

# Soaring Digest

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Front cover: Three Bats. Two completed CoroBat fuselages sit beside an untouched Cramer Flat Bat, their primary component. For the complete CoroBat project, including construction, see "CoroBats Hit the Slope," starting on page 4 of this issue. Photo by Larry Weller. FujiFilm FinePix 4900ZOOM, ISO 200, 1/20 sec., f5.6

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### 4 **CoroBats Hit the Slope**

A plastic flat-sided baseball bat and sheets of Coroplast become a nearly indestructible V-tail sloper. A history of the design and the entire construction sequence are presented in text and photos by Larry Weller.

### 24 **A Bride's View of R/C Gliding**

Mary Ann Parker relates her experiences revolving around a major RC soaring event, the Northwest Soaring Society Tournament. (Originally published in the NWSS Newsletter, 1987)

### 25 **Learning to Use a Hi-Start**

Building on Jerry Slates' hi-start article from the July 2006 issue of *RCSD*, Ed Anderson explains hi-start dimensioning, preparation, and launching techniques, including required tension and recovering from errors.

### **28th Armidale Sailplane Expo 33**

A long weekend to celebrate Australia Day, great weather, winch and electric launch thermal soaring, plus RC-HLG and an appearance by Joe Wurts made for a wonderful and memorable event.

Text by Brian Ford with photos by Peter Pine, Jo Carbines and Peter Prasser.

### **Morelli M-200 Walk-around 40**

The M-200 is a two-place sailplane with a staggered seating arrangement and performance better than generally expected from this type sailplane. An additional bonus — the construction materials and methods used on the full size aircraft are easily simulated in model form. By Mark Nankivil.

Back cover: Dave Beardsley's Rodel Model 4.3m ASK 21 flown from Memoloose Airstrip, over Hells Canyon just outside Imnaha, Oregon. This was taken at the *Quiet Flyer* Alpine Soaring Adventure 2004. Even on a stormy day, the Alpine lift was excellent. Photo courtesy of Dave Beardsley. Nikon D-100, ISO 200, 1/750 sec., f5.7, 200 mm

# R/C Soaring Digest

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## In the Air

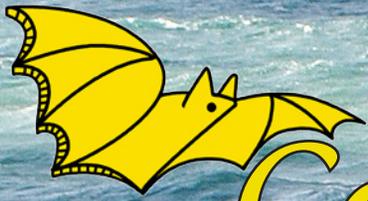
Writers new to the pages of *RC Soaring Digest* are the hallmark of this issue.

- Ed Anderson has been writing articles for various on-line venues for some time. A recent thread on RCGroups stimulated him to begin writing for *RCSD*.
- Brian Ford, Peter Pine, Joe Carbines and Peter Prasser got together for the Armidale coverage after we asked Peter Pine about that possibility earlier this year.
- Mary Ann Parker, wife of Kirby Parker, is still involved with RC soaring and the Northwest Soaring Society. Kirby sent in her "A Bride's View of R/C Gliding" in response to an R/CSoaringDigest Yahoo! Group message.
- Larry Weller, a friend of Tom Nagel, flies his Corobat from the slopes of Lake Michigan, along with Bix Norman, and Rolly Kardian. Larry is an excellent photographer, as can be seen by the construction photos and the lake shore shots which he managed to capture despite a biting wind.

Thanks to everyone who contributed to this issue!

Our Redwing XC is finished! It took thirty-five ounces of lead in the nose to bring the CG to a conservative location. Some of this will no doubt come out during the initial flight testing, but it does make for a heavy fuselage. Actual flight testing will take place after its appearance at the Seattle Museum of Flight Soaring Expo at the end of February. 60 Acres will hopefully be dried out by then.

Time to build another sailplane!



# CoroBats

## hit the slope



Article and photos by Larry Weller, [larry@moynihangallery.com](mailto:larry@moynihangallery.com)

## Part 1 - Introduction

Just when I decided heaven on earth was sitting in a lawn chair flying thermal gliders I met regular *RC Soaring Digest* contributor Tom Nagel when he returned to Saugatuck, Michigan for vacation in the summer of '07. Tom, my friend Bix Norman and I went to the local Tulip City Air Force Club field on the outskirts of Holland, Michigan, to fly electric gliders on a beautiful summer day.

I knew of Tom's interest in slope gliding from our previous e-mail correspondence. On the way back to Saugatuck, a little resort town where Tom and his family were vacationing, and close to where I live, I pulled off the two-lane highway to show Tom a monumental sand dune overlooking Lake Michigan. His excitement about the slope gliding potential was so contagious that shortly after he left for home, Bix and I bought and built a couple of Weasel Pros and a couple of Erasers. In short order we were on our way to becoming slope dogs.

Then we bought a couple of Le Fish or "fishies" as designer Steve Lange (Surfimp) fondly refers to them. I laid the Le Fish parts out on my building table and went to <http://www.rcgroups.com/forums/> to review how Steve built his Le Fish. Somewhere in the middle of 2003-2004, Le Fish build-forum Steve describes a simple Coroplast design he



made for the slopes suggesting a more conventional build would be heavy.

You all know Coroplast? It looks like a plastic corrugated cardboard, which is essentially what it is. This interested me because, coincidentally, at this same time, a friend, Rolly Kardian, whose dad Rich Kardian taught Rolly how to fly RC slope gliders off the dunes of Western Michigan at the age of 8, was mulling over a conceptual Coroplast sloper.

At one of our regular Saturday morning breakfast gatherings I shared with Rolly

Surfimp's comments. Rolly gets a certain look when confronted with a challenge.

Several years ago Rolly built a number of powered combat planes from Coroplast inspired by others' experiments found on <http://www.spadtothebone.com/SPAD/> and other web sites.

About a week later, sometime in mid October, several of our club members were back at breakfast. Rolly asked us to come to his car to see his concoction of arrow shafts, Whiffle Bat, and Coroplast. What we saw is very much like what you



see in these pictures, except the bat still looked like a bat.

The nose of his prototype glider was the stub end of the bat. As a consequence of the short snout, Rolly used a four C-cell receiver battery along with a couple of ounces of lead to get this aileron and elevator only glider to balance on the spar.

The glider can be built with about \$30 – \$40.00 in materials, less electronics. Your cost will depend on what you have on hand and experience.

The wing is great! There is about a 1.5-degree dihedral to fix that droop look of many straight wing planes, and the spar is tapered upward so that the airfoil slims nicely from the root to the tip.

Unlike many of the early Coroplast wings, Rolly designed the wing with the flutes running front to back. This technique adds considerable strength and aids in creating a smoothly rounded airfoil. Inside of the 2-mil wing where the leading edge arrow shaft is located, the skin is 5/8" wide to remove one layer of the skin

and most of the underlying flute material. This allows easy wrapping of the wing skin around the arrow shaft to form a realistic airfoil.

There are no ribs whatsoever in the wing. The tapered 5-ply wood spar and the 4-mil Coroplast aileron and trailing edge combination, along with the stiffness of the Coroplast and gluing jig, create a nice looking semi-symmetrical airfoil with a slight undercamber. You may not find this airfoil in Compufoil, but if you are a seasoned glider flyer you know it will work!

Two days later I called Rolly and my other good flying friend Bix to meet at Tunnel Park, overlooking one of the many beautiful swimming/sunbathing beaches along the coast of Lake Michigan. This site is located a few minutes north of Holland, Michigan. A spy cam mounted to a condo complex about a mile south from the slope (<http://www.spyglasscondos.com/weatherstation.as>) showed on my computer monitor the wind to be out of the west at 20-25 mph. Bix and I had our Weasels and Erasers. Rolly had his prototype V-tail, Coroplast-Whiffle Bat. For the next half hour or more the three of us cruised the slope sometimes tagging each other intentionally or not. The real hoot, though, was to see the blunt nose bat flying so gracefully rolling and looping as it sailed along.

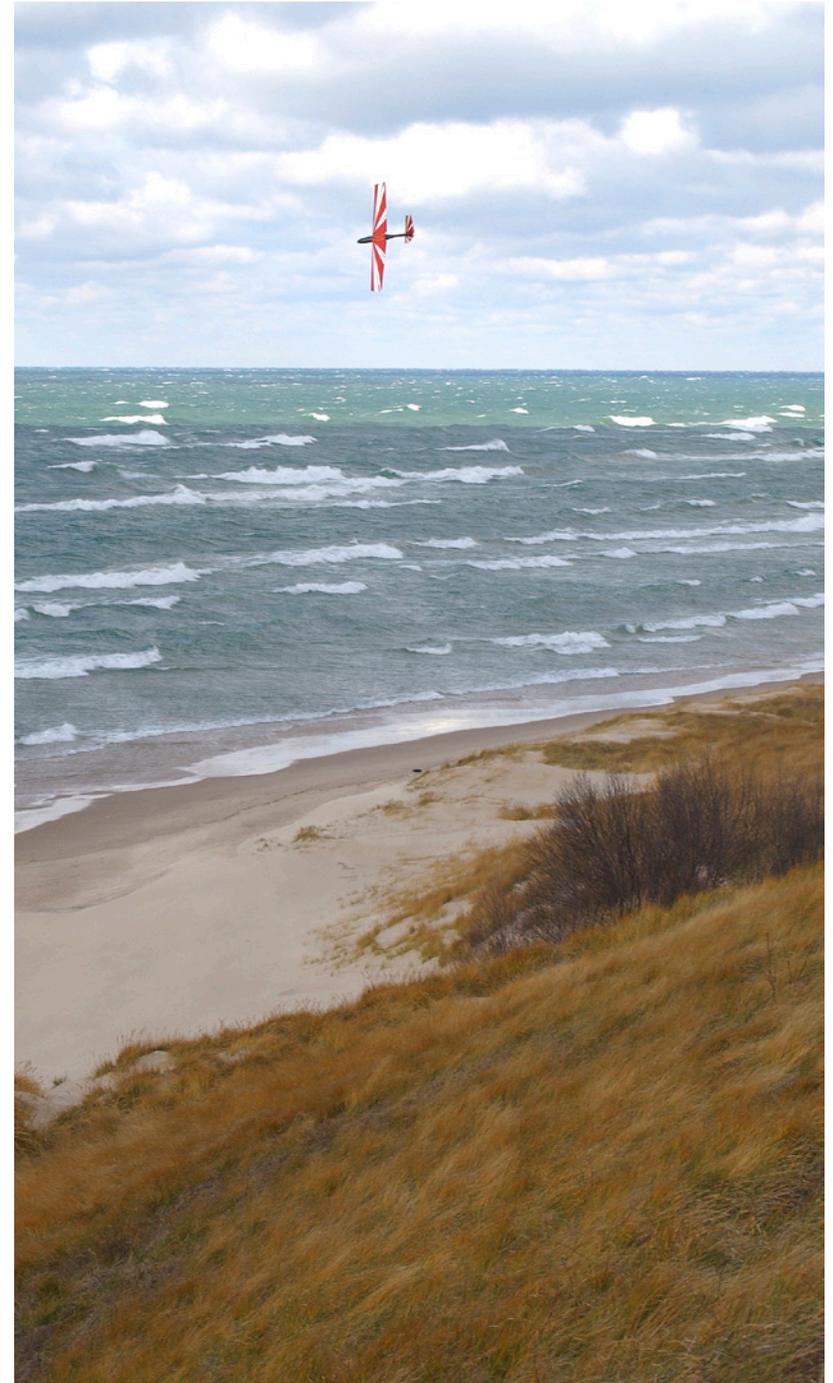
Back at my build table I carefully collected the parts for my Le Fish and temporarily put them away in a drawer to make room for a Coroplast/bat glider.

Rolly had chosen to build his wing 6' and then trimmed it down to 5' because he liked the proportion. I liked the proportion, too, but when it comes to throwing out a foot of wing, I couldn't bring myself to it and neither could Bix. As a matter of convenience and timing I did most of the build on both Bix's and my plane. After cutting the parts for both I found it easier to complete mine first so I could think through procedures with materials about which I'm unfamiliar. Even though Rolly's glider flew well on rudder and ailerons, Bix and I elected to go with ruddervators and ailerons. Rolly made this change on his as well when he was fitting the new nosepiece.

You'll find after building one of these planes they become very quick to build and it is really easy to cut parts for several at a time. Done. Besides their strength, this fast build is what makes them a popular combat plane. Once the parts are cut they go together in about three days or so. If you leave the bat black, the canopy is the only thing to paint! The Coroplast comes in a variety of colors. Add some trim tape if you like and you're done. If several flyers build a few of these together it really helps to speed things along.

A week or two later we all had our gliders done. Rolly's reworked CoroBat weighed in at about 34 ounces, while Bix and my larger wingspans add about 8 more ounces. All finally sported plastic noses made from a 1.5 liter Evian water bottle (found at Walgreen's and some super markets) formed with a heat gun over a plug Rolly carved from some blocks of balsa glued together. He traced the shape from the front end of the bat before he cut off the tip of the bat. When all was done this nose was very rugged. Now we just had to wait for a west wind blowing across the lake from Chicago.

After what seemed like forever, a weak wind from the west blew in. Sadly, it was less than 10 mph. I flew my Weasel and Rolly actually was able to fly his CoroBat... barely, but he kept it in the air until we lost all wind.



