fact that I have a Shopsmith®, I don't use power tools to make propellers except for the prop-shaft hole which is done on a drill press. I prefer to carve propellers with a jackknife. I have a Case® jackknife that has a large handle for a comfortable grip, and a long straight blade (about 3 1/2" long by 1/2" wide). I sharpen it on a smooth yellow stone to keep it so sharp that I can carve even the softest balsa. I use a sanding board (about 1/4" x 1 1/2" x 20") with 4 strips of sandpaper glued to it (80, 120, 240, 400 grit) and use it for all sanding except for the hollow on the back side of the blade next to the hub.

So, to get down to it...

One: Pick a diameter and pitch. For our example, assume an 11" diameter and a pitch of 7 1/2".

Two: Pick a suitable piece of wood from which to carve the propeller. The piece I've chosen as the example is 11" long by one inch wide by 1/2" thick.

Three: Draw an end view of the block on a sheet of paper and put in the diagonal. Extend the diagonal and label the pitch as shown in Figure 1.

The propeller advances along the diagonal as it turns. It would travel the distance "C" while advancing 7 1/2".

Calculate C:

C = pitch x width / thickness,
C = 7.5 x 1.00 / 0.5 = 15"

The distance C is a circumference. Divide C by pi (pi = 3.14) to get a diameter. Divide the result by two to get the radius.

Radius = C / 2 x pi = 15 / 2 x 3.14 = 2.39

This means that at a radius of 2.39" from the propeller shaft, the diagonal of the propeller block will advance 7 1/2" in each revolution. You will also see that for 7 1/2" of pitch the thickness will decrease to 1/2T (1/4") at twice the radius, it will decrease to 1/3T (1/6") at three times the radius, etc. Backing up, it will increase to 2T (1") at 1/2 the radius.

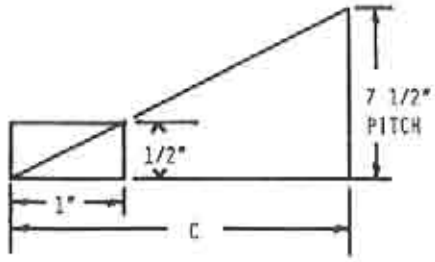


FIGURE 1

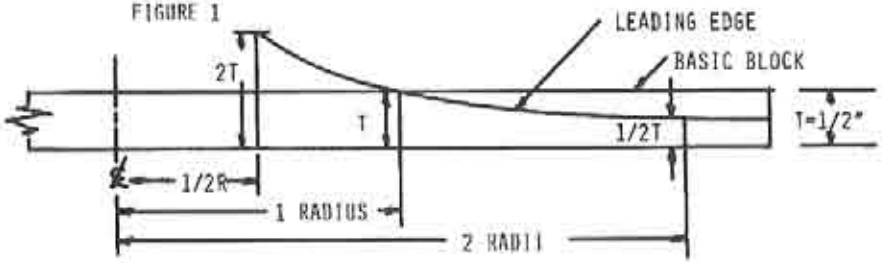


FIGURE 2

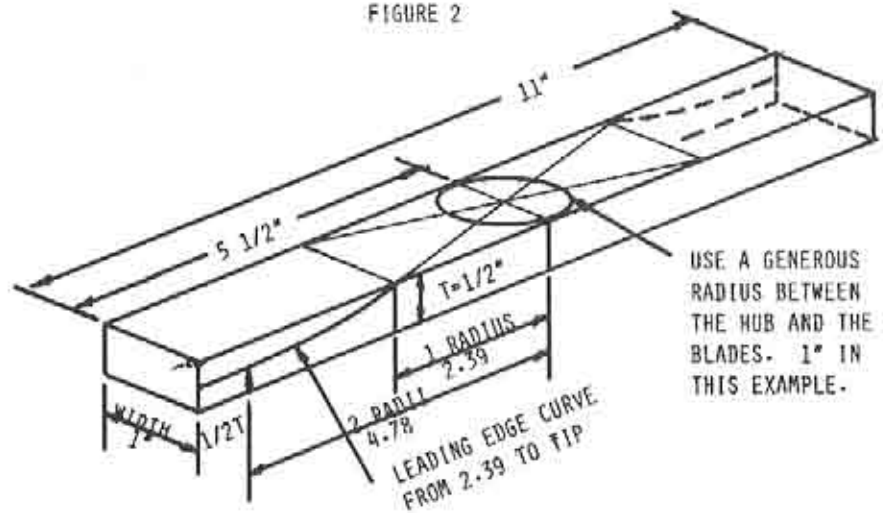
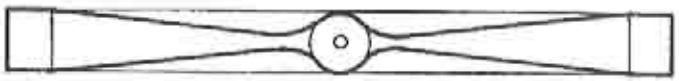


FIGURE 3

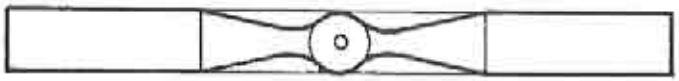
Four: Draw the shape of the leading edge as seen on the side view of the block (Figure 2). Do this for both blades. Think about what you are doing so that you lay out a right hand rotation propeller on both blades. (Doesn't this sound like I've been there?)

This may look complicated but it's not. I calculate T at one radius and 1/2T at two radii. I draw the curve as an almost straight line with about 1/16" bow in it.

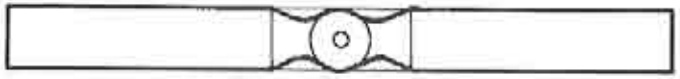
Five: Lay out the propeller on the front face of the block, as shown in Figure 3.



BLADE LAYOUT FOR 1/4" THICK BLOCK



BLADE LAYOUT FOR 1/2" THICK BLOCK
(PER EXAMPLE)



BLADE LAYOUT FOR 1" THICK BLOCK

FIGURE 4

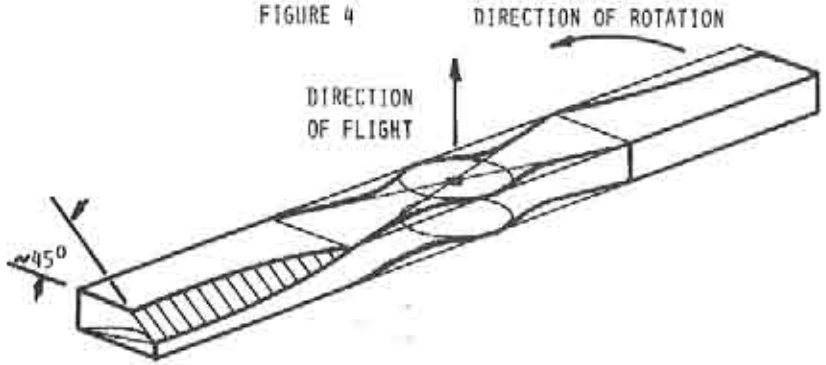


FIGURE 5

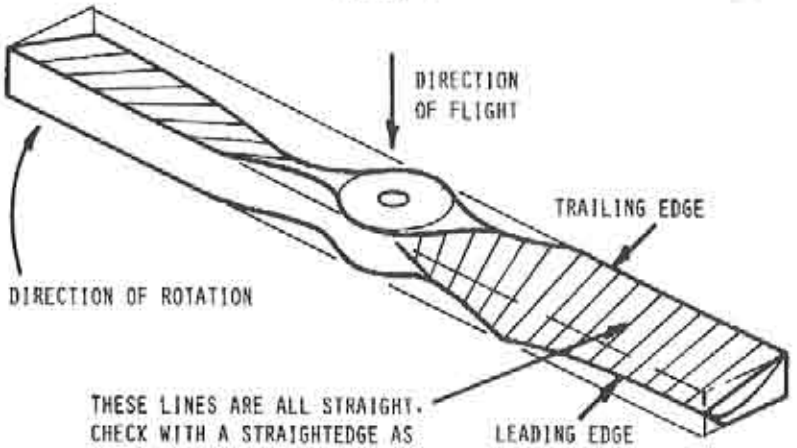


FIGURE 6

It should be noted that the final shape of the propeller depends to some extent upon the dimensions of the block chosen. As long as the length of the block of wood is equal to or greater than the diameter of the finished propeller, any size piece of wood can be used. However, as can be seen in Figure 4, choosing dimensional extremes can result in inefficient, nonstandard, weird or just plain dumb blade shapes.

Six: Cut out the hub area with a coping saw or a band saw and then drill the propeller shaft hole (Figure 5).

Cut the leading edge curve now. Make the cut at about 45°. Don't cut the block off level; you won't have enough wood left for a decent leading edge thickness.

Seven: Turn the block over and carve the back side of the propeller. Carve from the trailing edge diagonally to the leading edge. See Figure 6. This gives the helical twist to the blades that we have been working so hard to get.

Getting the helical twist in the back side of the blade is probably the most important part of carving a propeller. Take your time and get it right. Use the Michelangelo technique of sculpting. He took a block of marble and carved away everything that didn't look like a "Pieta" or a "David". The same technique works with wooden propellers.

Eight: Turn the block over and very roughly carve the front face to a sort of airfoil shape (within 1/16" or 1/8" or so).

Nine: Carve the blade shape, but wait until Step Eleven to round the tips.

There is nothing special about the blade shape shown in Figure 7 - 1 just like it. You can put any other shape on that you may prefer.

Ten: Finish carving the airfoil sections of the blades. Since the bottom of the blade is flat, the airfoil sections turn out to be "Clark Y" sections. Don't carve the trailing edge too thin. I try to get a finished edge about 1/32" thick, so for the first pass try to keep the trailing edge about 1/16" thick. You can check the airfoil section of the blade at any station by holding the blade between your thumb and forefinger as shown in Figure 8.

Look in past the tip at the shadow between the blade and your finger and you will be able to see the airfoil shape.

Slide your fingers along the blade while you look in and observe how the airfoil sections and twist change along the blade.

For some reason the blade sections tend

FIGURE 8

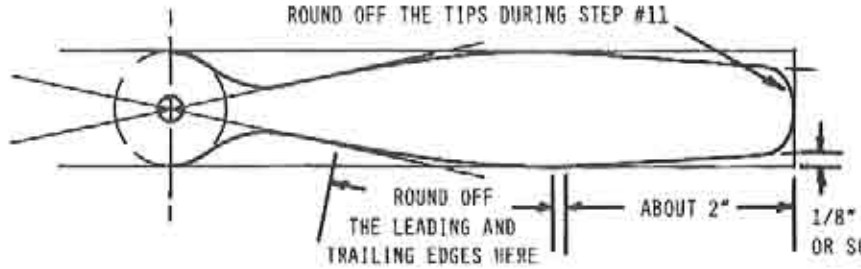


FIGURE 7

to be too thick. Keep looking in at the blade sections and then thin them down to about 10% thick, at least on the outer half of the blade. On the inner portion of the blade a compromise must be made. Thicken the blades so that they blend smoothly into the hub and have the strength to take the usual abuse.

