



AQUABIRD

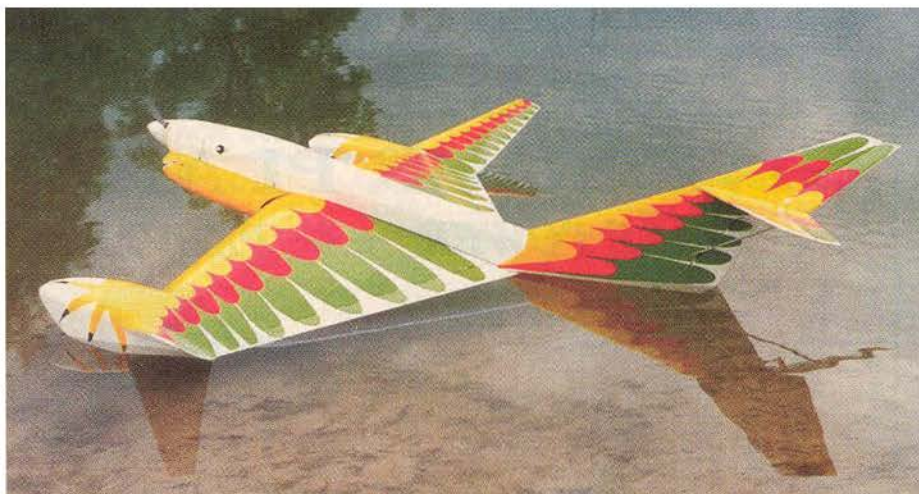
By Laddie Mikulasko



It's a bird . . . it's a plane . . . No, it's Laddie's new .40-.45 powered flying boat!

The Aquabird design is a culmination of many years of designing models of different shapes and configurations.

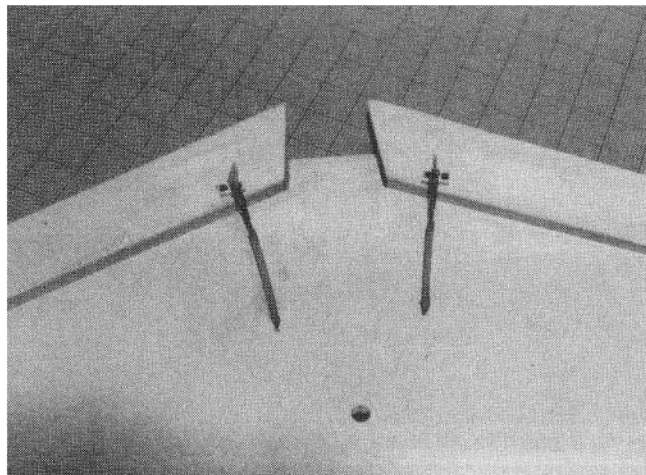
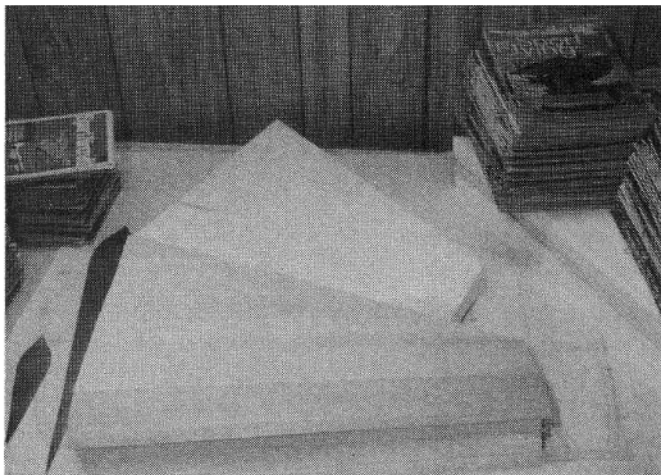
The idea for this model came to me after I saw a picture of a strange looking plane or flying boat in a magazine several years ago. The wing shape was reverse delta with anhedral and large sponsons on each wing tip. The engine was mounted behind the cockpit high on pylon, in tractor fashion. The stabilizer was mounted on top of the fin. Apparently, this was a proof of concept design to be used on a much larger version of a transport vehicle to fly or skim over the ocean surface. The design came from a well-known German designer of flying wings, Dr. Lippish.