The next call from Rolly came when I was at work. As I spoke with him on the phone from my desk I checked the Spyglass Weather Station on-line. It showed winds 30 to 35 mph. Winter was just around the corner. In fact, this 33 degree day would be our last slope flying for the year. Grabbing my plane and transmitter, which I keep at work, and a spring jacket (but no gloves), I headed for Tunnel Park.

At the risk of creating an oxymoron, I would call Tunnel Park a “gentleman glider pilot’s site.” This is because you can park close to the steps that take you to the top of the dune. The steps are easy for even an overweight sixties something to climb without the need for a medic spotter. At the top there are convenient park benches at bump-outs along the ridge that appear to be designed for pilot stations. There are even steps down to the beach to make the “walk-of-shame” in relative comfort. Soft dune grass covers the slope as well as where the sand beach meets the rise. A fenced off grassy area immediately North of the public park is our landing area. The fence is conveniently bent down on one section making it fairly easy to throw a leg over to fetch your plane, yet discouraging casual passage. The Department of Natural Resources frowns upon walking on dune grass in Michigan. The ridge is quite long and this allows for some terrific gliding distances. There is

only one smallish tree on the slope that I heard might become diseased sometime soon. Flying season pretty much ends here between Memorial Day and Labor Day because the beach becomes one magnificent tanning booth. This can be a distraction when the demands of this sport require you to concentrate on your plane.

When I stepped to the top of the slope with my CoroBat and transmitter in hand, I was almost blown back down the steps. Rolly was huddled on a park bench patiently waiting for me to come and launch his glider. The wind was far too strong to hold my airplane with one hand to launch. I put it down . It was all I could do to hold Rolly’s plane at the edge of the ridge with both hands. Rolly nodded to let it go... but I couldn’t. The gale made it a struggle just to keep it facing windward. After a minute there was a bit of a lull and off it went. She bobbed a couple of times as Rolly attempted trim adjustments with gloved hands, gloves that by this time I was coveting. In a matter of seconds the plane blew at what seemed terminal velocity into the hill. The wing popped off and I thought the plane was toast.

Not so! The rubber bands saved the day. After close inspection of all parts the only damage was a slight eighth inch nick in the paint on the underside of the plastic canopy. I told you this nose is a

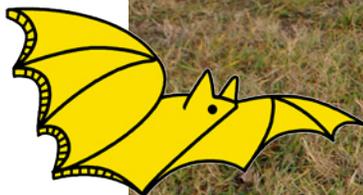
lot tougher than it looks. The canopy is attached to the plastic bat along with the receiver and servo tray in a way that allows for flex. When Rolly flew combat with a similar build he never had a glue failure. This plane can take a hit!

After a few minutes of Rolly reprogramming the controls, I attempted another launch. This time the plane flew for part of a second as it slammed into the ground in front of me, hitting the fence at the same time. No damage. The wind was so intense. Later we learned that a radio station reported wind gusts of 56 mph in our vicinity at the time we were trying to fly.

One more attempt led to a successful flight that lasted for a half hour. By that time I was in complete misery from exposure to the cold. Part of me wanted to get the hell out of there and part of me was mesmerized by how well Rolly flew the plane... running the slope and stunting along the way, while the lake below boiled in the gale.

I want to mention Steve Lange again. He is someone I have never met, but I admire his creativity and design skills. Because the inspiration for the CoroBat came out of Steve’s little EPP slope glider Le Fish, we sometimes refer to our CoroBat as Le Bat. I’m building one more CoroBat, and then getting back to building my Le Fish.

# CoroBat



## Part Two - The Build

### CoroBat Materials List

- Wing

This Coroplast source will cut and ship small amounts of 2 and 4-mil sheets. <<http://www.harborsales.net/fullsheetlookup.cfm?categoryID=6&subcategoryID=12&cat=Plastic%20Sheets#productview>>

Note: Where I note (flutes = x") this means the flute length should run the direction of x" when cutting out the part.

Wing skins: 2 ea – 18" (flutes = 18") x 36" – 2-mil sheets. Route one pass with router and 5/8" bit or multiple passes with Dremel router (make a 5/8" x 3 foot groove – 7" from trailing edge). Route just deep enough to remove one layer of skin and most of flute material. This allows wing skin to wrap smoothly around an arrow shaft.

Spacers between arrow shaft and spar: 8 ea – 2"x 2" – 2-mil sheets.

Servo compartment doublers: 2 ea – 4" (flutes = 4") x 2.5" – 4-mil sheets.

Ailerons: 2 ea – 36" (flutes = 36") – 4-mil sheets. (Ailerons are 5 flutes or 1 1/8"



wide.) Make sure to cut the strip 9 flutes wide as 5 will be the exposed aileron and 4 will form the trailing edge between the 2-mil top and bottom skin.

Center wing doublers located behind spar: 1 ea – 5"x5" – 4-mil

Center wing doublers located in front of spar: 1 ea – 2" (flutes = 2") x 5" – 2-mil

Outside wrap over wing joint: 1 ea – 5" (flutes = 5") x 10" – 2-mil

Wood Spar: 2 ea – 1/4" x 36" Wood Spar (5 ply) – Taper on table saw 36" long x 5/8" high (at root) x 3/8" high (at tip). Purchase plywood from your local hobby dealer.

Optional: 2 ea – 36" carbon fiber reinforcing strips or tubes, epoxy to face of spar. Use depends on whether you build your planes to fly or to crash.

2 ea – 1/4" x 6" plywood reinforcing doublers for front and back where spars join at center of wing.

3 ea - .260 (about 1/4") diameter hollow fiberglass "youth arrows" for leading edge. Purchase from K-Mart or discount sporting good store. Total cost approximately \$7.50 to \$9.00.

- V-Tail

1 ea - 22" (flutes = 22") x 5 1/4" - 4-mil sheet

- Fuselage

1 ea Cramer Flat Bat - 27" or 27 1/2" (ours measure 27" but the same bat on web site lists 27 1/2"). <http://www.school-tech.com/bats3.html>

- Canopy-Nose

1 ea - 1.5 L Evian water bottle (this is taller than most 2 L soda bottles). This is a little difficult to find -- try Walgreen's or a super market.

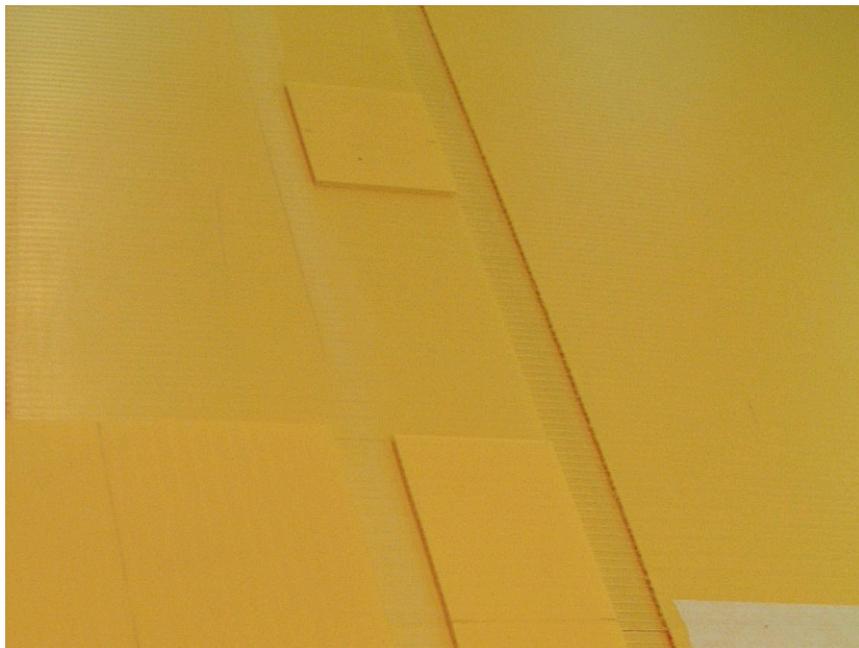
Enough balsa to assemble a 3.25" x 12" block to carve out canopy plug.

#### Building notes

1. Begin by cutting out all the parts carefully according to the material list above. Note that all the flutes are cut in the right direction and that you have counted the flutes required for the elevators and ailerons. In particular the ailerons need to be nine full flutes wide.

2. The wing skins should be rectangles at this point. Draw a line lengthwise on each wing skin 7" up from the bottom. Draw another line 7 5/8" up from the bottom and router out this 5/8" area with a 5/8" bit on a router or with a Dremel and router bit. If you use a Dremel router you will have to make several passes to achieve the 5/8" relief. Test your router bit depth on a scrap piece of 2-mil Coroplast. The goal is to remove a layer of skin and most of the flute material beneath it. Router a left and right wing skin. Go to the bottom of the 7"x36" rectangle area between the routed edge and the bottom of the wing skin and mark 1/4" up on one corner and 2 1/4" up on the other. Lay a straight edge across these points and trim off the waste. You now have the taper of your wing. Make sure you plan this out so you have a left and right wing.





3. If you don't have a table saw or don't know how to cut the tapered spar find a local wood worker. This is an easy job and shouldn't cost much. Look over the wing jig as well to see if you need help for this. It is a necessary tool for getting the airfoil right. Cutting the spars, wing jig and canopy plug are reasons to get several others involved. You can make three or more gliders in only a little more than time it takes to make one.

4. Join your wood spar with doublers and epoxy. I used a 1- 1.5 degree dihedral when joining the two halves... about  $\frac{3}{4}$ " space under each tip over the 72" spar length. You can see in the pictures that I reinforced the spar with a carbon fiber tube. This meant I had to adjust my 2" square spacer to accommodate the extra width. The spar must be exactly 2" behind the leading edge arrow shaft. I don't think I will bother with the carbon fiber spar reinforcement on the next wing. Rolly's does not have it and it survived a hard crash. This will be the whole spar at this point, but you will only glue the right side to the right wing skin for now. Scuff and apply acetone where the spar is to be glued and epoxy in place on the wing half you have on your table.

5. It is important to sand parts to be joined together and wipe with acetone just before gluing with thin CA. Apply glue sparingly with a wavy motion. Experiment with this on scrap pieces. Too much glue will not set or hold properly!

6. Lay out the right wing skin with the inside up on your table. Mark where you will place the 2" doublers along the wing. The doublers should be aligned right against the edge so that they will butt up with the arrow shaft one edge and the spar on the other. I planned for the servos about 15" from the root in case I cut the wing to 60" when I finished. It is a good idea to plan a doubler in front of the spar at that point. It is a good idea to put another doubler about 30" from the root in case you decide to make a 60" wing. Locate all the doublers in front of the spar and CA in place. Do not glue in the arrow shaft leading edge yet!

7. Take your 72" plywood spar and position the right half on the right wing skin you have just glued your squares to. Scuff and apply acetone on the wing skin where the spar is to be glued.

Using thick CA glue the right side of the spar in place. You can wick in thin CA along the spar, front and back to help keep it in place while the thick CA dries. Weight the spar down for the duration.

8. Use a carpet blade in a utility knife as shown and carefully clean out the 6th flute of your aileron strips. Practice on scrap till you get the hang of sliding the blade right along the flute without cutting into the adjacent flute. Remove the material from each side of the flute so just the top skin is holding it together. Now firmly hold one side of the aileron and bend the other side backwards over the side

you are holding. This will make a thin white line show along the crease. Do this on both sides of the single skin flute. Then, holding your thumb on top of the crease, bend the flutes down so that section folds into the space you removed with the knife. Move your thumb along as you go. Done properly, there will be a nice white crease on each side on the top skin where you folded. The 5-flute edge is the aileron. The 3-flute edge on the other side of the hinge gap is the trailing edge.

9. Scuff the four-flute side of the aileron strip, top and bottom in preparation to glue. Align exactly the open flute hinge joint with the trailing edge of the wing skin. You should tape it in place here and then draw a reference line on the wing skin to align the aileron before you glue it down to the wing. Use thin CA with a narrow wavy motion on either the aileron or where it will go on the wing skin. Position the aileron to your reference line. Rub across the aileron to insure a good joint. Now, mark and trim the 2-mil, 4" wide doubler to fit between the spar and the aileron leading edge. It should span across the area where the servo will go. Use thin CA to glue in place.

10. Now remove this half of the wing from the table and lay down the left half of the wing skin. After you are certain you have a left and right side going here, repeat joining the 2x2" doublers to





this skin along with the aileron. Now drag over the right half wing you completed with the spar attached. Line it up carefully to the left half on the table. You will need to support the right side on one end so that you can glue down the spar to the left wing skin. Install the servo and center wing doublers. Trace your servos (HS81 or now HS82) and cut out with a sharp X-Acto knife. A snug fit here will keep those servos solid. Later we tape the servos to the servo covers and screw down to the wing with small button head screws. Set the wing aside until you are ready to wrap the skin.

11. Mark the fuselage (bat) in preparation for opening up the nose, ballast compartment, and extreme tip of the handle for the pushrods. From the tip of the top of the bat (on the flat side) measure 3" back and place a mark. At that mark draw a line across the top of the bat parallel to the tip. At each corner draw a line (arc) down to the rounded portion





of the bat tip. The goal is to cut off the front of the bat at an angle. Now, mark out a 4" long rectangle 1 1/8" behind the first line you drew on the flat top of the bat. This is for the ballast cut-out under the wing. To check your measurements you should have an 18" span from the aft side of the ballast compartment to where you will cut off the tip of the handle. The total length of your bat will be about 26 1/8" after trimming. My chop saw made quick work on taking off the handle. I like to drill 1/8" to 3/16" holes in the corners before cutting the lines with a cut-off wheel fitted on a Dremel. This will make a mess, but we all have been there before. Use a file or coarse sandpaper to smooth your cuts. Grind down the edges of the corners to feather into the flat part of the bat where you cut off the front. This will make the canopy slip on better without distortion.