Eleven: Put the rough carved propeller on a High Point® or similar balancer. Look at the heavier blade and remove the thicker portions nearer the tips that really don't look like a propeller. Start sanding the blades to a final shape, keep checking balance on the High Point®. When you are satisfied that the propeller is reasonably balanced and both blades look alike, round off the tips to your favorite shape and finish balancing. The balance doesn't have to be perfect because the next step is to put on a coat of sanding sealer. Let it dry and sand it down to a smooth stubble-free finish. Balance on the High Point® and put a coat of sanding sealer on the light blade. At this point I'm finished with the propeller.

Please note that I have steered away from exotic blade shapes, airfoil sections, pitch distributions, and all that other high tech stuff. Whenever I feel the need for something inspirational I pull out my old copy of "Airplane Design" by K.D. Woods open it to the chapter on wing design and read, "Anything that looks like a wing will perform almost as well as the best wing. (Fred) Weick has reached the same conclusion regarding propellers." ■

Mid-South Soaring Championships

...by Jerry Slates

The information and photos contained in this article came from several sources, and I wish to thank the contributors in advance: Ron Swinehart, Rob Glover, Bob Sowder, Gordon Jones, and Tom Ernst (editor of the MASS newsletter, *Mass Mail*).

Ron Swinehart with Struts.

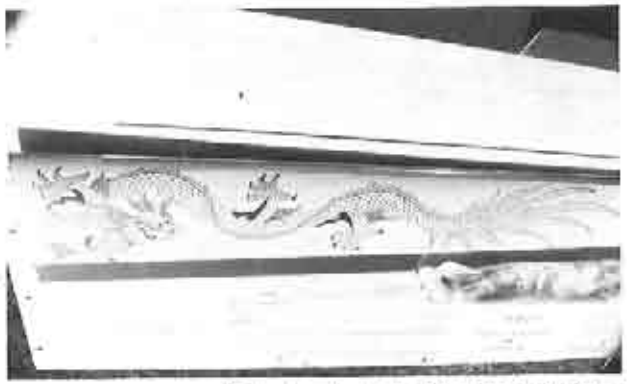
Group shot includes Struts. "Struts was given to Mike and Dana Kelly at the MASS November Turkey Shoot at the club contest last year." He is the "king of the barn".

(Below) Lars Erickson with his scratch built Full House.

Bob Sowder is about to launch his Falcon.

The Mid-South Soaring Championships were held in Memphis, Tennessee on June 27th and 28th. This event was jointly sponsored by The Memphis Area Soaring Society (MASS) and The North Alabama Silent Flyers (NASF). The format was a bit different than most two day contests I've attended; for those who could only show up for one day, it worked out great, as one didn't have to fly both days in order to win. The models flown included: Gentle Lady, Oly II, Falcon, Catalina, Bounty Hunter, Synergy, Saturn, Eagle, and Magic. The contestants came from Alabama, California, Florida, Georgia, Kentucky, Louisiana, Michigan, Missouri, Mississippi, Tennessee, and Texas. Mike Kelly, Bob Sowder, Ron Swinehart and Lars Erickson are to be commended for a job well done. All of the MASS-NASF members, helpers, fliers, supporters and all the others who joined in the fun made this one of the most successful events I have ever attended.

Cindy Erickson (L), Valita Glover (R) and Dana Kelly provided fast, accurate scoring. The results of the contest were known at the end of each day's flying!



This most unusual wing detailing at first glance appeared to be a decal. The dragon is really a hand-painted one-of-a-kind masterpiece. This Obechi-skinned wing detailing is one example of the custom hand-painted work of Donna Smith. For more information, Donna can be reached at (509) 548-5201, Washington.

No, I'm not going to bore you with detailed contest results and launch flight. Rather, I'd like to share what you missed if you weren't there: A Really Great Time!!

The site at Memphis is a park-like setting at the Cherry Point Sod Farms in Brunswick (only a few minutes from downtown Memphis); there are several hundred acres of Bermuda grass. Mr. Mac McGowan generously allowed the use of his farm and special thanks go to him from all of us.

The weather gods were kind with little or no wind, no rain, and lots of sunshine and mild temperatures. This was not easy, as they were busy the day before the contest and Sunday evening making up for lost time, or rainfall so to speak!

Saturday started with the usual pilots meeting, but I found myself not listening to the CD; I was staring at this turkey who was strutting around! I was relieved to find out that he is the MASS club mascot and that he is very friendly. He was also a real ham and was ready to pose for anyone who had a camera. With all the cameras I saw, he must have been a pretty tired turkey at the end of the contest. His name? Struts, of course! If you look real, real close at the group shot, you'll see Struts pretty close to dead center in the middle front.

As most of you know, *RCSD* sponsored a trade show/expo. which was set up under a 40' tent that was provided by the MASS/NASF folks. It was all ready to go (including tables), and was a real work of art. A master craftsman obviously built that tent. With the tables arranged and the material, handouts, and displays all set up, it was just perfect. All the material, etc. were sent in from all

Amy Harvey is holding a pink and white Spirit that her father built and gave her for a present last year.

(Below) Can Amy fly the Saturn? No problem. David Layne is coaching to her right.

over the U.S.A. and England by sailplane manufacturers or sailplane related businesses most of which are cottage industries. Some of the material was hot off of the press and was available for the first time. Much of the coordination on the trade show leading up to this two day event was done by myself and Gordon Jones. Our job was to pass out the handouts and catalogs and to answer questions. Several of these folks donated items for the raffle which were not expected and a special thanks is in order for: Basic Aircraft Technology Co., C.E.H. Products Inc., Jomar Products, Layne/Urwyler, Northeast Sailplane Products, RnR Products, and Tekoa: The Center of Design.

Fortunately, there were others who were able to join us. I was delighted to meet Chuck Anderson and his wife. He explained his Model Design Program to those with an interest in computer programs. Tom Jones of Zoomit Creations had some beautiful shirts done specifically for the event. Barry Kennedy, Kennedy Composites, was out on the flight line.

Rich Spicer, RnR Products, not only donated a Synergy 91 at cost, and answered questions, but participated in the contest, as well. He also demonstrated his beautiful SB/XC Cross Country; he had just come from the Great Race. One $5.00 raffle ticket bought by Cliff Williams walked away with the Synergy 91.

David Layne of Layne/Urwyler was there to answer questions about the Saturn and participate in the contest, as well. And David left <u>without</u> his Saturn all because of a bet...

At the Saturday night dinner which was held at the local Memphis BBQ restaurant, the main topic (outside of the great food), was about the bet that David Layne made with one of the junior fliers, Amy Harvey. I don't know exactly how all of this started, but Amy said she could beat him and he bet her his Saturn that she couldn't! Well, David did lose a round that counted more than the others, but Amy did well in that round. The showdown was David - 1453 points, Amy - 1556. Actually, I never laughed so hard in my whole life. David presented it to Amy at the end of the event, but it's not over for him. The favorite phrase at the local contests back in California is, "Hey, David! You want to make a bet?" David is one of the most fun folks I know and a GREAT sport, too!

Rich Spicer (L) chatting with Chuck Anderson (R) at the show tent. The rocks were used just in case a gust of wind came up. Gordon had the job of gathering enough rocks to hold the material down. There were lots of catalogs and handouts. Please "Take One".

The tent was just right! Special thanks go to the manufacturers and sailplane related businesses who squeezed in the time to send us their material, catalogs, brochures and/or displays. Special thanks to those who were able to join us. This is the second year in a row that RCSD has undertaken a trade show and we'll hope to see you at the 3rd one, next year!

Great company, beautiful weather and very good BBQ food at the site sure made us feel at home!

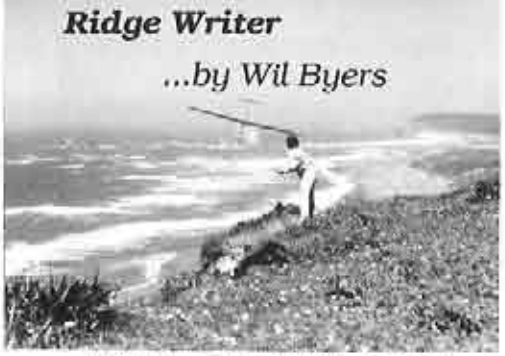
Saturday Results - First Place
Expert - Buddy Roos (GA)
Sportsman - Gary Warner (TX)
Novice - David Godfrey (AL)
Sunday Results - First Place
Expert - Don Chancey (TX)
Sportsman - Gary Warner (TX)
Novice - Steve Follis (TN)
Junior - Saturday
1st - Amy Harvey (TN)
2nd - Chuck Thomas (TN)
3rd - Michael Wilson (KY)
4th - Tim Serfess (TN)
Junior - Sunday
1st - Amy Harvey (TN)
2nd - Michael Wilson (KY)
3rd - Chuck Thomas (TN)
4th - Tim Serfess (TN)

RCSD was pleased to be able to sponsor the trophies for the junior class and hope to see them back competing next year. The NASFMASS will be held in Huntsville, Alabama on June 26th and 27th, 1993. The site will once again be approximately 100 acres of Bermuda off a large paved road leading to Redstone Arsonel. There are motels and fast food places within 3 miles of the site. Bob Sowder can be reached at (901) 757-5536; Ron Swinehart can be reached at (205) 883-7831 evenings.

If you're planning next year's vacation now or thinking about where you want to go, there are two other dates that will be added to the events schedule. The tentative schedule for the TNT (Texas National Tournament) is September 18-19, 1993 in Dallas, Texas, and the AMA NATS is July 16-27, 1993 in Lubbock, Texas. ■

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)

The Slope Scene

The little Bud-5J PSS entered by Mike Bamberg was a neat little soarer. The model uses an Eppler 205 airfoil & was able to fly in very light lift.

A junior, Alex Waugh, is 16 years old and brought this nicely done Hellcat F6F. This model was built from a kit by Slope Scale Associates, a Brian Laird cottage industry.