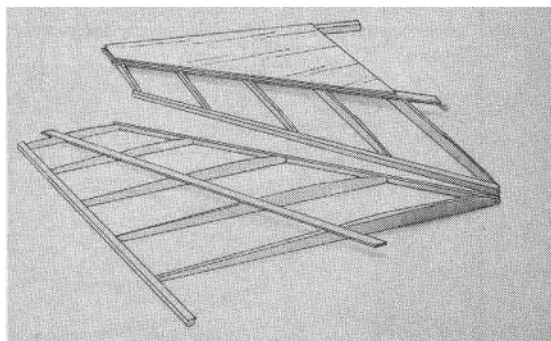
I have no idea what the outcome of the tests were. Obviously something was not there since we do not see anything of this type flying.

This did not bother me as the seeds of this design were planted and I started to make sketches of my version. The first version had the same type of wing as I had seen in the magazine but I eliminated the "T" tail. The engine was put in the front and had a single fin at rear. The sponsons were placed under the wingtips. The elevons and the rudder were used for controls.

After I built the model, I went to a nearby lake and tried to taxi on the water surface. That was fine, however, the problem developed when I applied more power. The tail would come up, but at the same time the nose of the sponsons would start digging in causing the nose of the plane to pitch down



LEFT: The wing skin is glued in place on the foam cores. RIGHT: Aileron control is transmitted by NyRods. Note: Hole is for the wing retaining screw.



LEFT: The fin is built in two halves, they are both sheeted prior to installation on the fuselage. RIGHT: Fuselage sides and formers are glued in place. Check alignment during assembly.

and the propeller to hit the water. Several attempts were made to take off but they were all unsuccessful.

When winter came I went to our flying field on one extremely cold day to try the take-off from the snow. I was lucky that the engine started immediately because I was so cold that if it had not, I don't think I would have been back to try it again. Anyhow, as soon as I applied the power the model was in the air and the fun began. The model started to climb steeply. I tried to correct this by giving it down elevator. The model immediately started to dive so I gave it up and the model jumped up.

The oscillation was getting more and more violent until finally the model hit the ground. I took the model, with broken wing, home and made myself some hot tea with something strong from the bar.

I was surprised by the way the model behaved on this short attempt to fly it. What I had expected to happen did not happen, and what I did not expect did happen.

I expected the model to roll on its back right after it lifted off because of the anhedral. I did not expect the model to be unstable in pitch. I was sure that I had the C.G. in the right place, so the only explanation I had at that time was that my elevons were effective at maximum deflection only.

Instead of rebuilding the model, I scrapped it and left the idea of building an improved version on the back burner for several years.

Because I do not like failures I decided to give it another try. The new version had the same size wing with much larger sponsons and I added winglets. I decided to use ailerons, but instead of having a single fin I gave it a "V" tail.

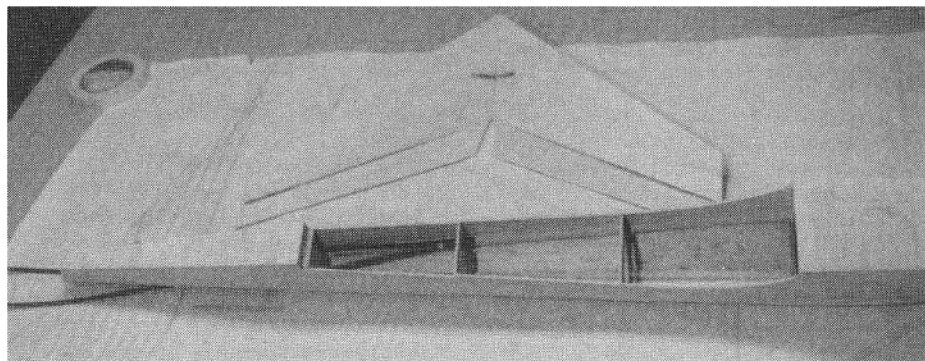
The first flight was attempted at our spring float fly. The model sat on the water surface nicely so I taxied out and applied power. The tail came up and the model was riding on the wingtip floats. When I gave it little up elevator the model lifted from the surface and seemed okay for the moment, then the oscillation started again. It was not as violent, but I still could not control it. I cut the power and the model hit the surface rather hard. When I retrieved the model there was no damage. This time, I knew that if I moved the C.G. further forward, the model would be more stable.

When I got home I decided to build a new fuselage, replacing the "V" tail with a "Y" tail.