12. Trace the front, what would commonly be called the top of the bat, for the diameter of your nose plug. Our plug is 11 1/2" long. Remember the canopy has to span all the way behind the front wing rod on the fuselage. Shape it to slope down toward the front. This will allow the bottom to be relatively flat to accommodate the servo tray that extends almost to the inside front of the canopy. Drill out the center of the backside of the plug and glue in a heavy dowel rod handle. You will want this to hang onto when you heat shrink the water bottle. You can also clamp it upright in a vise so you can stretch on a hot piece of styrene over the nose for the nose cap of the canopy.



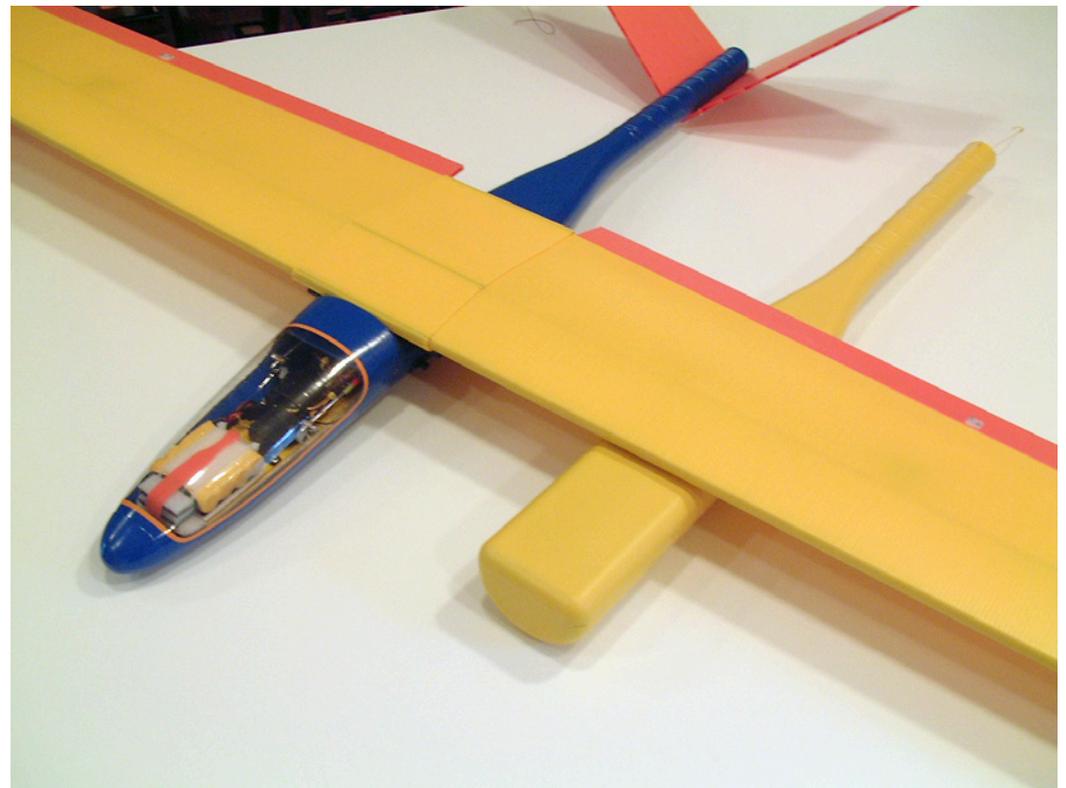
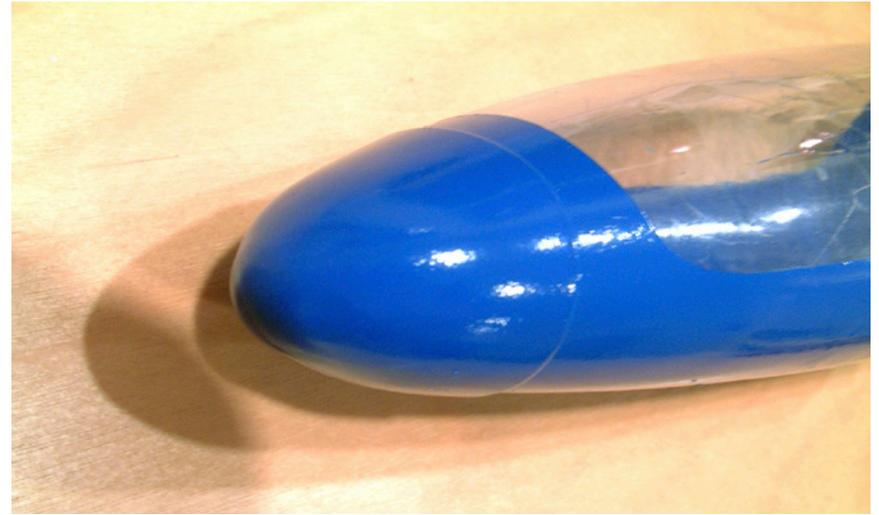
13. The canopy plug requires the canopy to be made in two pieces, one small and one large. This is because the bottle is too short for the nice nose shape and you need to somehow cover where the neck opening of the water bottle was. You will make the small piece for this. Use talcum powder to ease removal of the heat-shrunk plastic. Cut and remove just the very bottom the bottle. Cut and remove just enough of the neck of the bottle to allow it to slip over the plug. Slip the water bottle cylinder over the plug and heat the big end enough to bend it just over the back of the plug so it doesn't pull off as you shrink the rest of the bottle. Move to the neck and shrink that down pretty well so it doesn't pull toward

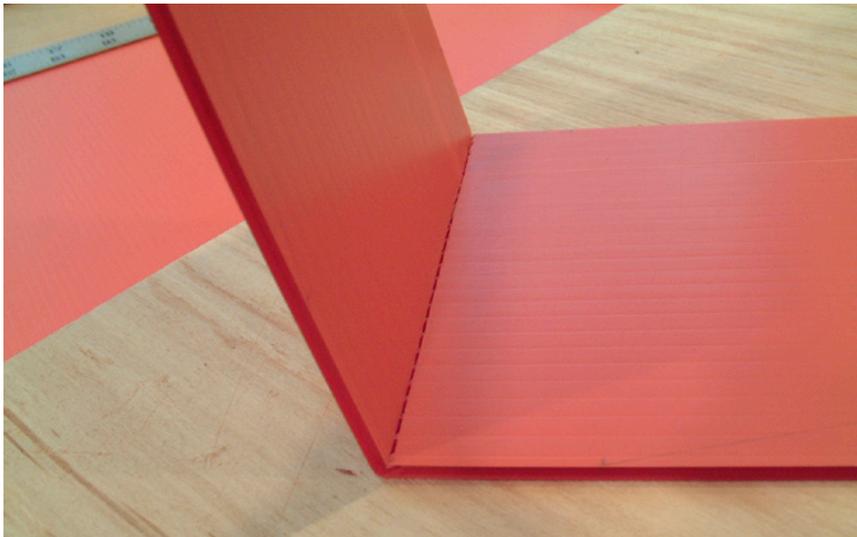
the back of the plug. Continue with heat across the bottle all the way around. You may not get this first time so get a couple of extra bottles, just in case.

14. Now find some scrap plastic or thin (0.030) styrene sheet from a hobby store and shrink over the small end of the plug. Trim to fit, scuff the inside and wipe with acetone. CA the front nose cap onto the canopy. When the canopy is painted the joint is almost invisible.

15. The V-tail can be made two sizes. For the 60" wing cut it as one piece 22" long. The trailing edge is straight. The leading swept from the center to 3" at the tip. Angle the tip to taste. This tail will be made from one piece of 4-mil. From the trailing edge mark 4 flutes inward and clean the 5th out the same as the aileron. This should extend the length of the tail. Bend and crease like the aileron. Draw a centerline on the top of the stab to define the left side of the V-tail from the right. Working on the top of the stab lightly score along this centerline through the top skin and just the flutes — no more. Move your ruler over about 1/8" from the centerline parallel to your last cut. Angle your knife toward your last cut to trim out a little wedge. Repeat on the other side of the centerline. Bend you stab back on itself at the centerline. This will not damage it. Clean your wedge cut with a single edge razor. The idea here is to have a small v-wedge cut in the top skin so that the tail will form a 'V' at a 70-degree angle but the bottom skin holds it together. Cut a notch in the ruddervators to separate the two halves. Make the notch wide enough so the halves just clear each other when moving up or down. The 72" wing has a 24" long stab before bending. Clean the cleavage with acetone. Prop up one side to form a 70-degree angle. If all looks well use a five minute epoxy in the wedge and let cure.

16. The servo tray is made from scrap ply or ply and balsa about 9" long. Shape to fit the curve in the





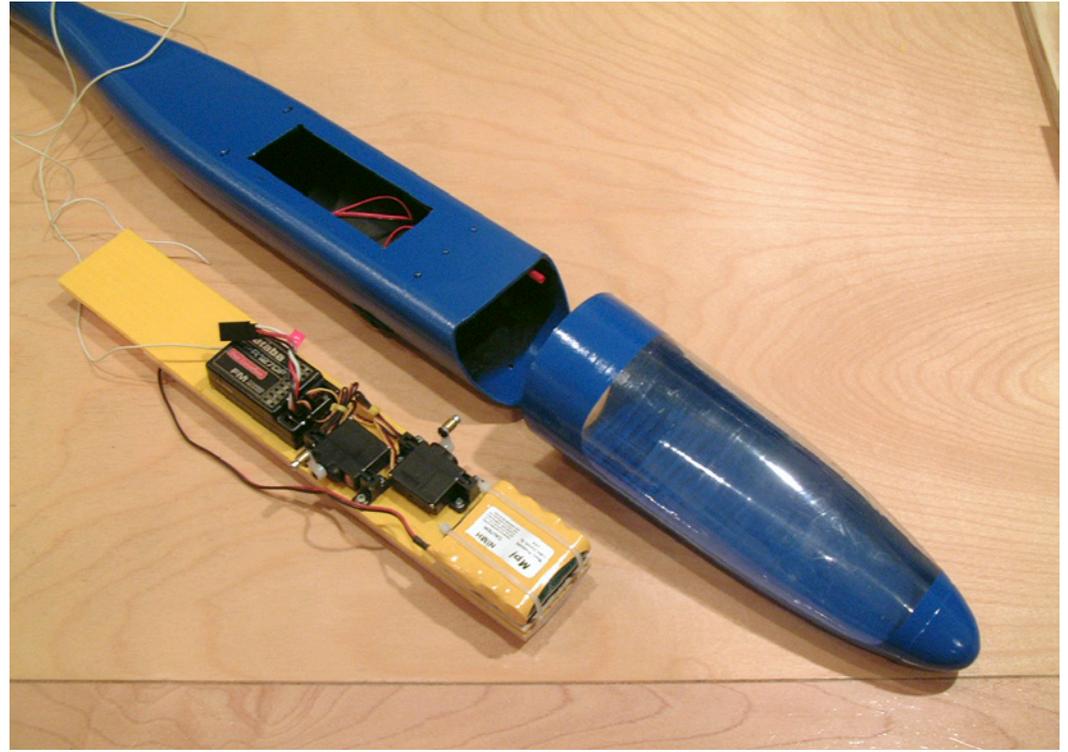
bottom of the bat. CA a 13" scrap piece of 4-mil Coroplast with flutes going lengthwise onto the ply. You will note the Coroplast extends back beyond the end of the ply. The Coroplast extension is where you will craft a ballast box out of additional Coroplast scraps. Think this through as you install the electronics. Wait to make to glue up the ballast box until you have installed every thing else in the fuselage. Doing so will assure that you can get at the push rod former in back to glue. Our thought was to make this whole tray to come out by removing two screws passing through the bottom of the fuse into blind nuts anchored on the plywood servo tray.

17. Locate your wing and drill holes in the fuselage for carbon wing rods directly below the leading and trailing edge. There is a seam on the bat about  $\frac{1}{2}$ " below the flat wing platform of the bat. This is where we drill.

18. The Sullivan pushrods are anchored to the inside of the tail portion of the fuse by drilling four holes for small plastic wire ties. Make two partial formers for the pushrods out of 4-mil Coroplast. Drill holes for the push rods and slide the formers onto them. Locate one just behind the back wing dowel and the other in front of the front wing dowel. With the dowel rods removed spot CA the tubes to the formers. When the wing rods are reinstalled the formers can't move. This procedure, along with the removable servo tray, will make repairs very easy should you ever need to replace a part or the fuselage.

19 The tail only needs to be screwed to the fuselage. Take care to line it up. We turned the bat upside down on a flat table and propped up the fuse so we could align the tips of the V-tail on the table while keeping the flat part of the nose square to the table. Control horns are mounted to the top of the ruddervators.