(R) Frank Smith's Duster is using a Gentle Lady airfoil. Model is from Frank's own plans and has a span of 120".

The "Austria Elephant" had to hook up to the winch line, also. This 25' span model flew unbelievably graceful. Additionally, the wings flexed very realistically as the model moved through "bumps" in the air.

Del Brengman attended this year's scale fun fly and brought this highly unusual canard ship. Del didn't know what full-size ship the model was copied after. So, if anyone knows what this ship is, Del would appreciate knowing. Send info. to me and I'll pass it along.

Ken Stuhr built a very unusual BLOHM-VOSS BV188. It is a replica of German bomber powered by four jet engines. The picture does not do the 74" span PSS justice.

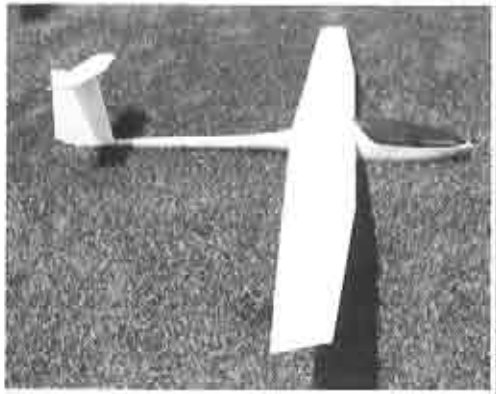
Another master builder from Canada, Fred China, built his ASK-13 from Charlesworth plans. The 13 has a total all up weight of 17 lbs. and a span of 4 meters. It also carries a wing loading of 23 oz./sq. ft.

Notice how the Habicht sits in the shadow of the Austria? Habicht is small with a span of only 3 meters.

(Below) This all glass ASW-20 from Fiberglas Flugel won pilot's choice for modern scale. The model is a super soarer and uses the Quabeck HQ3.0-15 airfoil to climb in the lightest of lift.

Eric Eiche's beautifully finished Grunau Baby. Model is finished in a natural wood stain to simulate birch ply like used in its full size counterpart. Eric built the model from his own plans. Covered in Coverite Silkspan.

Don't know whose ship this was, but it was a neat functioning P-51 look alike. About 70" span with a glass fuselage and sheeted/glassed wings.

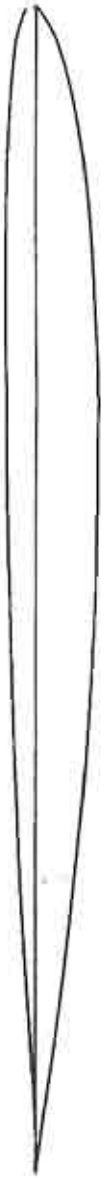


Galen Davis flew the DG-600 to great heights under some cumulus clouds. Model is from a very nice Multiplex kit.

After suffering for two days without wind, pilots and planes moved to the local thermal field. Gary Brokaw's ASK-18 was one of many scale ships to utilize a winch line for altitude and rise off ground (ROG) launches. Model was scratch built from Chris William plans.

S2055

NO	X	YU	YL
1	0	0.000	0.000
2	1	0.762	-1.227
3	2	1.347	-1.561
4	4	2.155	-1.927
5	6	2.756	-2.145
6	8	3.243	-2.294
7	10	3.647	-2.407
8	15	4.360	-2.586
9	20	4.798	-2.674
10	25	5.082	-2.702
11	30	5.260	-2.687
12	35	5.351	-2.639
13	40	5.366	-2.565
14	45	5.311	-2.467
15	50	5.183	-2.347
16	55	4.978	-2.204
17	60	4.689	-2.039
18	65	4.315	-1.846
19	70	3.864	-1.615
20	75	3.349	-1.340
21	80	2.782	-1.028
22	85	2.170	-0.694
23	90	1.498	-0.364
24	95	0.729	-0.090
25	100	0.000	0.000

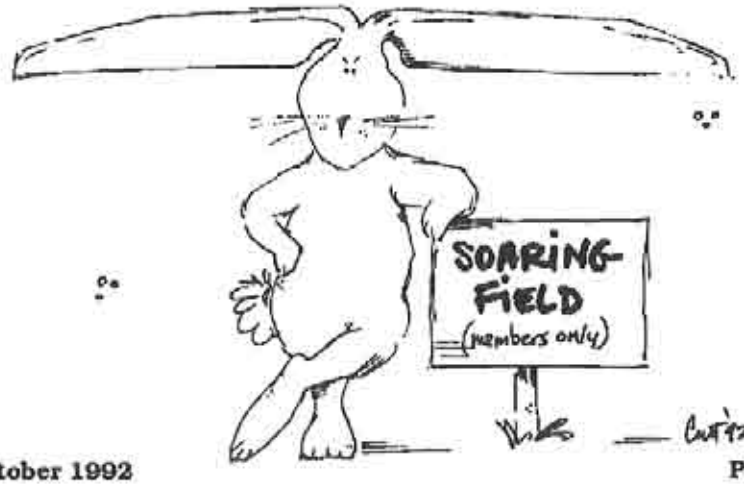


An ASW-17 built by Ray Franz is from Viking Models. Ray says, "The 17 is quite fast and penetrates into the wind easily." Model is 1/5 scale and uses an Eppler 203 airfoil.

A close look at Eric Eiche's Fafnir scale detailing. The pilot's head moved back and forth when the rudder was moved. The stall horns were functional as switches for radio gear.

Pete Marshall's little PSSs - a Japanese Zero, Spitfire, and P51 Dago Red sit on the runway waiting for the wind to come up. These slopers are fast and furiously aerobatic.

A Tucano, a P-39, a Beechcraft Stagger wing, and a Folkwolfe wait for the wind without too much impatience.

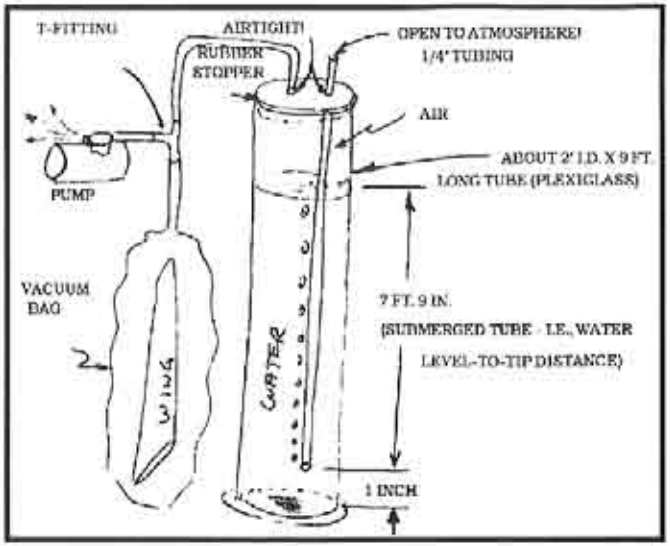


Curt Nehring
San Dimas, California

A Vacuum Regulator

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

If you don't have a vacuum regulator for vacuum bagging, and still want to maintain 7 inches of mercury vacuum, you can make a device from plastic tubing. It is based on the principle that 7 inches of mercury is equivalent to 7 ft. 9 in. of water. (Mercury is 13.6 times heavier than water.)



It would be best to use clear tubing such as Plexiglass, but anything will work. Visibility helps you to see that the system is really working. Diameters are not important, nor do the tubes have to be dead straight. Allow enough room for the water to rise. It is most important that the system be absolutely airtight. Use plastic, PVC. It is easy to fabricate and cement. Make sure the tube is vertical when in use. Connect it with a length of tubing to your pump-bag system. When the water is seen bubbling, it means that the vacuum is exactly 7 inches of mercury. ■

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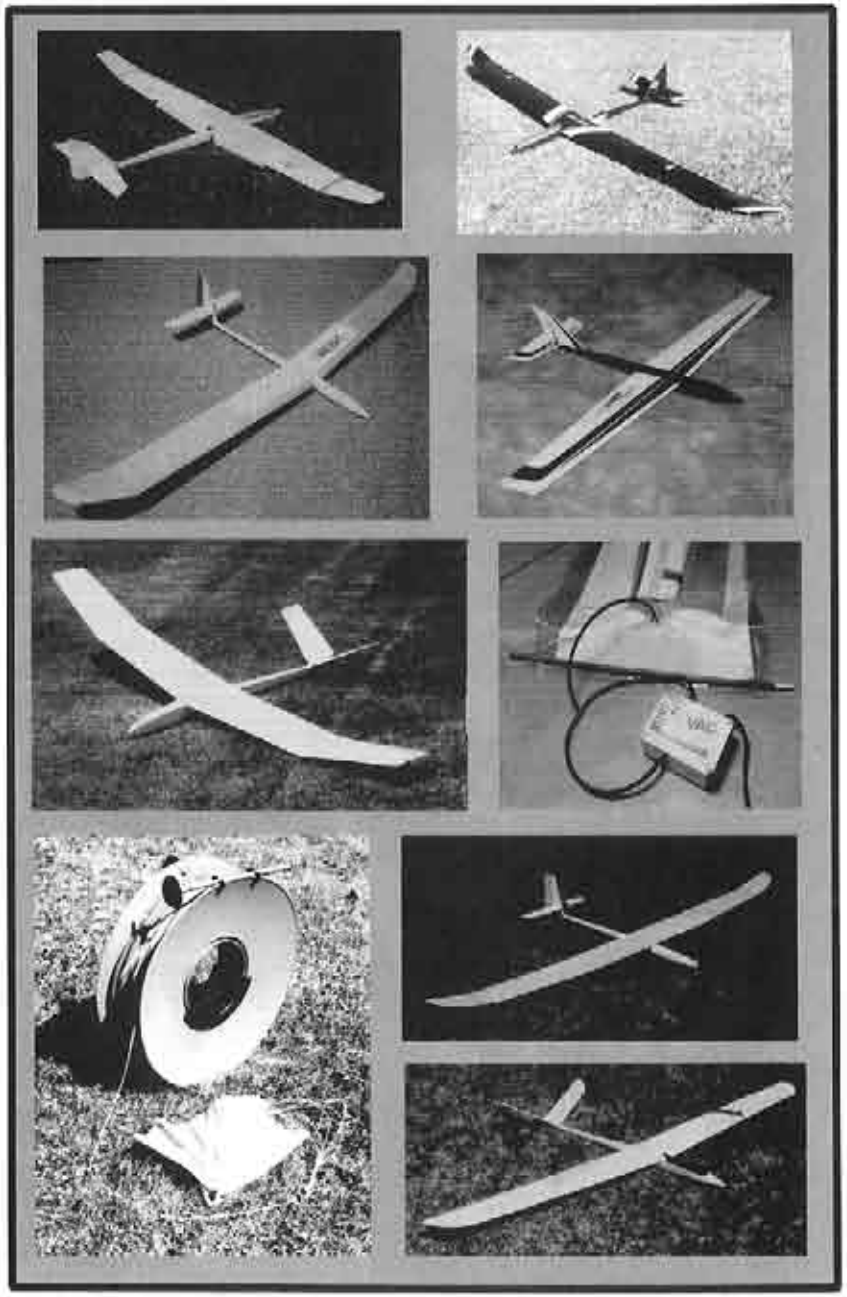

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(Top) Falcon 880E Servo in Fin
(Bottom) Falcon 880E Motor & Prop

Falcon 880E

In the past, because of a lack of a large selection of motors, two meter and small planes were the norm for electric power. Now, with all the new generations of motors, it is possible to convert almost any size sailplane to electric power.