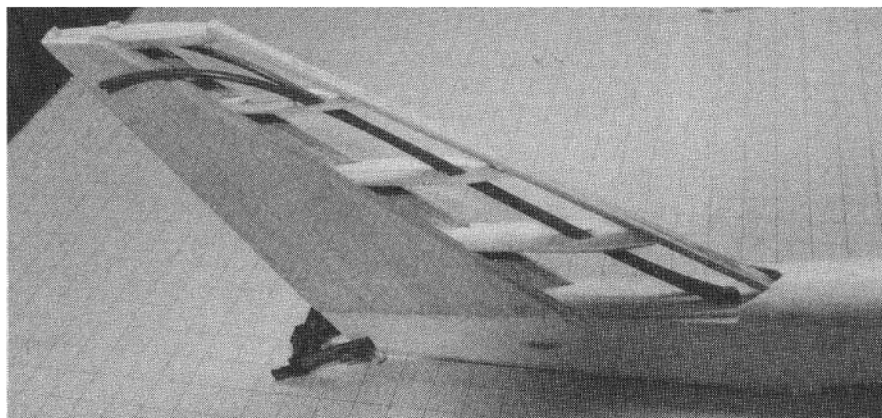
During the fall float fly I was there with the new version of the Aquabird. The plane was put on the water surface and I taxied out. As I applied the power the tail came up and the model was riding on the surface of the lake.

The model took off nicely with no oscillation present. But, before I had a chance to jump with joy, the cross wind started to swing the model to the left. I tried to correct it with full right rudder and ailerons but it was not enough and before long, the model hit the water. I retrieved the model and went home to dry out the receiver and servos. At the same time I increased the deflections on all control surfaces.

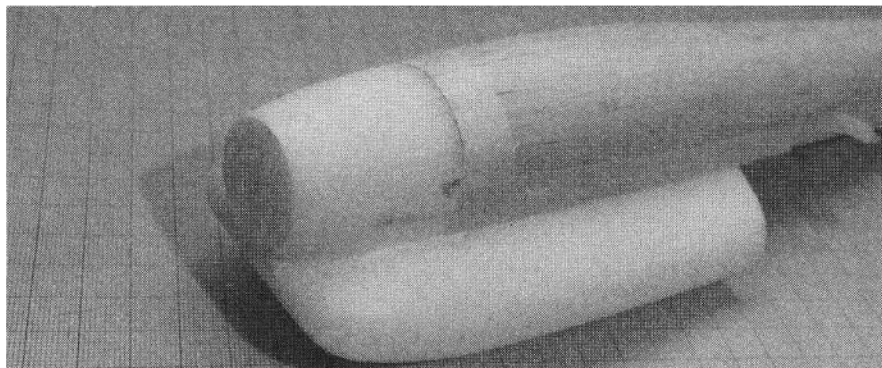
The next day I was back to try it again. I



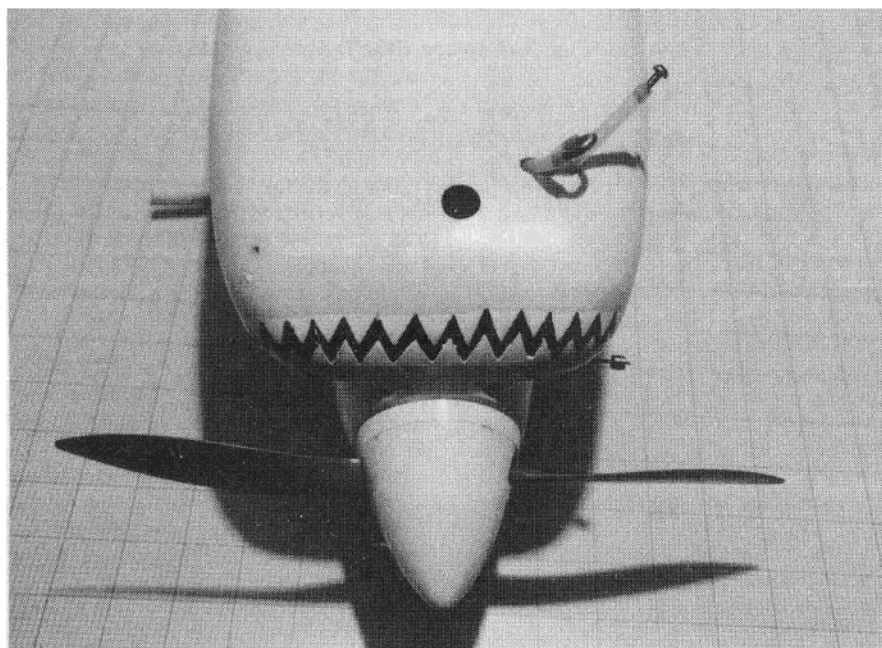
The fuselage has been sheeted and is ready to have the fin glued in place. The horizontal stabilizer is also shown completed.