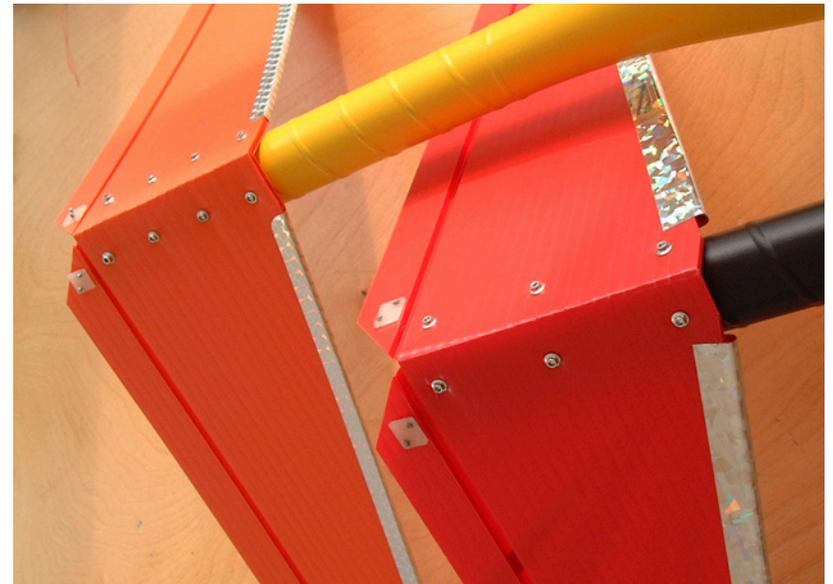
20. Trim and fit the canopy to the fuse so that you can retain the back of the canopy by the front wing rod. The canopy is also

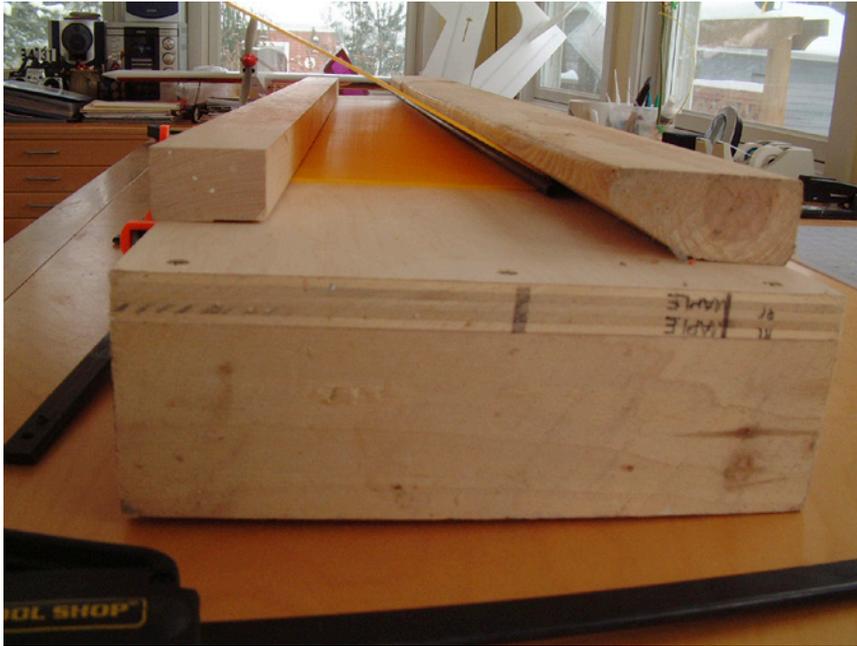


screwed to the servo tray. You can use an optional ½" x 10" sliver of wood to act as a skid. This provides a little additional support on the plastic canopy.

21. Finishing the wing requires making a jig like shown in the picture. There are two parts to the jig. The main frame and a stick made to hold down the top skin to the trailing edge. Three clamps provide the required pressure. Two people make this operation much easier because you don't have a lot of time once you CA the trailing edge.

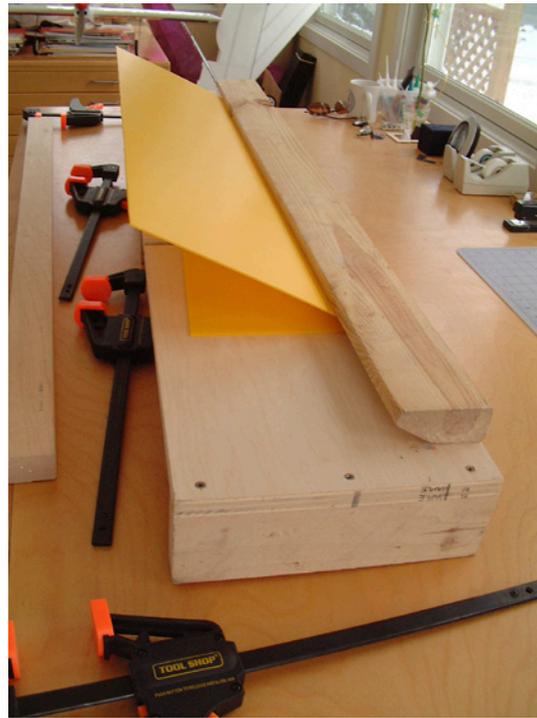
22. The arrow shafts need to be cleaned of tail flights and tip. Cut them as necessary to get 72" and use dowel rods in the carbon fiber arrow shafts to join. Try to cut and join so all the splices are in equal position on the wing. This helps keep the wing balanced from tip to tip. I bent a small piece of music wire rod for the center splice to the approximate dihedral angle.



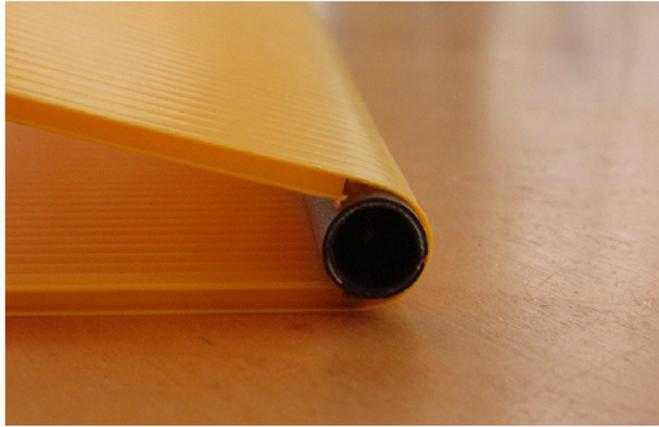
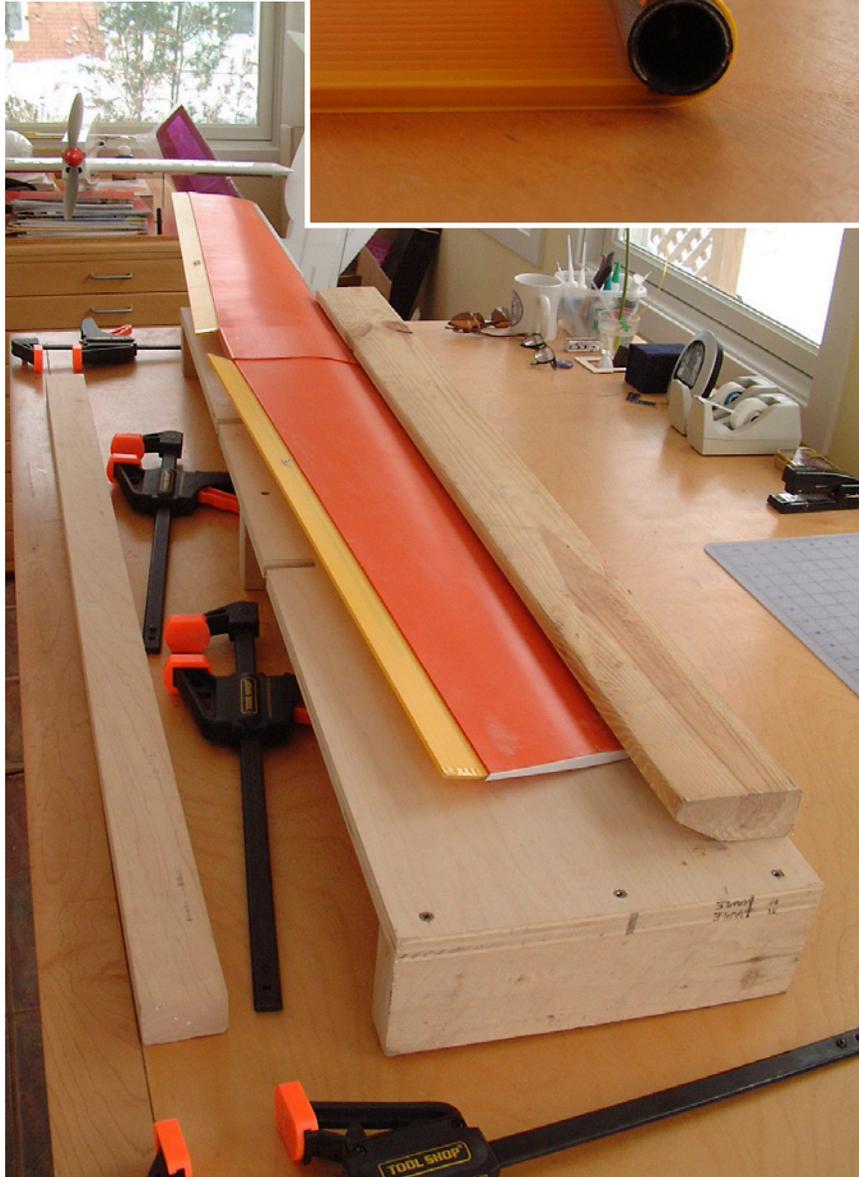


23. Cut a 1/2"x36" wide scrap of 2-mil Coroplast and temporarily tape this shim spanning the width, on the underneath side of the wing skin, just behind where the arrow shaft will be glued (this will add a little Philip's entry to the airfoil). After this side of the wing is completed, remove the shim and use it on the other wing panel. Place half the wing in the jig with the arrow shaft in place but not glued. Let the other half hang out from the jig while you complete this half. Trial fit with the wing well seated in the jig and pull tightly all along the top skin to pull it taught to the trailing edge. Mark each end of this top wing skin with a sharpie at the trailing edge. Remove the wing and cut the waste off the top skin with a ruler and X-Acto. It should now perfectly match the sweep of the trailing edge. This is where it gets a bit tricky. Remove the arrow shaft. Using a hot glue gun run a small bead just against the back edge of the section where the spacers will butt against the arrow shaft. Move like the wind with the glue gun... carefully making one long

but narrow bead of glue. If you use too much hot glue it oozes onto the front of the arrow shaft and makes for a bumpy leading edge. Slide the arrow shaft into position and quickly push the wing back into the jig at the same time as pulling the top skin back tightly toward the trailing edge. Hold this position for a minute or so while the hot glue cools.



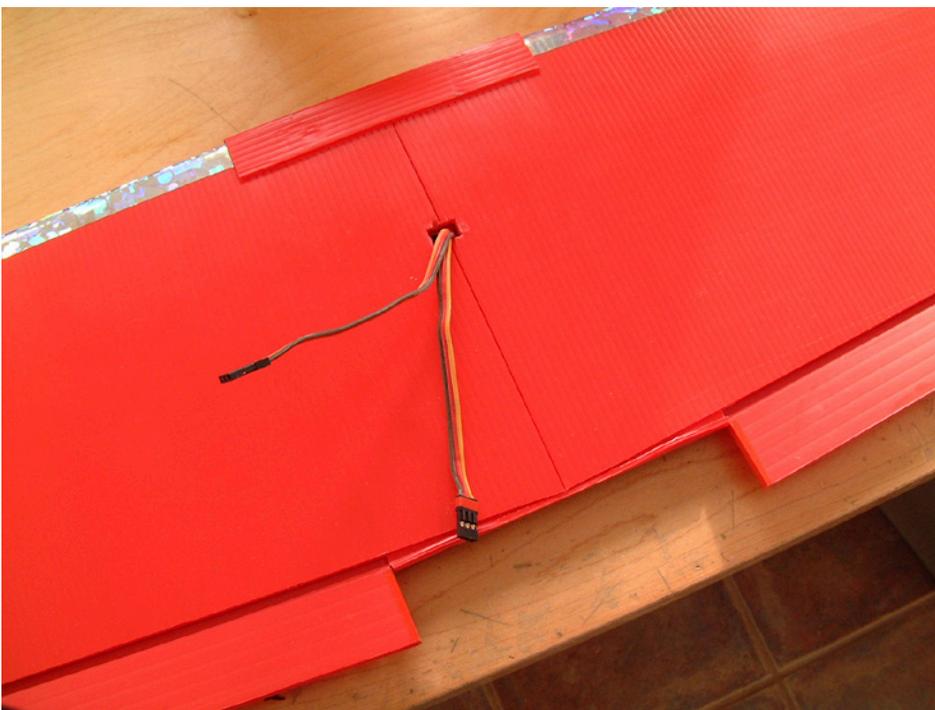
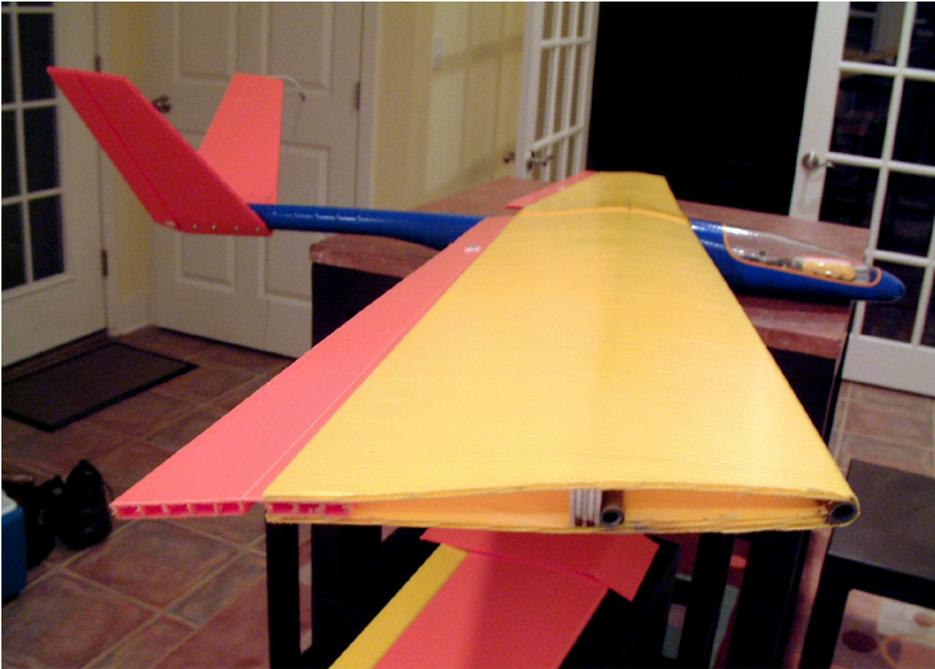
24. Pull the wing back again and make sure the glued arrow is seated properly in the routed area and that it is up tight against the 2x2" spacers. Align the wing just in front of the jig and quickly glue the top of the spar with thick CA. Apply thin CA to the four flutes of the aileron in a wavy motion. Slip the wing tightly into the jig pulling on the top skin one last time. Bring the skin on down to the trailing edge. Rub along the trailing edge to merge the glue to both surfaces. Place the wooden trailing edge part of the jig onto the trailing edge and clamp tightly. We leave this for about 30-40 minutes and swap lies about the greatest thermals we caught when we were ten feet from landing.