Many readers have asked me about converting large sailplanes into electric. The pluses for a large electric sailplane are many. They are easy to see and, generally, they are very stable, but mostly they just look great.

My favorite large electric sailplane is the Falcon 880 that I converted. I think that most everyone by now knows of the fine reputation of the Falcon 880. Because of the Falcon's fine flying abilities, it became a candidate for an electric conversion.

I have included a few pictures of the prototype before it was finished to show you what was done to convert the Falcon into an electric powered sailplane.

Electrifying the Falcon 880 was something I had wanted to do and, as it turned out, so did Mark Allen of Flite Lite. At that time he was the manufacturer of the Falcon. Mark got only as far as cutting the nose off of the fuselage, and then ran out of time to do any more on this project. I acquired the fuselage and finished the conversion. After cutting off the nose to fit a Freudenthaler 45 mm carbon fiber spinner, the rest of the plane is built in the same manner as the glider version with the exception of the servo installation in the fuselage. Here, I mounted the rudder servo and elevator servo in the fin. This was done to leave the fuselage open for the batteries, receiver and speed controller. Although I have not experienced any problem with the long servo leads, I would recommend using

Falcon 880E

noise traps. Try and keep the weight as light as possible. I clear lacquered the wings with two coats of lacquer. I applied Monokote on the rudder and stabs, but left the fuselage unpainted.

Flying the Falcon is great. It flies in thermals (just the unpowered version, but with a built-in winch), with the option of doing a go-around if you should miss your landing approach.

I use an HP 10 cell motor, 10 900ma SCR's, a Freudenthaler 45 mm carbon fiber spinner with a RFM 120 carbon fiber prop, a Novack speed controller and a 225ma receiver battery pack, all controlled with a Vision radio.

If you are looking to convert a large sailplane into electric, The Falcon 880 makes a fine choice. I have heard, but do not know for sure, that Flite Lite may make an electric Falcon 880. To find out or to show your interest in a large electric plane, give Ron Vann a call at Flite Lite at (707) 838-9020.

If you already have a large sailplane, give electric power a try. I have found that if you can fit the motor in the nose, everything else will usually fit with the possible exception of a pod and boom type sailplane.

With today's high tech and high horse power motors and light weight equipment, I think almost any sailplane can be converted into electric. Another large sailplane that I am going to convert is the Alcyone by Northeast Sailplane Products. If you do a conversion, send me some pictures and specs.

Congratulations to the U.S.A. Team for being first in this year's world F3E competition. Individual standings were: Rudolf Freudenthaler, first; Jerry Bridgeman, second; Jason Perrin, third; Steve Neu, seventh. Jerry Bridgeman missed being the world champion by only four points. If possible, I'll try to get some facts on the equipment they were using.

News Flash

...from Bob Sliff
Team USA Manager

F3E Electroflight World Championships

Arnem, The Netherlands
19 - 22 August 92

"Team USA captures the gold by an impressive margin."

"After 7 rounds of flying, Team USA finished 201 points ahead of 2nd place Austria, and 480 points ahead of 3rd place, Germany. Team members Jerry Bridgeman, Jason Perrin, and Steve Neu placed 2nd, 3rd, and 7th respectively. Team USA was the only team to place all three members in the top eleven places. Jerry, at 2nd place, was only 4 points behind Rudolf Freudenthaler, with Jason 21 points behind Jerry. A commendable effort by Team USA in bringing home our first F3E gold medal."

Results

Rank	Team	Score
1	United States	12684
2	Austria	12483
3	Germany	12204
4	Switzerland	12157
5	France	12103
6	Italy	11784
7	Belgium	11257
8	Czechoslovakia	11110
9	Australia	10973
10	Netherlands	10856
11	Sweden	10706
12	Great Britain	10580
13	Japan	8695

Banshee

Some of you may say, "Oh, another two meter!" But, believe me, this is not just another two meter. The Banshee is a high performance, highly pre-fabricated kit with some very unique qualities.

The Banshee was designed and is kitted by Brian Agnew of Agnew Model Products, 166C Springwood Circle,

Banshee

Longwood, Florida 32750; (407) 260-6223. To give you a little background on the Banshee, Brain flew one in this year's Nationals and won two meter. He also won standard and got third in unlimited. He also got an award for best overall performance and an award for the single highest score in any class.

The following is an introduction to the Banshee that comes with the directions in the Banshee kit.

"Banshee was designed to be a competition worthy 2-meter capable of excelling in a variety of conditions. Banshee has the ability to take advantage of light lift without sacrificing its ability to carry ballast and penetrate in heavy winds. While the Eppler 387 is an "older" section by today's standards, it is by no means obsolete. This section has gained tremendous popularity in both hand-launch & electric circles. It has the ability to perform at light loadings used in hand-launch while retaining an uncanny ability to carry the weight required with electrics. Empty or unballasted, Banshee has the widest speed range of any 2-meter I've flown; the difference between landing speed and "churn and burn" will amaze you."

To get the Banshee in the air takes about 12 hours. Most of the time consuming work is already done. The first thing you will notice are the two piece plug-in wings. They are pre-sheeted in Obechi and have the flaps and ailerons already cut out for you. The root rib is already installed as is the servo wire hole, and the servo location is marked on the wing for you. The really unique part of the wing is that the polyhedral brake is already done and the Obechi

Banshee Wing Below & Neat Tow-Hook Above

has been pressed onto the wing in one piece so that there is no break or seam in the sheeting. A really neat touch that most manufacturers can't or won't do. All that has to be done to complete the wing is to install and sand the leading edge, cap the ailerons and flaps, add the tip block and sand to shape, and clear lacquer the entire wing. The whole process shouldn't take more than a few hours and you will wind up with one of the nicest wings you will ever find.

The stabs are also pre-sheeted and the brass tubes installed. All that has to be done is to install the leading edge, the tips, and sand to shape. The rudder is built-up with very good quality wood provided in the kit.

The fuselage is the last major part to prepare and is also of the very highest quality. This requires the bellcrank, wing rod tube, push-rods and tail post to be installed. The fuselage is then prepared for painting by following the instructions or using your own favorite method.

The last thing to do is to install the radio. Here again, follow the instructions or use your own method. The instructions that come with the kit are very well written. A nice touch is that Brian goes into detail on setting up the plane for the best results. With Brian's flying record with the Banshee, I would highly recommend following his detailed set-up.

The kit is of the highest quality in both materials provided and in workmanship, right down to the tow-hook which, by the way, is available separately from Brian. Check with Brian for cost.

If you want a high quality 2-meter sailplane that is highly pre-fabricated with a really neat wing, designed and flown by the national champion, give a Brian a call and order one. You won't be disappointed. I know I wasn't and I've built four: two for myself and two for a friend. Maybe I could cut the nose off and install an electric motor...and...Oh, well...that's for another column. ■

R/C Soaring Resources

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

Seminars & Workshops

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

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

Reference Material

Madison Area Radio Control Society (M.A.R.C.S.) *National Sailplane Symposium Proceedings*, 2 day conference, on the subject and direction of soaring. 1983 for $9.00, 1984 for $9.00, 1985 for $11.00, 1986 for $10.00, 1987 for $10.00, 1988 for $11.00, 1989 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. Walt Seaborg, 1517 Forest Glen Road, Oregon, WI. 53575

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

Reference listings of *RCSD* articles & advertisers from January, 1984. Database files from a free 24 hour a day BBS. 8-N-1

Bear's Cave, (414) 727-1605, Neenah, Wisconsin, U.S.A., System Operator: Andrew Meyer

Reference listing is updated by Lee Murray. If unable to access BBS, disks may be obtained from Lee. Disks: $10 in IBM PC/PS-2 (Text or MS-Works Database), MacIntosh (Test File), Apple II (Appleworks 2.0) formats.

Lee Murray, 1300 Bay Ridge Road, Appleton, Wisconsin, 54915 U.S.A.; (414) 731-4848

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

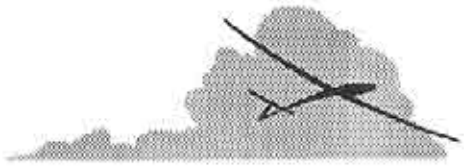
Canada - Southern Ontario Glider Group, "Wings" Program, dedicated instructors, Fred Freeman (416) 627-9090 or David Woodhouse (519) 821-4346

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.

Maryland - Baltimore Area Soaring Society, Steve Pasierb (President), 21 Redare Court, Baltimore, Maryland 21234 U.S.A., (410) 661-6641

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

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



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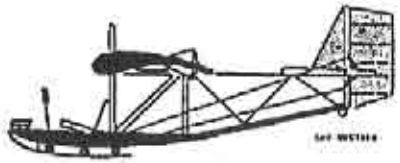
T.W.I.T.T. is an organization of engineers, scientists, pilots, sailplane enthusiasts, model builders and many other persons having an interest in flying wing/tailless aircraft technology. Write to T.W.I.T.T., P.O. Box 20430, El Cajon, CA 92021 to find out how you can participate.

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



The Vintage Sailplane Association

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

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

NEW PRODUCTS

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

Mini-Mix ™

...manufactured by Hoopes Designs
...from Basic Aircraft Technology (B.A.T.)