The fin is glued to the fuselage. The two elevator NyRods are clearly shown.



Foam cowl blocks have been shaped and sanded, and are now ready for fiberglassing.



Bottom view of finished cowl. The cooling air enters the cowl through the openings between the six center teeth. The air exit is between the cowl and wing leading edge.

was getting nervous on the next take-off with so many failures behind me. The model picked up speed quickly and was airborne in no time. The Aquabird was climbing nicely. I made a gentle turn to bring it back. The model responded to all my commands immediately and precisely.

What a relief it was. I started to explore the flight characteristics by rolling, looping, stalling, and doing inverted flights. The model behaved the same as a conventional low wing model in every respect and was

very stable. The turns were precise with flat bottom winglets creating enough lift to offset some loss of lift on the inboard wing when in a turn. During the stalls, the model would drop one wing and make half a turn before it recovered.

The landings were beautiful, with no tendency to dig in with the sponsons and the propeller was high above the surface during taxiing and take-off. Because of the anhedral and large sponsons, water can't get into the fuselage so the radio does not get

wet.

Since that first successful flight, I try to fly my Aquabird as much as possible by visiting other float fly's in southern Ontario, Canada.

I hope I did not bore you with my account of adventure in designing this model. At the same time I do not want you to think that this design is a result of me having nightmares either!

CONSTRUCTION

The description of the building sequence will be short, describing the key steps only, as I'm pretty sure that beginners will shy away from building this model. The model is moderately complex, but should pose no difficulty for an average builder.

Wing:

To build the model I suggest building the wing and winglets first. As you can see, the wing and winglets are cut out of foam with hot wire. Cut the foam sheet to two exact same size blocks to get the outline of half of the wing. Draw the centerline on root and

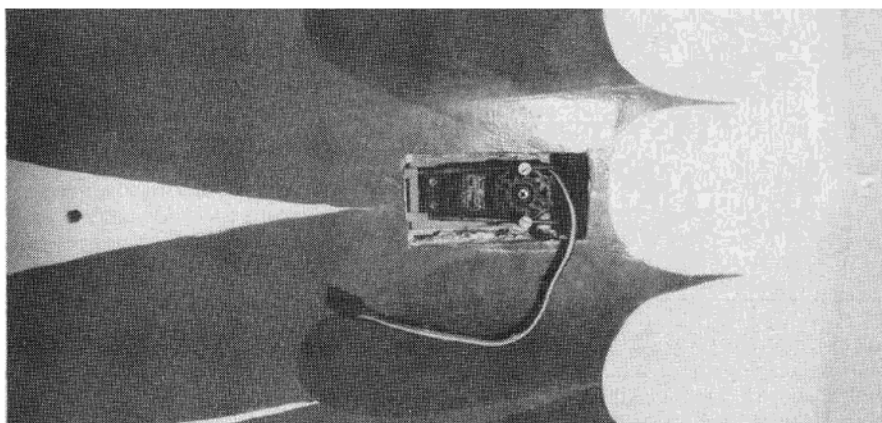
tip sides.

Cut out the plywood or aluminum templates. Divide each template into the same number of divisions and draw vertical lines on them. Affix the root and tip template with long nails to the foam blocks right on the centerline.

Start cutting at the leading edge with the person at root rib calling the numbers on the template and the helper following them at his end. Cut the other half of the wing the same way. Mark the dihedral angles on the foam blocks and affix a straight guide piece to the foam on this line and cut through the foam.

Cut out the wingtips. Because the airfoil is a flat bottom, affix the template in such a way that only the top is cut around the template.

Make a trial fit of both of the half wings and wingtips to see if dihedral angles are correct. Cut the 1/4" slot in the center of the wing and 1/8" wide slot in the tip to accept the plywood dihedral braces as shown on



Aileron servo is mounted in place in the wing. Note that pushrods exit almost straight back.

the plan. The top and bottom can now be sheeted with 1/16" balsa sheets.