25. Time's up! Pull the wing to check your work. The trailing edge should be aligned and tight. If you experience a pop up on a section just weep in some additional CA and re-clamp.

26. If all is well, match up the other side of the wing skin to make sure it meets OK in the center. If it doesn't, trim this first before you cut off the waste behind the trailing edge. Repeat the process and you're almost done. About the only thing left is to fit the 2-mil 5x10" wrap for the center of the wing. Hold it in place so that there is enough material to cover the back of the trailing edge, over the top of the wing and back under the leading edge about an inch. This will prop up the front of the wing for a bit of positive incidence. To make a good fit around the leading and back of the trailing edge, use your carpet knife and remove the flutes from the side that will be glued down to the center of the wing. At the front of the leading





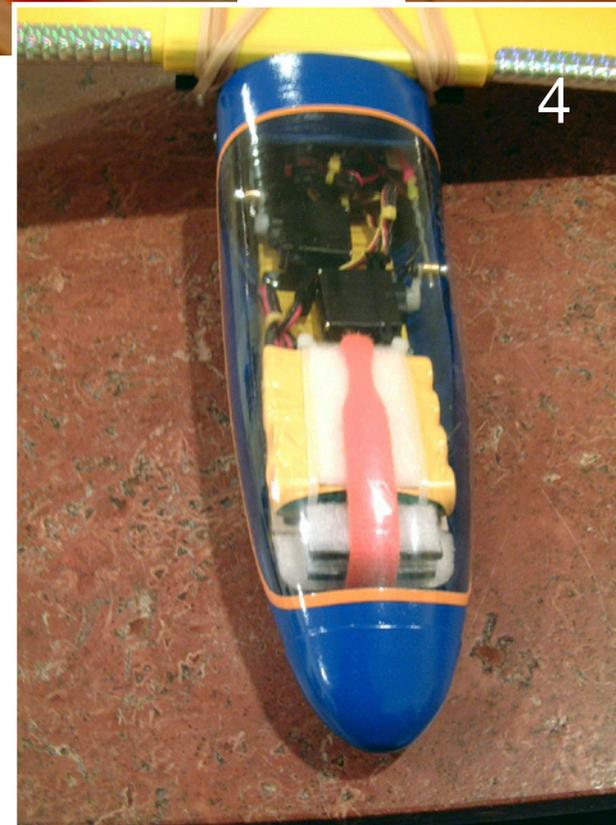
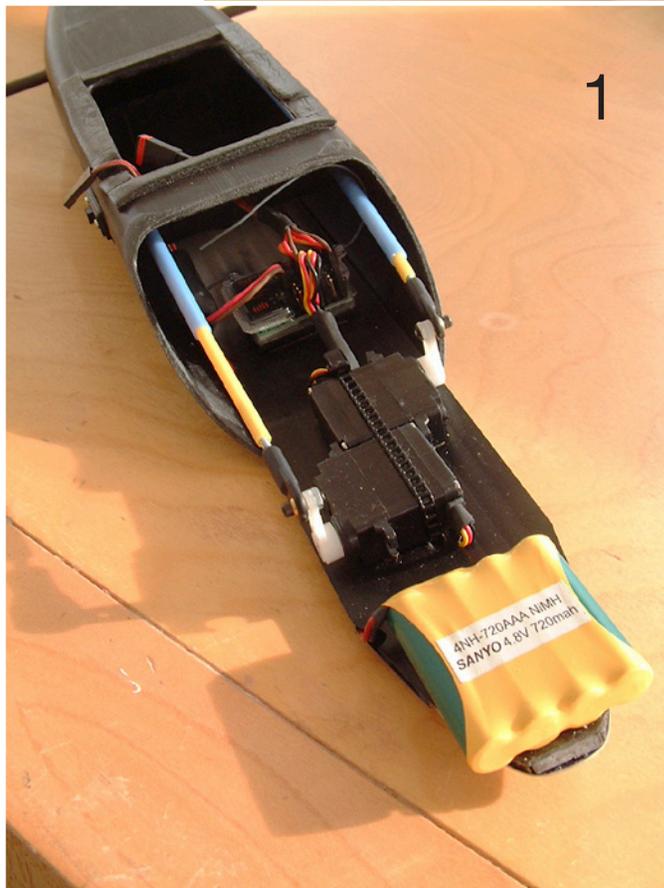
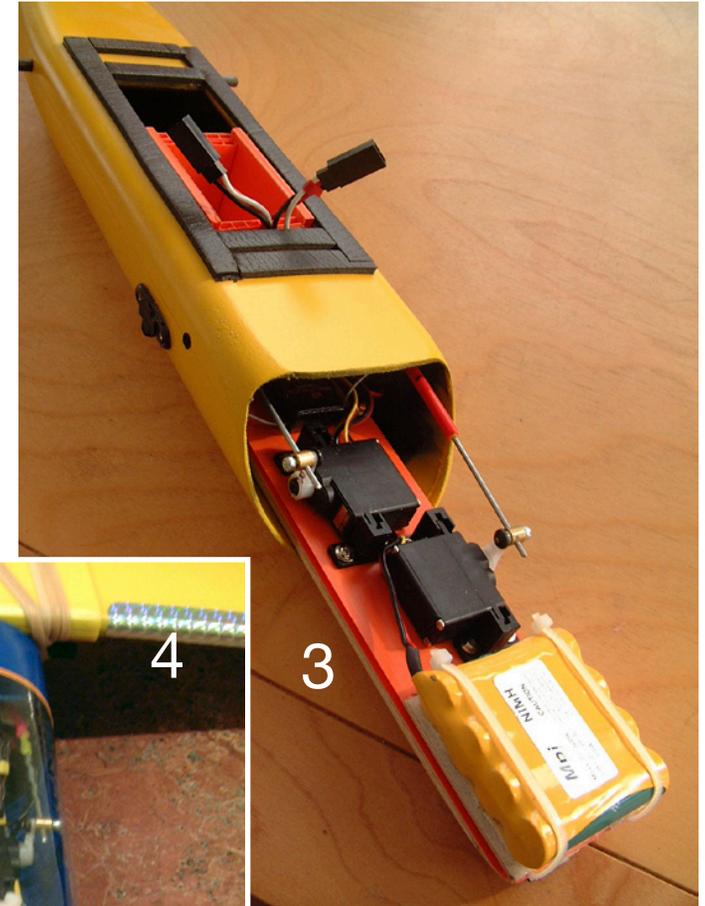
edge, the high spot on the top of the wing and a couple of spots on the trailing edge we shove thin carbon rods into the flutes to prevent the rubber bands from crushing the Coroplast. CA these in place.

The wing tip angles were cut on a table saw at a 15-degree downward slope. A sliding chop saw would be much easier, if you access to one.

Finally, cover all the open flute areas with clear hinge tape. The rest of the set-up is standard glider routine.

I realize this process may seem daunting if you haven't worked with Coroplast before. I cut the parts for six more wings and tails in about three hours including the routing. I could probably glue these up in a day or two. I made extras of everything as I went along on the first plane. The parts are cheap and most extras come from scrap.

Feel free to e-mail questions to: [larry@moynihangallery.com](mailto:larry@moynihangallery.com).



1. Rolly's servo tray.
2. The former supports the pushrods in Bix's CoroBat.
3. Bix's servo tray.
4. The servo tray also supports the nose cone



Left: Rolly and two Corobats.

Above: Bix's CoroBat and mine in the snow.

Opposite: Heading out for another run. ■



March 2008

# A BRIDE'S VIEW

## *of R/C Gliding*

by MaryAnn Parker,

**M**y introduction to the Northwest Soaring Society contest actually began several weeks in advance as my bridegroom deserted me every night to spend several hours in the "MODEL" room! It was less than reassuring when everyone who arrived to register at our house laughed and questioned my judgement and choice of spouse.

As the evening wore on and my floors became covered with male bodies, I, too began to question my judgement, but I must admit that all guests were fun to have around and added to the feeling of anticipation. Besides, when they left there were several additions to our wardrobes -- just kidding, Barry. You can have your shirts and undies back.

Saturday morning arrived and people began gathering at the field. The skies were blue, the grass green and damp, the trees beautiful and the breeze gentle. Planes of all sizes and shapes were being placed on the ground and on stands. In the distance I heard Tom yelling for men to help move those "wenches" to

the other side of the field, but I thought that was too personal to watch.

The excitement builds as TEAM OREGON arrives with banners, horns, music and a parade of cars onto the field.

Out of the chaos gradually order developed and each group of helpers had their own area arranged for maximum efficiency and the contest began.

I had agreed to assist with scorekeeping which could have become interesting as I am neither computer knowledgeable nor mathematically inclined.

It was amusing to me that so many people who can build these wonderful flying creations following intricate detailed instructions have trouble reading the words "SCORE CARDS GO IN HERE."

I was quite surprised to hear people asking for the C. D. In my line of work that refers to communicable disease. I didn't think any one actually went looking for one.

One of the planes had an identity crisis and thought it was a bird and followed

its instinct to nest in the tallest tree in the field. After a great deal of psychotherapy and gentle prodding it regained its sanity and returned to papa.

A few other things were a bit mystifying such as thermals which I thought were worn in cold weather. I also heard many calls for a retriever but all I saw was a toy poodle.

All in all I enjoyed the weekend very much in spite of the fact that a high percentage of the people walked around with their noses in the air. There was a feeling of camaraderie and sportsmanship and it pleased me to see several people take time to inform and advise youngsters who showed up at the field to observe.

I expect my viewpoint will change because I have bought a Gentle Lady kit which I will build this winter, so look out everyone and heads down! ■

This article first appeared in the Northwest Soaring Society Newsletter in 1987. <<http://www.northwestsoaringsociety.org>>

# LEARNING TO USE A HI-START

by Ed Anderson, [aeajr@optonline.net](mailto:aeajr@optonline.net)  
aeajr on the forums

Thermal duration soaring is a wonderful way to enjoy radio control flying. It is both relaxing and exciting to launch a plane without a motor and learn to keep it in the air based on nothing more than the available the energy in the air itself. However, flying without the use of a motor seems a bit strange to some folks. But experience tells me about half

of the people who try it find they enjoy it a great deal. That means if you try RC soaring, there is a 50/50 chance you are going to love it.

I think one of the reasons we don't see more people flying unpowered sailplanes or gliders is that they don't understand how the planes are launched. So that is what we will discuss.

In general, there are four ways to get an unpowered glider into the sky when launching from a flat field:

Hand launch – Just chuck it up there!

Hi-start – Basically a rubber band launch

Winch – An electric catapult

Aerotow – Have another plane pull the glider into the sky.



You can also use a motor of some type. This approach only uses the motor to get the glider to an appropriate height so the pilot can go hunting for thermals. Today the most popular would be electric motors, but you can use fueled motors or even rocket motors to launch your glider. You see, glider pilots are very creative people.

In this article we are going to introduce you to the use of the hi-start. We will discuss what it is and how to learn to use it. I think you will find it interesting. I assure you that launching a glider with a hi-start is a lot of fun!