The Mini-Mix™ was designed with a state-of-the-art microprocessor to provide a cost effective method of mixing complex channel functions on non-computer and older radio systems. The Mini-Mix™ is simply plugged in a series with the appropriate channels and corresponding servos without the need for receiver or servo modification. Its small size and low power requirements make the Mini-Mix™ suitable for all but the smallest aircraft.

There are different versions of the Mini-Mix™ that fulfill specific requirements such as elevon mixing for flying wings and deltas, V-tail mixing, flaperon mixing (flaps and ailerons), coupled aileron and rudder, flap to elevator mixing, and crow mixing.

Features

- Operates with FM and AM radio control systems.
- Supports both 1.5 millisecond and older 1.3 millisecond servo pulse schemes.
- Fail-safe feature eliminates interference glitches.
- COP (Computer Operating Properly) watchdog timer to prevent microprocessor lockup.
- Servo reversing on all channels.
- Powered by the standard 4.8 volt flight pack.
- Low power consumption (less than 25 milliamps).
- Physical dimensions: 2.75" X 1.00" X 0.62"
- Weight: 1.00 ounce

MM001 - Elevon mixer is configurable for flying wings, deltas, V-tail and flaperons.

MM002 - Aileron/rudder mixer will mix rudder to aileron (ideal for legend, etc.) and decouples when rudder control is desired. Jumper selection will mix 100% rudder to 100% aileron or 50% rudder to 100% aileron.

MM003 - Flap/elevator mixer will mix elevator to flaps and decouples when elevator control is desired. Trim pot adjusts the elevator center point based upon flap input.

MM004 - Flap/V-tail will support V-tail mixing and mix flap to V-tail. Trim pot adjusts the elevator center point based upon flap input.

MM005 - Four channel flap to elevator. Rudder is coupled to aileron as with MM002 and the elevator is coupled to the flaps as with MM003 but in one package.

MM006 - Four channel flap to elevator, aileron to rudder mixer that supports "crow" mixing. Rudder is coupled to aileron as with MM002 and the elevator is coupled to the flaps as with MM003. This model will support 3 or 4 servos for wing camber control. Perfect for high performance sailplanes.

MM001 - 3 cost $49.00 ea. + S&H; MM004 - 6 cost $74.95 ea. + S&H. $10.00 extra for low battery indicator option. Basic Aircraft Technologies (B.A.T.) is located at 10424 Golden Willow Dr., Sandy, Utah 84070; (801) 571-6406. ■

"These are not amateur produced products built in someone's basement. Rather, these are designed by a modeler who owns a rather large electronics firm. He just enjoys developing electronic devices that solve today's modeling problems. He designed these for his own use. However, I was able to talk him into doing production runs in his plant on a time available basis. We have locally been flying these for over a year. We have flown the mixer in an Airtronics Legend using only 4 channel radio. We can mix flaps & elev., ail. & rudder, and even land in the crow mode.

"Mixers simply plug into the receiver and servos w/o changing anything. No battery is required for mixers. They are small and use little current from flight pack. Mixers have servo reversing in case your radio does not. Mixing is adjustable and the mixers also reject unwanted signals. The best part is that the Mini-Mixers move control surfaces smoother than a Vision computer radio at a fraction of the cost of a RCD on board MOM.

"There is one problem, now. Our production run will not start until mid-September '92. However, delivery should be rapid once the intended production run is made.

"P.S.: A low voltage indicator for the flight pack will be available on our new Mini-Mixers, soon!" Bob Harman, Basic Aircraft Technologies ■

RAVEN 3m Fiberglass Fuselage

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

The Raven is designed by Mike Smart, Mike Smart Designs in England. The sailplane is slightly different with its unique "Gull Wing" design, but straight or polyhedral type wing options are covered in the complete set of building instructions and plans. Although the plans show the fuselage as a plywood built-up type construction, Mike has given Viking Models permission to reproduce this fuselage in epoxy and fiberglass. This epoxy fiberglass fuselage is a bit narrower than what is shown on the plans, however there is ample room to accommodate any standard size radio and servos.

This 51" fuselage plus plans is available from Jerry Slates, Viking Models, U.S.A., 2 Broadmoor Way, Wylie, Texas 75098; (214) 442-3910 or FAX (214) 442-5258. ■

Specifications - RAVEN 3m

(Thermal, Slope)

Fuselage Length:	51"	(Below: Completed RAVEN 3m by Mike Smart.)
Suggested Wing Span:	119"	
Suggested Wing Chord:	10.750"	
Airfoil:	Mod. E193	
Radio Channels:	As Required	

Launching & Landing On the Slope

...by Mike Bamberg
Hillsboro, Oregon

I have been impressed by the large increase in slope soaring. The slope is one of the best places to get air time. But most newcomers certainly have a few problems when it comes to landing! The old saw about landing being the hardest part of flying is especially true on the slope. Flying a glider on the slope is probably the easiest task at hand. Launching can be anxious at times, but there are several guideline there which can help. But landing a glider consistently and safely takes planning, even before you heave it off the hill.

Launching and landing on the slope requires an understanding of the currents and eddies which are part of EVERY slope and the potential for additional problems which are unique to each slope. It helps to visualize the slope in this way: the wind is a river of air (Thanks, Dave Thornburg.) with the ground as one shore. (We won't worry about the fact there is no other shore.) If we take a vertical section slice through the slope, it will look just like a shoreline of a river with a bump sticking out into the flow. Got it? Good. Now refer to figure 1.

The stream flows smoothly until it reaches the bump. It then has no choice but to move over the bump. As it does the flow nearest the bump changes direction and increases in speed. The flow furthest from the slope is affected the least. As the flow crests the hill, there is another change in direction and speed. There is an area of vertical movement which extends forward, up and behind the brow of the hill. We call this area the lift zone.

The shape of the brow of the hill, the downwind slope, the wind speed, and the length of the face all affect the air flow at the top of the hill. Let's take them in order.

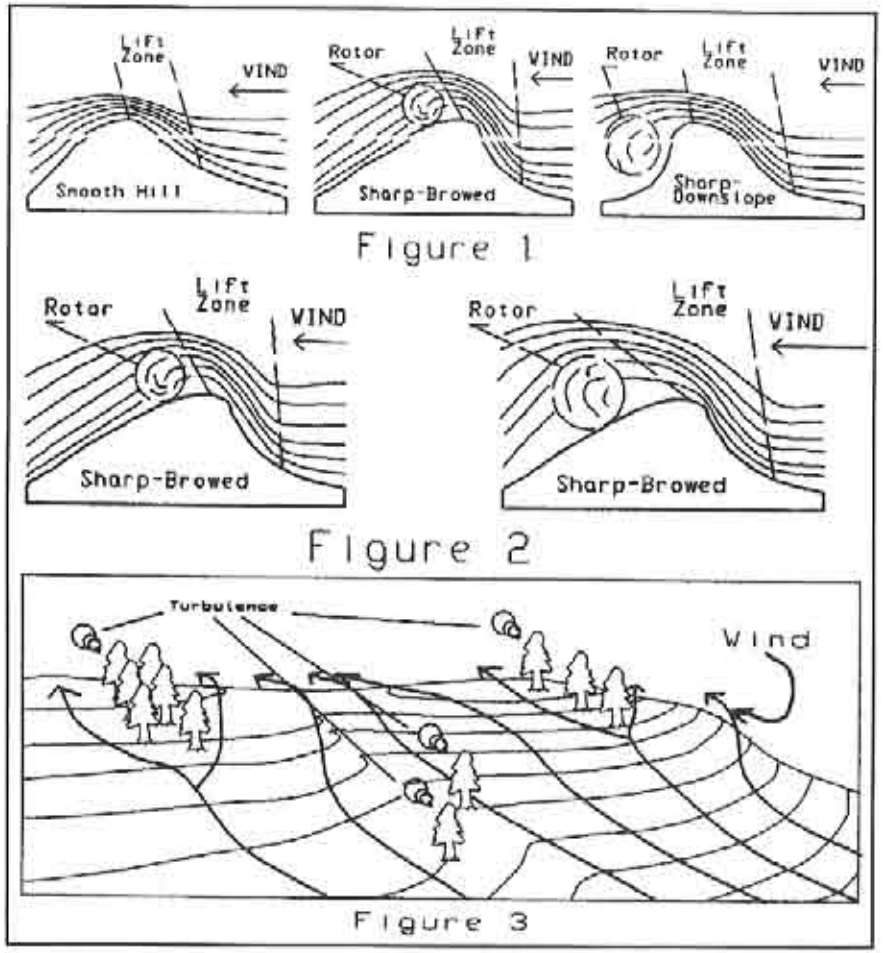
A sharp browed hill will result in the formation of a pronounced eddy (rotor) at the top and behind the brow of the hill. A hill with a steep downwind slope will also produce a rotor. A smooth browed hill with a long gentle downwind slope will produce little or no rotor. Notice the points of highest velocity winds on the drawings (where the lines are closest). We will come back to that. Now refer to figure 2.

Now to the wind. For a sharp browed hill, as the wind speed increases the rotor will have more energy and will move further downwind from the brow of the hill. This will sometimes make the rotor seem to disappear, which as far as we are concerned it has. This increase in wind speed will also affect the lift zone size and shape on both a sharp and smooth browed hill. It will extend higher and further behind the hill.

Lastly, the length of the windward face of the slope will affect the depth and strength of lift and the formation of a rotor. A longer windward face will result in a larger lift zone both in depth and height. There will also be a greater tendency to the formation of a rotor as the wind will have developed a greater momentum in the direction of the slope face and will resist turning at the top.

The highest velocity winds are the areas of greatest lift and, since they occur close to the ground, they have the greatest potential for problems. As the wind pushes along the ground there is friction which slows the wind right at the surface. The slowing which will affect our model operation extends only about 20 feet up, but full size aircraft are affected by this surface friction up to several hundred feet AGL. Also, the ground is irregular which causes turbulence and gusting.

This is just the effects of the wind in 2 dimensions. If we had a ridge of a mile or more, and we flew in the middle of it, all



we have said would always hold true. Unfortunately, the horizontal and contour shape of the slope also affect the airflow. See Figure 3.

When we use a slope at the end of ridge there is a tendency to lose some of the wind around the end. This is just like the loss of lift at the end of a wing. If the wind can go around rather than over the hill, it will. The top of a ridge is rarely a straight line. The saddles and gullies of the ridge will change the lift and add additional sources of turbulence. Lastly, large trees and outcroppings will also create turbulence.

With that all covered, let's talk about flying.