Glue the sheeting to the foam with epoxy or contact cement. While the glue is drying, keep the cores in the cradles with some weight on top. Let it sit that way overnight.

Trim the excess sheeting around the perimeter of the wing. Cut out the ailerons and glue on leading and trailing edges. Sand the root smooth.

Smear some epoxy glue into the slot in the center of the wing and root face of both

halves. Insert the plywood braces and join both halves together. Wipe the excess epoxy and let it cure. Glue the wingtips on the same way.

The sponsons can be made now. First take the triangular stock and make the cuts approximately every 1/2" and 3/8" deep. Now you can glue the triangular stock to the sponson's sides. The sponsons can be built separately to be glued on later or you can build it right on the wing. Before you close the bottom, glue in the hardwood block if

you are planning to fly from a hard surface. Sand the sponsons and round the top corners only.

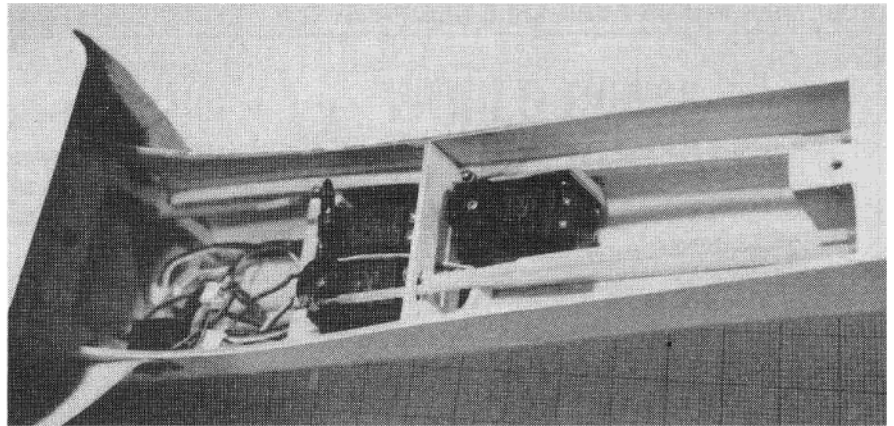
Cut out the opening to accommodate the aileron servo. With long pointed piano wire, drill the hole from the bottom of the wing into this opening so the NyRod tubing can be glued in to control ailerons.

Cut out a 1" x 1" opening in the center to accept the hard balsa block to support the wing bolt. Glue the block in with epoxy. Give the wing a final sanding.

Empennage:

The vertical fin and rudder are built in two halves to be joined later. To build the fin, pin the ribs down and glue leading and trailing edges to them. Glue the spar in place and sand to the contours of the ribs. Sheet this half with 1/16" balsa. Glue in the NyRod for elevator control.

Build the other half the same way. Join both halves together. The rudder is built in similar fashion. Sand fin and rudder to your satisfaction. At the top of the fin, make a



Servo installation in fuselage. Note that elevator inner NyRods are joined together at the servo attachment point.

to all the formers. Insert and glue in the NyRods for the rudder control. Sheet the bottom of the fuselage at the rear.

Notice that the bottom between formers F5 and F6 are sheeted as well. This is important since this area will get wet and no water is allowed to enter into the tail.

Take the fin and fish the elevator NyRods into formers F6 and F5. Keep pushing until the root rib of the fin sits on top of the fuselage longerons.

Glue the fin to the fuselage longerons, then glue the NyRods to the formers. Glue on the top fuselage sheeting. Because there is a compound curve between formers F1 and F3, that section has to be planked with 3/16" thick balsa strips. Once the glue is dry, sand this planking to 1/8" thickness. Inside the fuselage glue in hardwood block to former F5.

Now it's time to make the cowl. Depending on the type of engine used, the shape of the cowl can be changed so that it hides the muffler with the engine inverted. I built mine this way: First the fuselage was covered with iron on plastic from former F1 to the former F4. This was done to prevent the fiberglass from sticking to the fuselage.

Next, I cut the foam into blocks. One for the middle and two for the cheeks. Make sure that the cheeks are large enough to hide the muffler when completed.

With a small amount of the 5 minute epoxy, glue the blocks to the firewall and to the sides. Now sand the blocks to get the proper shape as shown on the plan. Use the templates to check the shape. Because the fit between the blocks was not perfect, I filled the void with water soluble filler and sanded it.

Take the 3 oz./sq./yard fiberglass and cut the strips on a 45° angle.