#### WHAT IS A HI-START?

A hi-start is basically piece of elastic material attached to some string that has a metal ring at each end. Most typically, latex rubber tubing is used for the elastic. The diameter of the tubing determines the strength of the hi-start and the size and weight of the plane it can launch. The typical hi-start has about 100 feet of latex rubber tubing in the range of 1/8" to 1/2" diameter.

A string, or line, is typically tied to the tubing to allow the glider to reach a greater altitude than it could with the latex tubing alone. The length of the string is usually three to five times the length of the tubing. A common combination is 100 feet of tubing and 400 feet of line. With that combination you can launch a glider 400 to 500 feet in the air.

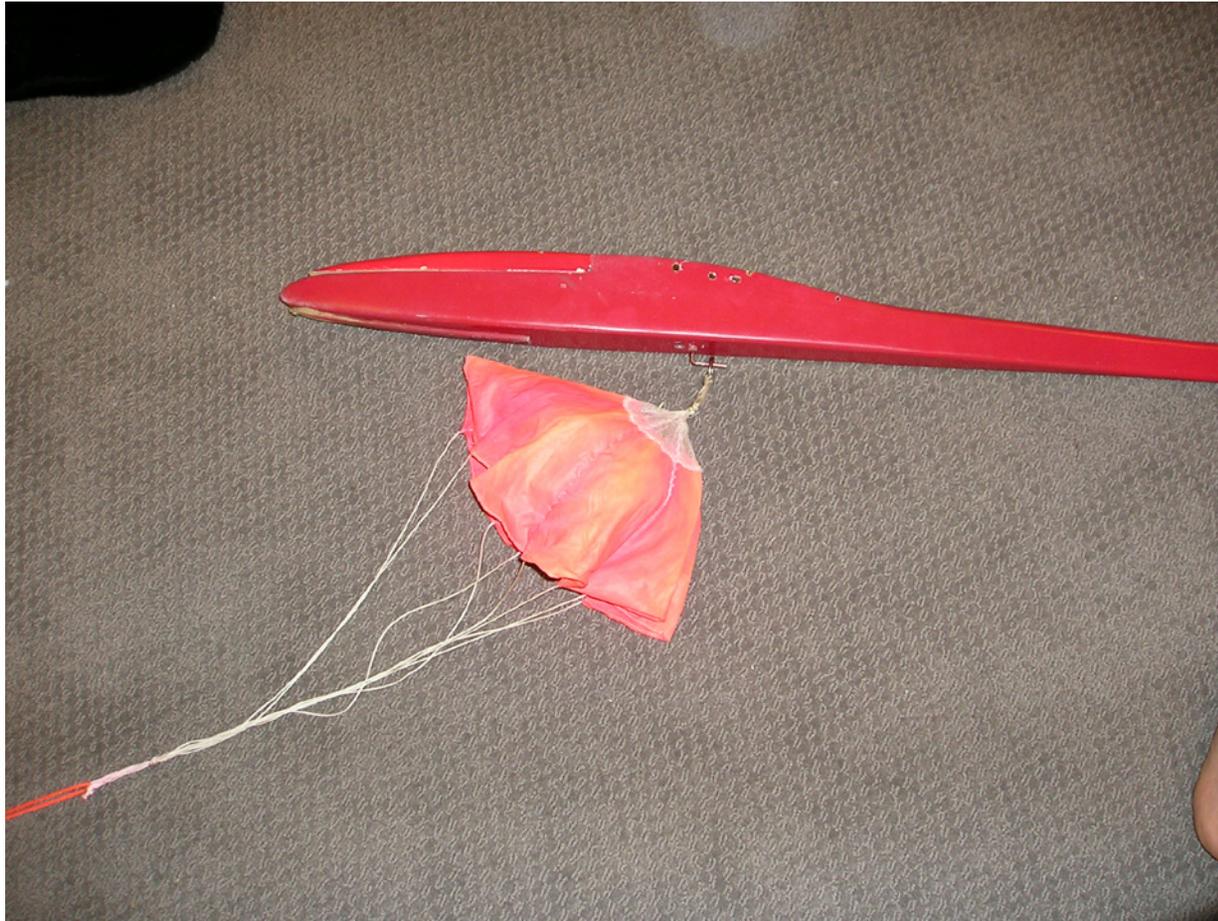


#### HI-START LAUNCHING - Getting Ready

What I will be focused on is not competition launches, but about safe sport launches. I just want to help you get in the air safely. While it is always preferable to get help from an experienced pilot whenever trying new equipment, hi-starts are pretty simple to use.

Naturally, your plane must be well trimmed and flying straight and even before you launch it from a hi-start. This can usually be checked with a hand glide. In fact, a hi-start launch is little more than an assisted hand launch, so if you can hand glide your plane, you can use a hi-start.

Getting good at hand launches is a useful skill for any glider pilot. It is easy and it



## PLACEMENT OF THE TOW HOOK

In order to connect the hi-start to the glider, we need a tow hook. You can buy them or you can make them, and most glider kits or ARFs include the tow hook in the package. However, it is the location that is most important. Once we launch the glider with the hi-start, the hi-start will pull the glider forward just like a kid running with a kite. By placing the hook at the right spot, the plane will rotate, nose up and climb, again, very much like a kite. Typically, the hook is placed about 1/2" to 1/4" forward of the center of gravity, the plane's balance point. After you gain confidence launching your plane, you can try moving the hook back to see if you can get higher launches. But note, the further back you place the hook, the steeper the climb and the harder it is to control the flight. So be conservative initially. You can always move the hook back later.

## STARTING SMALL

There is no reason you can't make your first launches with a full size, 500-foot unit. Stake it down, lay it out and launch the plane.

However, if you feel this is an awful big thing to handle on initial launches, you can start smaller. You can either get an up-start, which is a smaller version of a hi-start, or take your big hi-start and only use part of it for your initial launches. Remember, this shortening step is optional.

is fun. In fact the first time I ever saw a radio controlled glider fly was on a hand glide. The plane had a 10 foot wing span. The pilot took a couple of steps and just gave the plane a firm push. It flew out of his hand and floated across the field for about 200 feet, like magic. That was what got me interested in gliders.

Today I hand launch all of my gliders in order to insure they fly straight and true

before I launch them by any method. Based on the hand launch I can easily make small adjustments in balance and trim. The one tip I will give you on hand launching, if you have never done it, is that you toss the plane out with a firm push and you send it out level or slightly down, never up. This is not intended to get it high, but to test how it flies in level flight.

We will reduce the amount of tubing we are using and the amount of attached string. We will shoot for an approximately a 1:4 ratio of tubing to string. To adjust the amount of string you can cut it or replace it with a smaller piece during the training phase.

**DON'T CUT THE TUBING!** We want to preserve the tubing as a single piece as it will work better when you are ready to use all of it. To shorten the elastic I simply loop the elastic over the spike we use to secure it to the ground. If you use 2-3 loops over the spike, that will hold just fine.

#### HOW MUCH PULL DO I NEED?

Hi-starts are available in a variety of

strengths. Normally we like to size the hi-start so that we get a pull of three to five times the weight of the plane when the rubber is stretched three times its rested length. Most suppliers will rate their hi-starts by the wing span of glider they will launch to help guide you.

A typical two-meter glider weighs anywhere from 1.5 to 2.5 pounds. So a typical two-meter hi-start will probably yield a pull of eight to twelve pounds when pulled to three times its length. A three meter hi-start would typically be able to provide as much as double that pull.

We can check the strength of the hi-start with a scale. I use a 25 pound fish scale.

By stretching the rubber we can see how much pull we will get. The further we stretch it the more pull we get.

Most latex tubing can be pulled up to about three times its rested length without damage. So a hi-start with 100 feet of tubing can be pulled up to 300 feet. You can go less, but don't go more unless the manufacturer says it can stretch further.

Note that the elasticity of the tubing will be effected by temperature. As it gets colder the tubing will lose its "snap." I typically don't use a hi-start under 40°F. And I have noticed a drop off in power when it is below 45°. I have seen hi-starts ruined when used under 32°.



If your plane weighs about two pounds, then you want a 6-10 pound pull at launch. The range is a matter of personal preference and the strength of your plane. A very light frame will not take a lot of force. A plane with a strong spar can take more force which will typically yield a higher launch.

A very broad guideline on how to size the hi-start rubber would be:

2-meter glider: ¼" to 5/16" diameter tubing

3-meter glider: 5/16" to 7/16" diameter tubing

You can launch a two meter glider on a 7/16" three meter hi-start by not pulling back as far. So one hi-start can launch a range of planes by adjusting the pull to adjust the tension at launch.

#### DEPLOYING THE HI-START

We are going to stake one end, the end with the tubing, to the ground using a 12-16 inch spike, a large tent peg, screw in dog chain anchor, or some other method. Typically we attach a ring to the tubing and run the spike through the ring. Sometimes a washer is used to make sure the ring does not come off the spike.

Make sure the stake is secure in the ground as we are going to pull against it with a force of 6-20+ pounds and we don't want it to pull out. I usually slant the spike away from the launch.

Always deploy the hi-start so that the plane will launch into the wind. This will help the plane climb during the launch and give you the best control and the highest launch. Whether you are launching a glider on a hi-start or a jet off an aircraft carrier, you always launch into the wind.

Again, there is no reason we can't do that first launch with the full sized hi-start, but some people feel uncomfortable, so I am going to discuss how to take that hi-start and bring it down to size, temporarily.

#### FIRST LAUNCH – Short Length

It is easy to control the launch force of a hi-start by how far back we pull it, which will determine the stretch on the elastic and the energy of the pull. When we are ready to release, we do exactly what we would do on a hand throw. You want a flat firm throw with level wings. Don't just release the plane, throw it.

Once the glider leaves the hand, the hi-start will continue the pull to accelerate the plane giving the equivalent of a strong hand throw. However, the hi-start will pull it faster than a hand throw. The pull will be on the hook, from the center of the plane, so the plane will tend to rotate to a nose up position and start to climb. This is what we want.

For our first test launch, using a shortened hi-start, let's start with approximately 20 feet of rubber and 80 feet of string. The measure does not have

to be exact. Stake the rubber end down and walk the 100 feet till the hi-start is out straight and there is no tension on the tubing. Turn your plane on, check that all the surfaces are moving in the proper direction. If all is well, hook the hi-start to the bottom of your plane.

We are going to do a partial stretch this time. Normally we pull the rubber out to about three times its length, 60 feet in this case, but this time let's only go out to two times its length for a more gentle pull. Let's walk back about 40 feet, or about 16 steps for me. You should feel the rubber pulling. Now hold your plane and turn so you are facing into the wind.

#### WHAT NOT TO DO WITH THE RADIO

Let me provide one note on the radio... when launching, DON'T PULL BACK ON THE ELEVATOR. We do not use the elevator to cause the plane to rotate and climb. In fact, pulling back on the elevator will most likely cause the glider to over-rotate, go into a back loop and crash. That would be ungood.

The plane will rotate on its own based on the location of the hook. In fact, in some cases we will apply down elevator to keep it from climbing too steeply. But, for now, leave the elevator alone unless you see the plane is about to stall. If a stall is about to happen, apply a little down to help the glider maintain speed.

The only steering you want to do is with the rudder. The goal is to keep the nose

of the plane aligned with the hi-start and to keep the wings level. The hi-start will do the rest. You can use the ailerons, if you have them, but the rudder is better.

Ready to launch?

Move your sticks one more time to be sure the plane and radio are both on. We hold the plane over our head. We check to make sure the wings are level. Then we give it a good push, going out level, not up. It should fly out of our hand and start to climb a little. When it gets to about 2/3 of the way to the spike, the tubing will have probably fully contracted,

the line will go slack, the glider will likely level out and just fly off the line.

If the glider reaches the spike and the line is still attached, give it a little down elevator then a little up, just a quick dip of less than one second. This will help slip the ring off the hook. Then level it and let it glide out and float to the ground. You may achieve 20-30 feet of height on this launch, so be prepared for it.

This short test flight could be several hundred feet long, so make sure you have room. You may need to circle, so be prepared to do so. Nice easy controls

should be all you need. Don't panic and don't over control it.

Assuming all went as expected, you just completed your first hi-start launch. You can breathe now.

WHAT IF SOMETHING WENT WRONG?

If you get your wings out of level on the launch, the plane will tend to go right or left when you throw it, just like a bad hand throw. Use the rudder to get it back to center and work on getting a level throw. If you have ailerons you can use these to correct the angle of the wings, but the rudder should be your



primary control on the launch, assuming you have a rudder.

On your next flight be more aware of the level of the wings. If, after several launches, the plane always heads off in the same direction, check the trim on your rudder or ailerons. However, it is more likely you are tipping the plane as you release it. You may have to exaggerate it a little bit the other way. Most likely the problem is your release.

The glider should fly off the string as it floats out. If it does not, check to make sure the hook is not bent up toward the fuselage. It should be parallel to the bottom of the plane. The ring should slide on and off the hook easily with no binding.

If the plane tended to climb too steeply and wanted to stall, check the trim on the elevator. You may have some up-trim. Or the horizontal stabilizer may not be parallel to the wing, giving it an up elevator effect even when the elevator is neutral. I had that problem on one of my planes.

If it is climbing too steeply, put in a couple clicks of down trim on your next launch and see how you do. Just remember, when we go to the full scale launches, to remove those clicks as you leave the line at the top of the launch. Otherwise you will lose altitude faster than you want.