Launching is not too difficult if the wind speed is low (5 - 10 MPH) and there are no gusts; just point the nose into the wind and push the glider away. Notice the word push. The key on the slope is to ALWAYS maintain control. Throwing the plane often results in a nose high, slow airspeed, uncontrollable attitude. Since you already have a wind coming at you, you only need to add just a little bit of energy to get the glider flying at a normal CONTROLLABLE speed. Just push it off. When the wind speed increases we run into the concerns noted about surface friction. We will encounter turbulence and gusts. Now to launch will require two hands; one on the fuse-

lage for direction control and the second out on the leading edge of one wing to steady the plane against gusts. This almost always means that the best way to launch a plane is with two people, one on the controls and another to launch. Again the key is to simply push the plane off the hill. This may entail walking closer to the brow of the hill or even down slope a little to get into the strongest lift and give the plane the maximum immediate altitude. The wind will be stronger a little ways out so be prepared to give some down as you enter the strong lift. So, for the launch phase, the key word is CONTROL followed by PUSH. There are few exceptions to these guidelines and more often than not, the one who ignores them is the first to roll into the hill on launch.

Unfortunately, landing is not as simple or as straight forward. Landing a thermal plane on a field after a fun flight is usually fairly simple; keep it away from ground based objects, bring it around behind you, turn into the wind and fly it until it reaches the ground. If there is any wind you can almost park it in one place and let it sink to the ground. If you try that on the average slope with winds over 10 MPH, you will almost certainly have a struggle to land and will run a greater risk of damage to your plane. The lift zone may extend 60 or more feet behind and above the hill which will prevent you from descending smoothly from altitude. The rotor will bounce you around as you descend through it and may turn your plane upside down. The wind speed will decrease rapidly as you near the ground leading to diminished control and increased chance of a stall at the same time. I know this sounds familiar to some people. I watched them do all of this at the last race. It is very rare that a slope will permit this kind of landing. If it is a smooth browed hill with a fairly low wind speed, with no obstructions, and a long gentle downwind slope, you might get away with it. Most average slopes don't qualify on most of those counts. Will Byers is very lucky to have a bunch of them near him which qualify on most counts. The famous Eagle Butte fails only on account of a sharp brow. It's sure fun to fly there! But what can you do when you aren't so fortunate?

There are some guidelines (again?!) and techniques which we can use. First the guidelines:

Maintain airspeed and **CONTROL**. (There's an echo in here.)

Minimize your **A**PPROACH; plan it in advance and stay away from lift.

Avoid the **R**OTOR and other turbulence.

Plan your **E**SCAPE.

If you notice, the first letters of the key words spell CARE. That's what we want to do: land with CARE.

Maintaining control on the slope means keeping your airspeed up at all times. It is usually very dangerous (and damaging to your plane) to bring the nose up and slow your plane during the landing on a slope. You have no control to fight the turbulence, no momentum to carry through the gusts or escape the rotor. As you get close to the ground you will need to slow down to land, but that is only VERY close to the ground. We'll talk more about slowing down when we talk about techniques.

The longer you take to perform the actual approach the longer you expose yourself to the turbulence and rotor. Before you even launch, study the hill and plan your approach and your escape. If the initial approach you planned doesn't work (i.e., you encounter the rotor or too much lift), you may have to improvise but it's better to start with a carefully thought out approach. Unless you encounter a real turbulence or lift problem on your approach, don't change in mid-approach or alter your plan, just go around. (Escape...We'll get to it.) <u>It's usually better to start with more speed and less altitude.</u>

The rotor is invisible (Its limits can be explored if you really want some excitement.), but it usually doesn't extend all the way to the ground nor does it change position much on any particular hill at a given wind speed. It will be behind the brow and above the crest. You can usually go under it, sometimes around it, often over it. I don't recommend the latter as it violates the minimize-the-approach guideline. If you have planned an approach with an escape (We'll get to it!), and you encounter the rotor, you can expect it to be in about the same place next approach. Stay away from it. In front is best; there is almost always down air on the far side of the rotor.

One of the nice things about slope flying is that you can always turn out into the lift and regain your altitude. Slope flying is the only kind of glider flying where you don't have to land the first attempt; you can go around just like the power guys do, if you have planned how to do your escape. Speed is the main element of the escape. (Now, we talk about it.) Knowing the extent of the lift zone is another. I can trade my speed for altitude to get back to lift or I can continue forward into the lift zone to retry the approach.

Now, let's put this all together in a few techniques.

It is often a good idea to plan to go around a few times to get the feel of the approach and the air. Once you are comfortable with the approach and landing place all you do is enter the approach with just a little less speed and altitude and you will be able to land. You do not have to start high and drop down to land. In some cases it is better to start low and trade speed for altitude slowing to minimum controllable speed just as you crest the hill and land. It takes a little more timing, but is the best way to land on some slopes. Use bushes as both brakes and cushions. Better to get a briar scratch than cave the nose in on a rock. See figure 4.

In Approach A (The Hook) we have the situation where the slope continues up or there are tall trees behind us and we will not encounter the rotor at all. We do need a clear area to drop the plane into or a low bush will do. The clearing or bush should be below us and clear of large obstructions to both sides. Bring the plane well below eye level and flying faster than you would go for cruising the ridge. (It's tough to be explicit here; you will have to practice with your particular plane.) Turn into the hill and to the left or right of the landing spot. Trade speed for altitude as you climb up the slope and hook to the left or right as needed to turn into the landing spot. The trick to this landing is to stay low, in control and complete the turn with absolutely minimum airspeed. The plane then can simple sink through the air to the spot. Practice this by starting higher, do the hook and

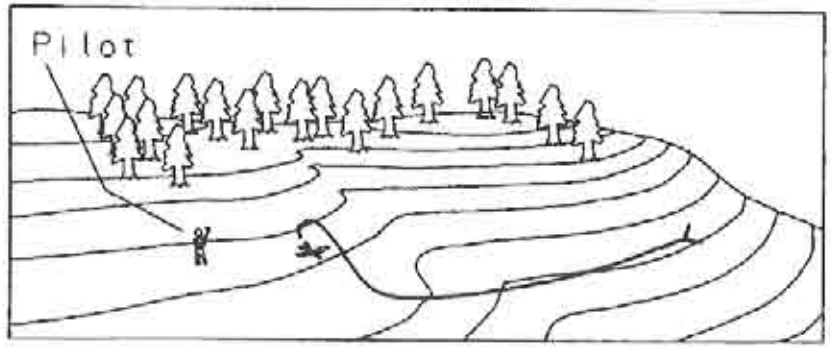


Figure 4

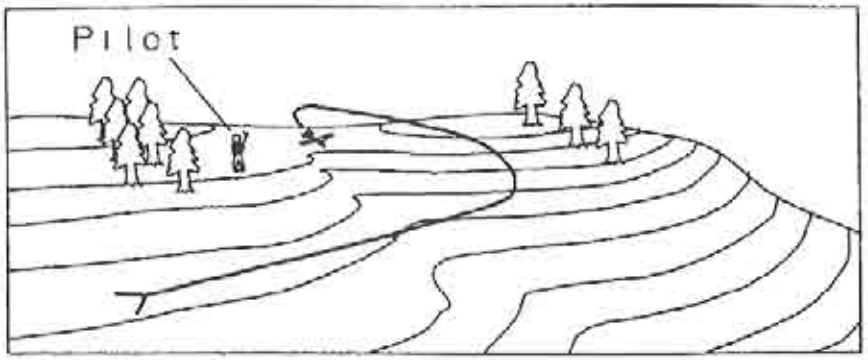


Figure 5

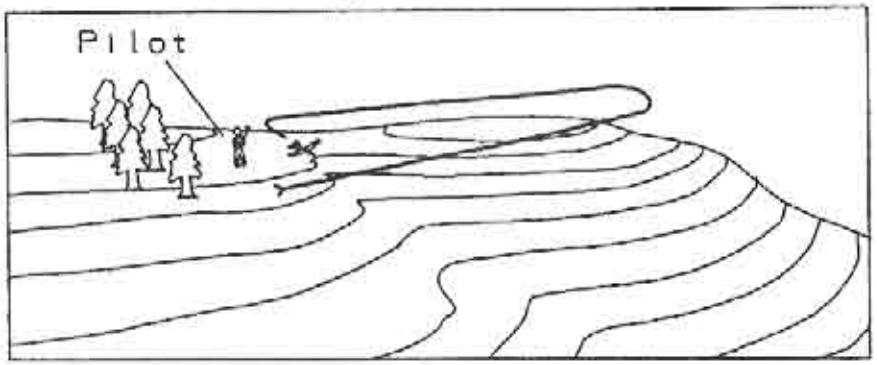


Figure 6

fly away from the hill. Disadvantages: Most of the approach is in the turbulent zone of surface friction; Timing is critical; Minimum escape opportunities at the end of the approach due to low speed and momentum; High danger to spectators if they are behind you and you overshoot the approach.

Approach B (I'm back in the saddle, again.) is used where the ridge top has a saddle or gully or draw which funnels the air and reduces the lift in this area. (See figure 5.) It's a variation on the Hook but is not as critical. The air through a saddle is usually more horizontal and the lift is less in this area. There may be eddies from trees or hillocks on the sides, but the rotor is pushed back. The landing spot can, again, be a clearing or a bush, but there is apt to be turbulence around the bush. Start the approach at eye level and normal speed. (I assume you are in the saddle or slightly up one of the sides.) Turn into the hill, fly into the saddle along one side, turn into the center and park the plane. (Match the wind speed if possible.) If the plane rises, push down, go around and start a little lower. If the plane drifts back, push down and forward to descend and land. Remember, the wind speed will decrease as you descend closer to the ground, and the plane will pick up ground speed. Expect it, plan to turn behind the landing spot and fly down and forward to it. Practice this by starting high and making the approach a continuous smooth U shaped pattern. Disadvantages: Confined space for maneuvering, higher wind speed through last phase of the approach. This approach can also be used on the top of smooth browed hills if you don't go behind the hill too far.

In Approach C (the End run), we first encounter the potential for the rotor to get us. (See figure 6.) This landing is used where we are flying off the end of a ridge or have an unobstructed approach along the slope to either side. Begin the approach at eye level and normal speed; run along the slope to the end or open side; turn a SHORT downwind and fly back toward yourself along the ridge out of the lift zone and in front of the rotor or under the rotor; as the plane gets close to the ground, make a quarter turn into the wind and land. The more altitude you have to begin, the further across the slope you have to go before you begin your SHORT downwind turn. Practice by flying the pattern forward of the actual path you will fly to land; then, gradually position the crosswind return leg lower and further behind the brow of the ridge. The escape is to turn from the crosswind leg early and push into the lift zone. Disadvantages: Requires a larger open approach area to execute.