If you have a computer radio, you might

see if you can set up a launch mix, but don't worry about that now. For now focus on the basics of the pull, the throw and managing the climb.

#### WHAT'S NEXT?

Not much. Practice at this length and this pull till you feel comfortable. Since the launches are low, you can get a lot of launches in a very short time.

Then go to a full pull, three times the length of the rubber or the length of pull that gives you the right pull for your plane.

Make sure you are going out straight and level. When you are comfortable, slide another 20 feet of tubing into the working area of the hi-start and add another 80 feet of line. You are now in range of a middle size hi-start.

The plane will launch higher with this arrangement. You change nothing, let the hi-start do the work. Just don't forget to give the plane a strong push/throw as you release it. Don't just let go.

Keep adding elastic in whatever increments you like till you get to the full length. Add 3-5 times as much line as elastic till you add it all back. Again a typical full size hi-start is 100 feet of elastic with 400 feet of line.

If you are using heavier tubing such as 3/8", 7/16" or 1/2", a pull of 1 1/2 times the tubing length may be all you would want in order to launch a 2-meter plane. My hi-start rubber is 7/16" and I only pull

back about 1 to 1 1/2 times the length of the tubing to launch my 2-meter planes. At that pull I can barely hold the plane. I measured it once at 14 pounds of pull, which is stronger than needed for a Spirit, for example.

#### Pop-Offs:

A pop off occurs when the plane rotates so much during the launch that it releases the line early and "pops off" the line. This can happen anywhere, but I have usually seen it within the first 150 feet of the launch.

A pop-off can be tricky to control. The plane may fly up at an extreme angle then stall and want to dive for the ground. More often it will pop off and go into a loop to the rear, behind you. If this happens to you, the best thing to do is to help the plane finish the loop rather than trying to prevent it. Fighting the loop often takes so much energy out of the plane that it will stall and you will be fighting to keep it from crashing to the ground.

If pop-offs are a problem, try putting a click or two of down elevator on the trim before you launch. Also make sure your tow hook is in FRONT of the CG. About 1/4"-1/2" is enough. The likelihood of a pop-off will increase with the power of the launch due to the rotation of the plane from level to climb, so let's get it under control early. That is why we build up slowly.

As the pull gets stronger, the plane will fly out faster and the lift of the wings will naturally take it higher. No need to throw it up, it will go up on its own. You can launch the plane at a more elevated angle as you become more comfortable with the hi-start and get to know how your plane launches. Eventually you can launch the glider with the nose at a higher angle. If the hi-start is strong, up to about a 45-degree angle works well. Just remember that the steeper the angle the more important the throw. Don't just let go, give it a good push.

#### HOW DO YOU KNOW WHEN THE PULL IS TOO MUCH?

If you are flying a plane that is designed with a winch in mind, you are not going to over stress it on a hi-start no matter how much pull you use. Winches can provide over 200 pounds of pull. No hi-start is going to pull that hard. And if it could, you would not be able to handle the plane.

However, if your plane is of lighter construction, for example a light weight built up wood design with a conventional wood spar, you may get more flex in the wings than you wish with a pull of 4 or 5 times the weight of the plane.

You have to watch the wings. If this is a built up wing with a covering, you can watch for wrinkling in the covering.

Start with a pull equal to three times the plane's weight. During the launch, as the wing flexes upward, the top covering will develop some slack and you will see it wrinkle. Since the plane is moving away from you fast, this may be hard to see. But if you notice it, you may be approaching the limit of the wing. So build up slowly.



#### SUMMARY

Hi-starts are great fun, low cost, and simple to use tools to get your glider into the air. Once you get the feel for launching you can work on optimizing your plane and your technique to get the highest launches possible.

I have made hundreds of hi-start launches with 2-meter and 3-meter planes. I launch at 20 to 45 degree up angle with neutral controls and the tow hook at 1/4" forward of the CG on most of my planes. I typically launch at five times model weight because I have determined

that my planes can take that much. I get great launches.

In the beginning I was afraid of the hi-start. Now I really enjoy it. If you have someone to coach you through the first few launches that's great. If you don't, try the method outlined here. I know you are going to like this!

#### ABOUT THE AUTHOR

Ed Anderson is well known on the RC forums under the title AEAJR. He often lingers in the beginner sections of the electric and glider forums looking for new flyers who need some help. Among his thousands of posts he has published numerous mini-articles on a variety of topics to help new electric and glider pilots get off to a good start.

Ed wrote two monthly columns for the Internet magazine, [www.RCEzine.com](http://www.RCEzine.com) covering both electric and glider topics. He has also written product reviews for RCUniverse Magazine.

Ed is an officer of the Long Island Silent Flyers, a glider club in New York. He is also an officer of the Eastern Soaring League where he is Website Content Editor and newsletter publisher.

Ed says he enjoys his electric planes, but he loves his gliders.

Ed has set up a feedback thread for this article on RCUniverse at <[http://www.rcuniverse.com/forum/m\\_7052105/anchors\\_7052105/mpage\\_1/key\\_/anchor/tm.htm#7052105](http://www.rcuniverse.com/forum/m_7052105/anchors_7052105/mpage_1/key_/anchor/tm.htm#7052105)>

# 28th Armidale Sailplane Expo

Text by Brian Ford, photos by Peter Pine, Jo Carbines and Peter Prasser



Alan Mayhew aims for the spot

**A**rmidale is an inland city halfway between Brisbane and Sydney on Australia's East Coast in the state of New South Wales. For this country it is also one of the highest cities, sitting on a plateau at an elevation of 1000m

(3300ft). The sailplane contest is held over the Australia Day (a bit like a laid back Independence Day) long weekend at the end of January on a cattle station (ranch) south of the city. The event was kindly hosted by NEMAC (New England

Model Aero Club) and organized by the Sailplane Expo trust. The trust is a small group of pilots with big hearts who work hard to keep the event going each year by arranging sponsors, the field, equipment and the dinner.



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1. Bjorn Rudgley guides Des Kingdom to the landing area.

2. David Pratley launches Junior Michael Abrahams while Matthew Partlett times.

3. Matthew Partlett comes in for a 1m spot.



1. Hutton Oddy, the only local pilot, gets his Open Electric soarer ready.

2. Dave Anderson (with Eraser) and Jeff Irvin walk back to the pits.

3. Phil Crandon launches for Jamie Zambelli.



Joe Wurts shows how its done.



Carl Strautins mid launch.



Being a relative newcomer to the Event (attending six of the past eight years), I haven't been witness to the "goings on" in one of Australia's oldest R/C soaring competitions, however every year some of the older chaps will get together and reminisce about the good ol' days.

From its inception, the Expo has catered to many forms of R/C thermal and electric soaring. There have been aerotow demonstrations, F3B speed, even Old-timer. Now it is predominantly Open Thermal (run much the same as the duration and landing task in F3B), RES, DLG and the still developing electric thermal disciplines of Open and Limited



Peter Pine brings in his Open Electric Graphite for a spot.

Electric. In the past, Open Thermal and Electric Soaring were run as separate events on the same field, over the same weekend. Not this time. It was decided to run them as one. DLG was run during lunch breaks and at the end of the last day.

The event has a long history of innovation. Only by trying something new, whether it works or not, can we ever progress. As modellers, we are happy to

try new model types and radio systems, why not an event format as well?

For possibly the first time in a sizable competition, electric models flew with winch launched models. That's right, with them, doing the same task within the same working time. Obviously they were scored differently. There was a lot of debate about how to achieve this.

For the electric models, classifications split them into a main class and a sub

class that competed against each other. The same was done with winch launched open thermal and RES. They were group scored together and the highest ranked in a sub class was the winner of that class.

How did it work? An electric model launching area was set up adjacent to the winch lane. There were concerns about possible "interaction" between each group of model types, but the risk was deemed similar to what is already done within the same model class where there is the possibility of a mass launch. For the three days of competition there were no incidents between classes.

The weather was a little cooler than usual. Armidale in January can be very hot with temperatures in the 40s degC (105+ degF). This year the days were mild, but we did get some afternoon storms that cut short the first day. One of the usual discomforts of flying near cattle is flies. Like most Australians, they are very friendly. A couple of hundred flies being friendly at once become a bit annoying, so along with sun protection you needed insect repellent.

Australia is a big sparse place with huge distances between small groups of pilots. It is a credit to the event that it attracts modellers from all around the country. Most would have travelled 200 miles and up to 800 miles. This year the longest distance travelled by any of the 64 entrants was Joe Wurts. Seeing

the legendary man fly for the first time in Australia was a real bonus. He flew, he showed off, and was very approachable to all who had queries or needed a spotter. On the Saturday night he held an informative seminar at the local university and we heard about thermal hunting, flying and setups techniques. Unfortunately one evening wasn't enough to appreciate the depth of knowledge and experience the man possesses.

At the end of the long weekend, the results were as follows:

In Open Thermal Theo Arvantitakus came out on top. Theo will be one of the competitors at the next F3J Worlds. He was followed closely by Joe Wurts who proved southern hemisphere thermals behave just the same as northern ones. Third place was Carl Strautins, another regular at previous F3J/F3B Worlds. Junior pilot Michael Abrahams came 6th.

In RES Paul Gibson, Jim Romer and Owen Pearcey took out the first three places.

The Open Electric competition was lead by Alan Mayhew (another past F3J Worlds pilot), next was David Leitch (who flew at the last F5B Worlds) and third Bob Watson.

In the Limited Electric class, Shane Spoor, Ian Roach and Alan Beck came out winners.

For DLG (using a derivative of F3K rules), Hutton Oddy beat out Joe Wurts for top place with Brett Anthony third.

The Old Buzzard trophy for the highest placed over 50 years old was won this year by Alan Lowe who finished 8th.

The event had a few challenges along the way, but the main idea was to fly, have fun, meet new pilots and hopefully learn from a bone fide master R/C soarer. The format of Expo has constantly evolved over the years and no doubt lessons learned this year will lead to a few more changes next year.

What better way to spend a national holiday than to stand in the great outdoors flying R/C soarers? ■



Above: Mandrella based on Ray Pike's Mantaray, 2m wing, 1kg weight, 3S LiPo, and Feigao 380-6L motor.

1. Mark Linwood tries to find his model behind the flies.
2. Shane Spoor winner of Limited Electric with home constructed 2m Aegea based on Drela design with Cylon Elite Mini power and 2S LiPo.
3. Michael James' son gets in the spirit of Australia Day.
4. Warwick Paynter (left) and Des Kingdom (right) present the Bald Eagle Trophy.



# Morelli M-200 N1031

Walk-around by Mark Nankivil, nankivil@covad.net

The “Centro di Volo a Vela del Politecnico di Torino” (CVT), was founded in May 1952 by a group of seven Italian enthusiasts to develop and build sailplane prototypes and related equipment.

The Morelli brothers, Alberto and Peiro Morelli, designed the group’s first sailplane, the CVT-1 Zigolo (Bunting) to come out of the workshop. Designed as a low cost sport type sailplane, it first flew in late 1953/early 1954 with the design being approved by the Italian Civil Aviation Authority.

While the development of the CVT-1 was underway, Alberto Morelli started the design of the CVT-2 Veltro (Greyhound) which was meant for competition flying.

Cutting edge in design, it was one of the first to use laminar flow airfoils and may have been the first to incorporate a T-tail. The CVT-2 turned into a workhorse for the CVT and was used to develop improvements to the design itself as well as sailplanes in general.

Results from this development work were integrated into a later design, the CVT-4 Strale (Dart).

The CVT’s next design was the M-100. Designed by the Morelli brothers in early 1956, it was a submission for the Italian Aero Club’s plan to develop and provide to the Italian glider clubs a modern single seat sailplane. The design was accepted by the Aero Club and a prototype was built in six months. Numerous problems were found with the design, and after a period of development the design went into series production being known as the Aer Pegaso M-100S. CARMAM also produced the design, and altogether approximately 180 sailplanes were built.

The need for a two place training and sport type sailplane was defined which led Alberto Morelli to design the M-200. The wing was a further development of the M-100S wing being stretched from 15 meters out to 18.5 meters and the aspect ratio to 19:1.

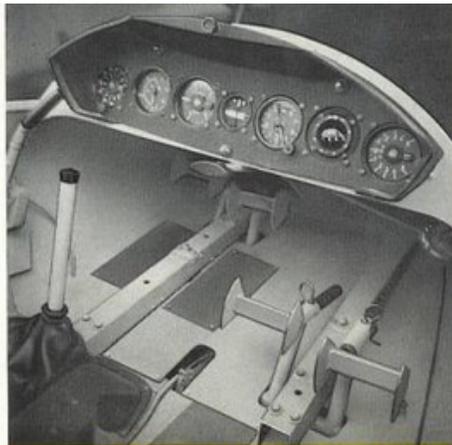
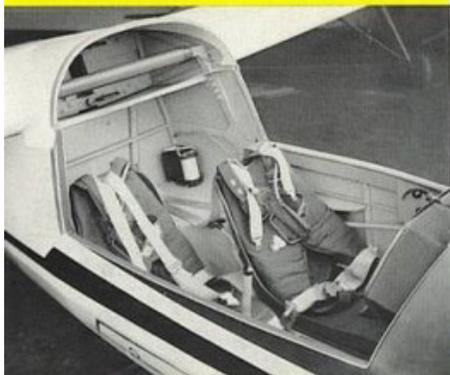
The wing continued to be traditional wood structure with fabric covering. The fuselage was a molded shell structure made up of pre-molded 1/8" thick plywood double curvature panels tied together with a few formers and stringers. The cockpit was set up with staggered seating which allowed for a little less frontal area but still allowed for easy communications between the occupants. An interesting feature carried over from the M-100s design is a set of rotating plates in each wing (three per wing panel) which act as spoilers. They rotate and pop out into the airstream top and bottom of the wing, are not speed limited, and require very small forces to actuate.