There will be times when you cannot use one of these approaches exactly and will have to combine elements from several. But, if you practice each of them and exercise CARE, you will have more success with your slope landings.

Good landings!! ■

Military Glider Book Review
"Silent Wings"

...by Lee Murray
Appleton, Wisconsin

"Silent Wings" by Gerard M. Devlin is a fascinating chronicle of the development, use, and legacy of military gliders during World War II. If you are as interested yet uninformed on the subject as I, you will be captivated by what you will learn. Below is a synopsis.

The first few chapters are a history of early glider development and how experimenters around the world built on what had been learned from previous pioneers. Some of these lessons were the result of tragic accidents. Many advances were made by the Germans who, as a result of the Treaty of Versailles, were banned from developing powered aircraft. As a consequence, the Germans concentrated on gliders to such an extent that they eclipsed the efforts being made elsewhere. Wasserkuppe became the mecca for glider enthusiasts around the world. Americans showed spotty interest but notable achievements were attained at places such as Elmira, Point Loma, Soledad Mountain, and Oahu, Hawaii. Thermal soaring was only theoretically possible since pre-WWII glider performance did not permit gliders to gain altitude in thermals with any reliability. Gliders for U.S. military purposes were not seriously pursued until the start of WWII.

"Silent Wings" next few chapters discuss the program which was hurriedly entered following the German's successful dawn surprise glider assault into Fort Eban Emael, 20 miles inside of Belgium. Once the American military glider effort was moving, developments followed at a rapid pace and were paralleled in Britain, Russia and Japan. Glider pilots were typically in short supply. Eighteen military glider flight schools were created to supply 6,000 pilots for the 14,612 military gliders produced. Over 16 American companies were listed as producers of these gliders. An incredible 13,909 CG-4A gliders were produced by several companies but mostly by the Ford Motor Company and Waco Aircraft. CG-4A's outnumbered B-17s, B-25s, B-26s, P-38s, P-40s, C-46s, and C-47s. "CG" stood for Cargo Glider. Other Military gliders of major significance included the CG-15A (a smaller wingspan than the CG-4A with higher load capacity), the British Horsa (all wood and fabric) and Hammilcar gliders. At the end of the war $20,000 gliders were sold for $75 each for their many feet of Grade A lumber. Despite their high numbers, very few cargo gliders remain today and very little celebration surrounds the glider program. Why?

"Silent Wings" documents the many misjudgments made in the military glider program. I believe this explains why we don't hear more. As R/C glider pilots, we know the importance of landing site quality and visibility, weight distribution, fuselage and spar integrity. It seemed these lessons had to be learned and relearned in the military program. Poor communications between the tug and glider pilots sometimes resulted in accidents. Night landings without moonlight were training exercises which rarely could be executed in practice without casualties. Gliders were typically towed at 500 feet through flack, anti-aircraft and small arms fire. For most of the missions there were no parachutes or armor. Glider mission success was also dependent on the tug's survival, the tug's navigator's ability to get to the landing zone and both pilot's ability to see the landing zone through fog, lack of light and heavy battle smoke. Few glider pilots could boast of having more than a couple missions. This was not a story people wanted to share.

Those military gliders are the predecessors of the high load, short runway, cargo aircraft of today. When the military needed new gliders fast, gliders were

created by removing the engines and fuel tanks of powered aircraft. Near the end of the war, engines were placed back onto glider designs creating self launching gliders or cargo aircraft. Gliders also served as evacuation aircraft and were snatched out of combat areas without their tugs having to land. Military gliders have been towed across oceans and even slope soared for hours with enough wind. There is much for glider enthusiasts to feel good about.

The job done by military glider pilots is one that should be applauded because of the lives that were saved during subsequent ground and sea invasions. Gliders delivered artillery, tanks, jeeps, bull dozers, troops and fuel behind enemy lines. Gun emplacements were neutralized, bridges were captured to allow Allied troops to cross at strategic places. "Silent Wings" is abundant in its photographs and reporting of eye witness accounts of various glider missions in Germany, Holland, France, Italy, Belgium, Burma, and the Pacific Theater. The strategy for the missions and the hindsight is reported. The book is endorsed by the Chicago Sun-Times, "Military Reviews", "AOPA Pilot", Lt. Gen. James M. Gavin, Lt. Gen. William P. Yarborough, and includes a forward by Gen. William C. Westmorland. It is published by St. Martin's Press - New York. My copy came from Book Warehouse, a national chain. ■

At the 1992 Experimental Aircraft Association (EAA) fly-in at Oshkosh, Wisconsin the National WW II Glider Pilots Association had a tent which contained many photographs, a collection of video's and

talks given and a CG-4A glider under restoration. The CG-4A is often referred as a Wacco, the company who designed the craft. I had several conversations with glider pilots including William Horn editor of *Silent Wings*, the newsletter - Voice of the World War II Combat Glider Pilots (Address: Silent Wings Inc., 7038 Northaven Rd., Dallas, Texas 75230; (214) 368-6097; Subscription Rates: as of Sept. 1991, $10.00 per year U.S., $15.00 Canada, $18.00 overseas). I was also given an aircraft screw destined to be used in a CG-4A. I got the name and address of a William C. Simonsen of San Diego who has made plans and built a scale model CG-4A. The local newspaper and the EAA fly-in program booklet both had articles about these WW II glider pilots and their missions.

Much information and videos are available through the National WW II Glider Pilots Association and the Silent Wings Museum Foundation in Terrell, Texas. The museum is located on the Municipal Airport at Terrell, Texas, 25 miles east of Dallas on I-20. According to the literature from the museum, the Waco CG4A is the centerpiece of the museum. There is also a video theater showing various WWII-Type Combat and Training films of Gliders, Glider Pilots, and Airborne Troops in Action. In addition to the theater, scale model diormas depict major combat actions in the WWII European Theater of the war. There is an outstanding collection of WWII Stars & Stripes newspapers, YANK magazines and hundreds of original documents on WWII. ■

Schedule of Special Events

Date	Event	Location	Contact
Oct. 3-4	CSS Pumpkin Fly	Cincinnati, OH	Chuck Lohre (513) 731-3429
Oct. 4	Unlimited Thermal AMA & LSF Regional	Kirkville, NY (Syracuse)	Dave Zinteck (315) 656-7103
Oct. 10-11	2M & Open Last Fling of Summer	Tulsa, OK	Sandy Hay (918) 747-4112
Oct. 18	Hand-Tow/ Hand-Launch Contest	Irvine, CA	Scott Smith (714) 651-8488
Oct. 24-25	M.A.R.C.S. Symposium	Madison, WI	Al Scidmore (608) 271-5500
1993			
June 26-27	NASF/MASS Mid-South Soaring Champs	Huntsville, AL	Ron Swinehart (205) 883-7831
July 16-27	AMA NATS	Lubbock, TX	
Sept. 18-19 (Tentative)	TNT Texas National Tournament	Dallas, TX	Henry Bostick (214) 279-8337

Hand-Tow/Hand-Launch Contest Announcement

The Second Hand-Tow/Hand-Launch Contest will be held at the Irvine Model Aviation flying site on Sunday, October 18, 1992. In response to participants' suggestions, this format, which has been discussed in the February and July, 1992 issues of *RCSD*, will be continued with the following changes:

1. The 60" and 2-meter divisions will be merged; all participants will be scored together.
2. There is no limit on the design or construction of the sailplane; foam wings and/or any other exotic construction techniques will be allowed as well as open-bay construction for the 2-meter ships. The only limit is that the maximum wingspan is 2 meters.
3. In order to promote safety, the maximum weight of the sailplane shall not exceed 32 oz.

This will be a fun fly and there is no entry fee. The tow-lines will be provided, as well as instruction in how to use them. (It's easy!) AMA insurance or equivalent is required.

The location of the Irvine Model Aviation flying site is the Irvine Civic Center Community Park Site, behind the Irvine City Hall. Call Scott Smith evenings at 714/651-8488 for directions and/or other information. ■

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

COMPOSITE SAILPLANES ARF, FOAM CORES & CUSTOM WINCH ACCESSORIES fully machined. On-board multi-purpose computer MINI-MIXERS™ for upgrading non-computer radios: $49.00 - $69.00. Basic Aircraft Tech, Bob Harman, 10424 Golden Willow Dr., Sandy, Utah 84070; (801) 571-6406.

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.

For Sale - Personal

Multiplex ASW-24, partially built; Eismann CAMERO, (4) Futaba servos in wing, built in scale-type spoilers, never crashed, ready to fly; Eismann VAMPIRE kit; Roland Summers MERLIN, all glass, hollow core wing/stab, new. Best Offer & Shipping, each. Contact Don Chancey, 2726 Crosslands Dr., Garland, Texas 75040; (214) 495-8688 (home) or (214) 470-2049 (work).

Multiplex FIESTA, N.I.B...$215.00 + shipping. Contact Mark Hoffman after 7:00 P.M. CST at (214) 386-8613 Texas.

Dodgson PIVOT w/2 sets 72" wings, set up for 2 S33 servos, never flown...$120.00; Sig RISER 100, like new...$100.00; Davey Systems PROPHET, 2m kit, N.I.B...$40.00. All prices include shipping. Call Kevin Thomas at (412) 238-2749 or write: 508 W. Main St., Ligonier, PA 15658.

ASW-24, fiberglass fuselage w/clear canopy & cockpit (wing & tail surfaces drawings available), 3.5 - 3.8 M span...$130.00; CIRRUS 75, fiberglass fuselage w/fiberglass canopy (wing & tail surface drawings available), 3 M span...$60.00. Both fuselages available all time. UPS shipping not incl. in price. Call Peter Zak at (305) 687-7706 Florida.

CHEETAH, extended wing, flaps, ailerons & spoilers, "7" servos RTF less radio...$300.00 includes wing bag. Less servos...$200.00. Contact Curt Nehring at P.O. Box 791, Anaheim, CA 92815-0791.

Gliding with Your Futaba 7UAPS

...by David Griffin
Christchurch, New Zealand

The setting-up instructions for the Futaba 7UAPS are not very clear. Here are some ideas for setting up the transmitter for a "full house" glider operation using 2 aileron servos, 1 or 2 flap servos, elevator & rudder. Features available include:

Launch - aileron & flap down, elevator up
Crow Braking - flaps down to 90 degrees, ailerons up 20 - 30 degrees
Speed - flaps reflexed (slightly up), elevator in pre-set down position
Aileron/Rudder couple
Elevator/Flap couple

The philosophy I use is KISS. (So, why did I buy a 7UAPS?) I have used switches to select the desired control surface position so they will be the same for each launch or speed run.

Model Set-Up

Separate servos are required for aileron operation.

For flap operation, 1 or 2 servos may be used. I strongly recommend using a strong servo such as the Futaba 3002 to absorb the strain of holding the flaps down to 90 degrees at high speed and also to withstand the shock of landing with the flaps down. If you use 2 servos, they must be mounted so that the arms are both on the same side (e.g., both arms on bottom and left side of servos). Also, the arms must be mounted on the same position on the servo.

Receiver Set-Up

Aileron left servo plugs into channel 1 & right servo plugs into channel 7
Flaps Channel 6 - use a Y lead for 2 servos
Elevator channel 2
Rudder channel 4

Transmitter Set-Up

Set the model Select function 'SEL' to a spare memory.

Set the mode to 'GLID' ... Remember, if you change to another mode, you will lose the memory of all your settings!!

Let's look at each of the settings in turn. Refer to the instruction manual for basic operations, also.

ATV Set to your own requirements to control the amount by which each servo travels.

Dual Rates (D/R) Set to give dual rates for AIL, RUD, ELEV. (See also COMB.)

Exponential I only use this one on my elevator to soften up the feel of a very sensitive elevator. Also, useful on AIL & RUD.

Reverse As required.

Fail Safe Your choice. I set the flaps to 90 degrees down so if I lose control, the model should descend!

Pre-mix 1 Master 2, Slave 6 - Operate flaps down 5 - 10 mm with up elevator. (Useful for quick F3B turns and Slow flight.

PMX 2 Master 5, Slave 2 - Use the gear switch to select a predetermined amount of down elevator for speed. Select 0% for off side of the switch and + or - the required amount of down elevator for the ON side.

Launch (STAT) Skip ahead to Differential notes, and then do this section.

Ch 1 - Select left aileron down the required amount. (The right aileron will slave the same amount.)

Ch 2 - Select some up elevator to help with the launch.

Ch 6 - Set flaps down slightly more than ailerons. (Helps prevent tip stall at high angles of attack.)

Airbrake (ABRK)

Ch 1 - Set left aileron up desired amount (about 20 - 30 degrees).

Ch 2 - Set elevator down. Needs a fair bit. Check at altitude during flight.

Ch 3 - Set throttle to ON. This gives a variable Crow Mix. You could also use OFF so that when you select the switch to 6 - 2, the crow brakes will immediately fully deploy. (I prefer the first method as this keeps your finger on the Aileron or Rudder and Flap control. You could also use the Set Cut-off point function so that the ailerons only go up at low throttle setting.

AIL-RUD Couple (1-4) Set the rudder to move in the same direction as the ailerons at about 50%. This will help to balance turns. I recommend using the rudder D/R switch to select 1-4 on and off for speed runs, etc. (See also COMB note.)

Differential (DIFF) Select the amount of travel you wish in each direction - more up aileron than down!

Flaperon (FLPR) Leave off - INH

V-Tail (VTAL) Leave off - INH

Flap Trim (FLTR) Select on. Then, use ch 6 knob to set flap neutral point in conjunction with the FLTR % amount.

Sub-Trim (STRM) Ideal for fine tuning of neutrals, particularly at the set-up stage.

Parameter Setting (PARA)

R.SET Panic button - If you get confused and wish to start, again!

ATL Off - This function allows the throttle (Flap) trim to work over the full travel of the lever, and not just the bottom end as is normal on a power plane. This only works with a servo plugged into Rx ch 3, which then doesn't allow you to program in the Launch function

COMB I select all the dual rates on the aileron D/R switch as the only time I ever use the function is for speed runs. You can still set the individual rates for AIL, ELEV & RUD in D/R mode. Use COMB 3.

MXSW Set to 12 so that both mix functions are on the P.MIX switch.

Mix Set to GLID. There are some useful functions in AERO, but you also lose a few like STAT. Remember, if you change modes here, you lose all your settings!!

MOD C= PCM; F = FM receivers.

COPY & SEL I have my F3B ship set up basicly the same in 2 memories: #1 for duration and distance, and #2 for speed. (See alternative set up.)

TRIM Very useful! Re-sets control surface neutrals so Transmitter trims remain in the centre position. I use this function at the field to fix minor adjustments. On a test flight, I like to launch with this function so that I can easily fix any major trim problems.

Alternative Set-Up

With the above set-up, the flaps are only available with the switch in the 6-2 position. I like this as I then fly with the switch in the centre position where any playing with the throttle will not move the flaps. If I wish to thermal with flap down, then I select 2-6 (Launch position), and fine tune any elevator compensation required with elevator trim. For speed, I use another model memory, which is a copy of the above settings, and then make the following changes:

PMX 2 Master 3, Slave 6 - Gives the throttle a full-time flap function. Adjust the percentages as required. (You will also need to adjust ch 6 knob and % in FLTR.)

ARBK

Ch 1 - Set ailerons up (reflex), as required.

Ch 2 - Set elevator down, as required.

Ch 3 - Set to off, so that moving 6-2 switch will immediately deploy flaps & ailerons up.

Ch 6 - Set flaps up required amount.

This will leave you with the same launch function, Full flap for landing - no crow, but accurate landings not required in the speed event. Test the Airbrake function at altitude, as it can take a few tries to get the correct setting, especially for elevator compensation. Another hint - Raise your flaps just prior to landing (a few inches above the ground) to save the shock on your servo and its mounting.

Good Luck!! ■

Kit Review

Alcyone Unlimited

...by Jim Thomas
West Lafayette, Indiana

The Alcyone is a LeRoy Satterlee design kitted by Culpepper Models that is being sold through Northeast Sailplanes. It is part of the "scaled-up Chupperosa" series, and is intended as a first aileron sailplane or a high-tech sport plane. It is aimed at the intermediate builder-flier. The wing is of balsa-sheeted foam core construction, and the builder can purchase the kit with a choice of built-up or composite construction for the fuselage and tailfeathers. It can be flown on a three channel radio (coupled aileron/rudder, stab, flaps) or a full-house computer radio with servos on each flying surface. The ship has a planform quite similar to many other current designs, with straight trailing edge, tapered leading edge, and polyhedral wing tiplets. The wing is a two-piece design with a novel bolt-down feature.

The review kit included the new, balsa-sheeted foam core stabs, and the optional fiberglass fuselage. Kit component quality was generally good, although the wood supplied for sheeting the wing was a bit on the heavy side (8 lb. stock). The fiberglass fuselage was satisfactory, but the nosecone fit to the fuselage could be improved. As received, the canopy had a 1/4" gap between its rear edge and the recess in the fuselage to accept the canopy.

Construction is straightforward and well documented by two full-size plan sheets and an instruction book, which included helpful photographs. The instructions received were for the original version of the Alcyone (wood fuselage and built-up stab) and did not discuss the fiberglass fuselage option or the foam-core stabs. A phone conversation with Mel Culpepper indicated that the updated instructions will be included in kits about the time this article publishes. However, the plans were sufficiently detailed to allow straightforward construction; the instructions would be supplementary to the experienced builder.

The wing and stab skins were attached with West Systems epoxy applied by vacuum bag. The rudder was conventional built-up balsa construction. The wood parts and control cable tubes were installed into the fuselage with epoxy or thick CA.

The Alcyone incorporates a couple of novel features in its spar system and wing attachment system. The spar itself is a basic design with a balsa core with spruce caps and plywood shear webs. The unusual part is that the spar incorporates not only dihedral, but also sweep. Fortunately, the required jig is both described in the instructions and the pre-cut pieces were included in the kit. A lot of fitting was necessary to obtain a good fit prior to locking the joiner tubes into the spars. This is critical to ensure that the two wing halves will mate together accurately with the proper dihedral.

The wing attachment system consists of the wing root ribs (1/4" ply, which are pre-drilled for the joiner tube, anti-rotation pins and mounting bolts), a 5/16" steel joiner rod, two steel clips (3/4" long, 1/2" across, 1/4" arms) and 1/4-20 nylon bolts. The combination of clips with bolts capture and hold the two root ribs together, providing both the means to hold the wing halves together and the mated wing halves to the fuselage.

The wings, stabs and rudder were finished with Monokote. The flaps and ailerons were hinged with tape. The fuselage was filled, primed and painted with Krylon-brand enamel. The Airtronics ATRCS/Module 7SP system with a standard 700 mah square battery was used, with servos for each flying surface. The servos in the wings were Airtronics 141, with standard size servos (Airtronics 102 and 735) in the fuselage. The finished Alcyone needed 4 oz. of lead in the nose to balance at the recommended CG, for a finished weight of 70.1 oz. (wing loading of 10.35 oz./sq. ft.). Considering the use of 6 servos, the fiberglass fuselage and balsa-sheeted foam stabs, this is a reasonable weight.

The CG and towhook were placed at the recommended locations (CG right on and towhook at aft position) for the initial flight. A hand launch showed that everything was near neutral. The first flight indicated that the towhook location was nearly perfect and that the CG was a bit too far back for the ship at 70 oz. About 1/2 oz. of nose weight was added, and flight testing was continued. This ship proved to be stable, responsive and fairly maneuverable for an unlimited class sailplane. There was little lift and 10 - 15 mph of wind on the afternoon when the test flying was done, but the Alcyone had little trouble staying aloft for 5 - 8 minutes. It was able to range to the limit of sight, and cover a lot of ground with ease. When small pockets of lift were encountered, 3 - 4 degrees of trailing edge camber would slow the ship up and allow tight, efficient turns. Judging from its ability to fly in marginal conditions, this ship should be a real pleasure to fly on a good thermal day.

In conclusion, the Alcyone was straightforward to build and finish, and flew in a predictable, stable and well behaved fashion with no bad habits. It will thermal very efficiently and will move across the sky with ease. With a retail price of $199 (including fiberglass fuselage option) the intermediate pilot wanting to move up, or the advanced pilot looking for a smooth-flying, efficient ship, will find the Alcyone a bargain. ■

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