Alberto Morelli undertook the first flight of the M-200 prototype in May of 1964. Production soon followed with 4 M-200s being produced by Avionautica Rio.

A production license was then issued to the French sailplane manufacturer Societe CARMAM (Coopérative

**PRINCIPALES CARACTERISTIQUES**

Envergure	18,15	m
Surface alaire	17,5	m <sup>2</sup>
Allongement	19	
Longueur	7,60	m
Longueur extérieure maxima du fuselage	1,00	m
Poids à vide	345	kgs
Charge utile minima	70	kgs
Charge utile maxima	225	kgs
Poids total maximum	570	kgs
Charge alaire minima	23,7	kgs/m <sup>2</sup>
Charge alaire maxima	32,6	kgs/m <sup>2</sup>
Facteur de charge correspondant	i = 4	
Vitesse maxima sans adrofrens	225	km/h
Vitesse maxima avec adrofrens sortis	225	km/h
Vitesse maxima de remorquage par avion	150	km/h
Vitesse maxima en atmosphère fortement agitée	150	km/h



**AILE** — Extrapolation de celle du M-20 S. L'envergure a été portée de 15 à 18,15 m, ce qui donne un allongement de 19. Direction mécanisée avec renforts très d'alliage bivalent. Commandage et table. Bordure de bordure en fibre renforcée.

**FUSILAGE** — Structure monocoque renforcée par goussets rigides et renforts. Le revêtement est constitué principalement de grande panneau précontraints de 30/30mm d'épaisseur.

**EMBALLAGES** — Le sens de direction est réglable indépendamment. Chaque pilote dispose d'une commande de manœuvre de pilotage.

**AEROFREINS** — De même type que ceux du M-20 S. Quatre paires de plaques actionnées sur chaque aile. Sont d'une construction robuste et ne sont pas sujets à l'usure. Quelle que soit la vitesse, un effort très faible est nécessaire pour les manœuvrer.

**COMMANDES** — Transmission rigides par câble ou acier pour les ailerons et le profondeur. Commande de direction par câble acier dans câble, assise par câble acier dans 2,2 mm. Commande des commandes ailerons et profondeur assurée par câbles LITHELLER acier.

**ATTERRISSAGE** — Pour vitesse de piste de 100 à 150 m. Piste assurée par frein principal en la de descente. Piste assure et assure assise.

**CROCIER DE REMORQUAGE** — Le bord crocier situé à l'avant du poste pour le remorquage et le bricolage.

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A bord du M-200 « FOEHN », vous pouvez connaître les joies du vol en monoplace ou en biplace selon votre désir, dans les conditions où aucun autre planeur ne peut vous procurer. ● Les deux pilotes étant malgré tout côte à côte, mais décalés, disposent d'une très grande liberté de mouvement. ● La soute à bagages très spacieuse, permet l'installation de la radio, de l'équipement en oxygène et de tous autres équipements jugés utiles pour le confort des pilotes. ● Ces avantages ajoutés à la facilité du pilotage, à ses performances élevées et à la sécurité de cet appareil, ajoutent un intérêt supplémentaire aux vols que vous effectuerez sur cette machine.

En description, les illustrations et les caractéristiques données sur ce document, ne doivent pas être considérées comme une offre formelle de construction. En outre, nous ne sommes pas responsables de l'usage d'appareils dans des conditions inhabituelles, et nous ne sommes pas responsables de l'usage de cet appareil dans des conditions inhabituelles par des personnes d'expérience ou de compétence insuffisante pour effectuer des vols de compétition, de la presse technique.

d'Approvisionnement et de Réparation de Matériel Aéronautique de Moulins) which proceeded to build 59 (other sources state 60) airframes from 1966 through 1972. Marketed as the M-200 Foehn (A warm dry wind coming off the lee slopes of a mountain range, especially off the northern slopes of the Alps), there were at least two imported into the U.S. with N1031 being the subject of these walk-around photos.

Robert Ball of Vienna, Virginia is the proud owner of N1031, a 1966 CARMAM produced M-200 and the eighth one produced by that firm.

Morelli M-200 Specifications:

- Wingspan: 18.1 m (59.3 ft.)
- Length: 7.60 m (24.9 ft.)
- Wing Area: 17.4 m<sup>2</sup> (187.29 sq.ft.)
- Empty Weight: 360 kg (794 lbs.)
- Max. Weight: 520 kg (1,146 lbs)
- Max. Speed : 225 km/h (140 mph)
- Max Speed in rough air: 150 km/h (93 mph)
- Airfoils: Root: NACA 63<sup>3</sup>-619
- Tip: NACA 63<sup>3</sup>-615

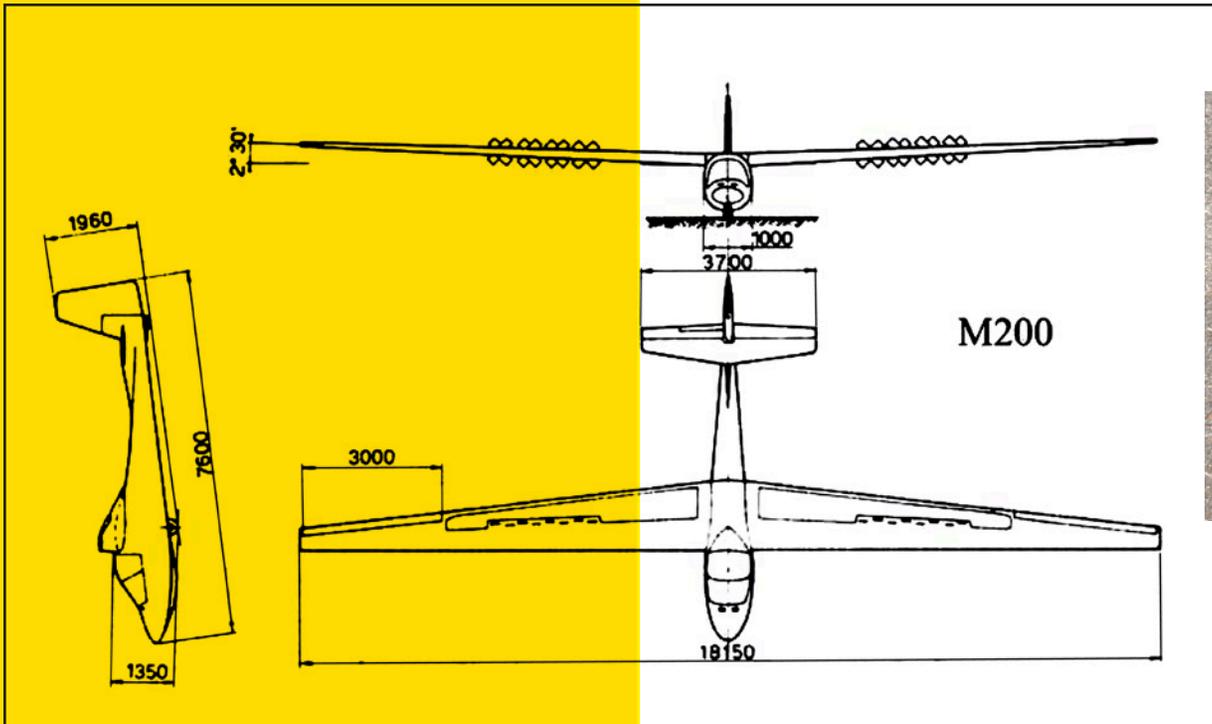
Additional information and photos of the M-200 are available at:

<[http://carmam.jimdo.com/history\\_of\\_the\\_carmam\\_m200.php](http://carmam.jimdo.com/history_of_the_carmam_m200.php)>

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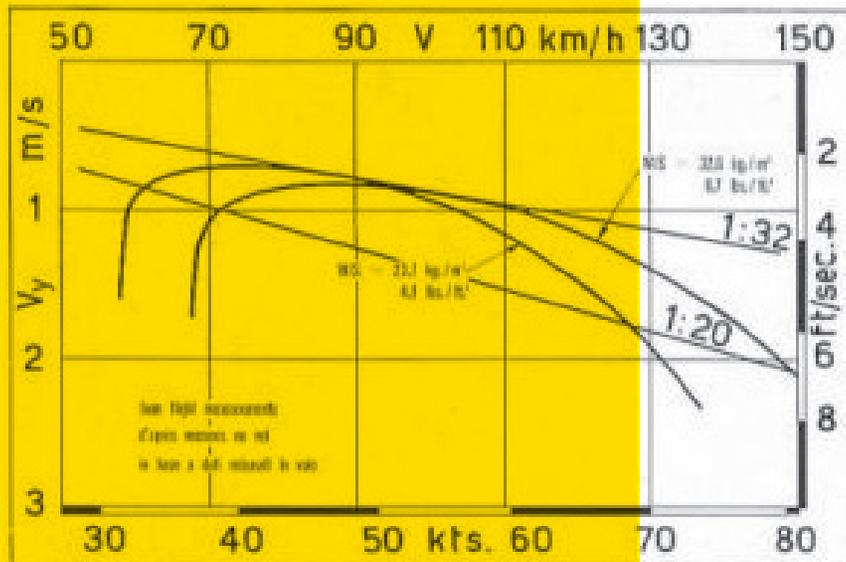
M-200 brochure images from:

<[http://carmam.jimdo.com/original\\_brochure.php](http://carmam.jimdo.com/original_brochure.php)>



M-200 3-view and polars from:

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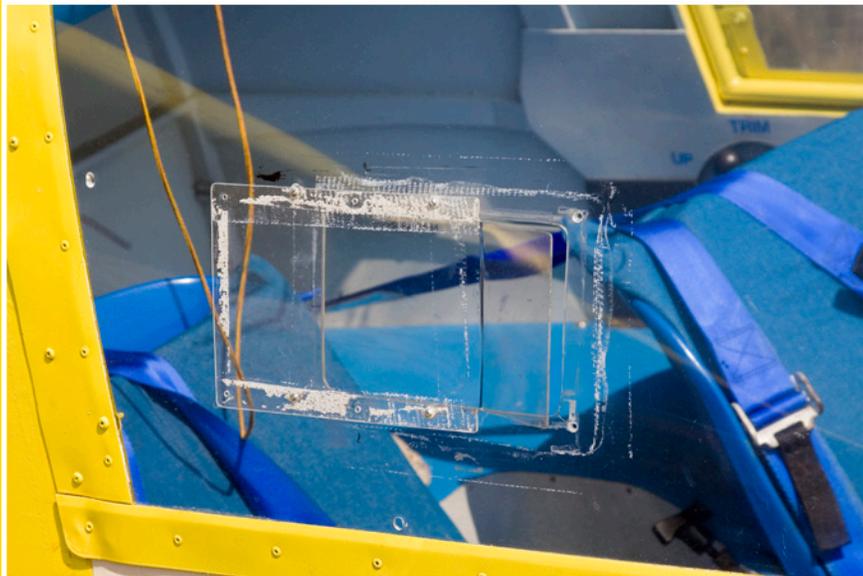




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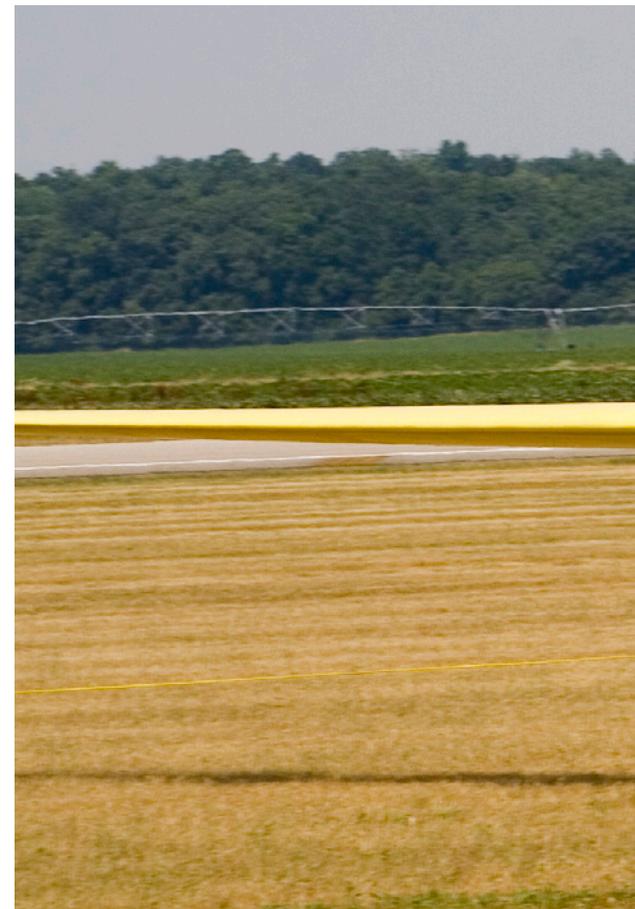


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