I secured the fuselage standing up and started to lay up the strips of the fiberglass cloth and brushed on the epoxy resin. I layed four layers of the cloth over the entire foam mold. Once the epoxy was cured I pried the foam from the fuselage.

Sand the outside of the cowl to get a smooth finish. To get rid of the foam from inside of the cowl, I dug it out and then I sanded inside with coarse sandpaper. Because the engine is mounted inverted,

"V" notch to accept the stabilizer later on.

The horizontal stabilizer and elevators are cut out from 1/4" sheet balsa as shown on the plans. The stabilizer halves are joined together using the plywood dihedral brace to set the correct angle, and to reinforce the joint. Sand the leading and trailing edges to the shape shown on the plans.

Fuselage:

To build the fuselage, cut out the sides and all the formers. Glue the longerons to the sides. Stand up the sides and apply glue

AQUABIRD

Designed By:

Laddie Mikulasko

TYPE AIRCRAFT

Sport, Land & Water

WINGSPAN

60 Inches

WING CHORD

12 Inches (Avg.)

TOTAL WING AREA

750 Sq. In. (Approx.)

WING LOCATION

Low Wing

AIRFOIL

Symmetrical

WING PLANFORM

Modified Delta w/Winglets

DIHEDRAL, EACH TIP

Center: 3-1/16" (9 1/2°)

Anhedral, at center

Tip: 6 1/2" (34°)

Dihedral, at tip

OVERALL FUSELAGE LENGTH

56 3/4 Inches

RADIO COMPARTMENT SIZE

(L) 13" x (W) 3" x (H) 2 1/2"

STABILIZER SPAN

23 1/2 Inches

STABILIZER CHORD (incl. elev.)

6 1/4 Inches (Avg.)

STABILIZER AREA

145 Sq. Inches (Approx.)

STAB AIRFOIL SECTION

Flat

STABILIZER LOCATION

Top of Fin

VERTICAL FIN HEIGHT

9 Inches

VERTICAL FIN WIDTH (incl. rud.)

11 Inches (Avg.)

REC. ENGINE SIZE

.40-.45 2-stroke

FUEL TANK SIZE

10-12 Oz.

LANDING GEAR

Conventional (Opt.)

REC. NO. OF CHANNELS

4

CONTROL FUNCTIONS

Rud., Elev., Throt., Ail.

BASIC MATERIALS USED IN CONSTRUCTION

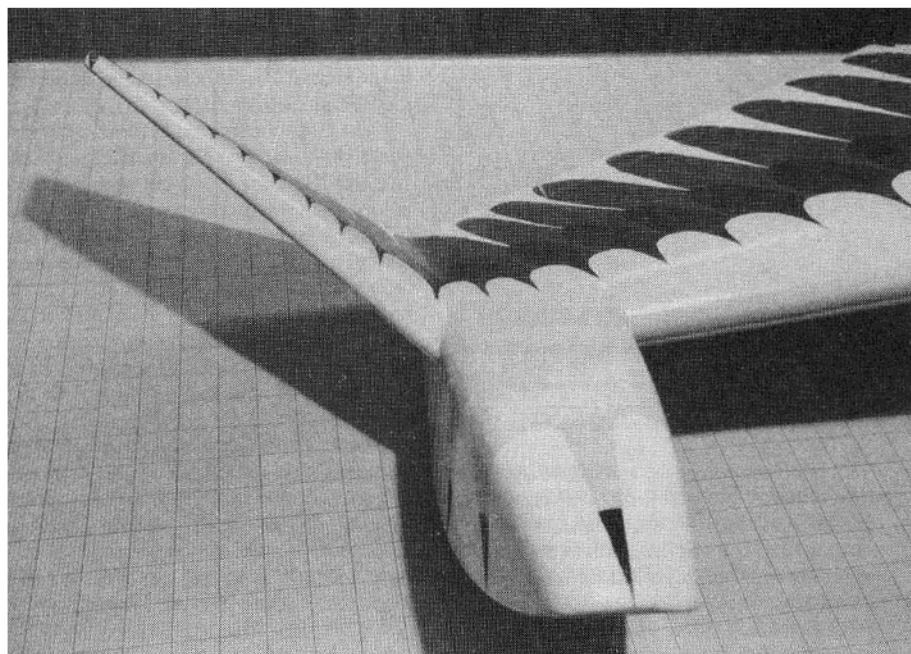
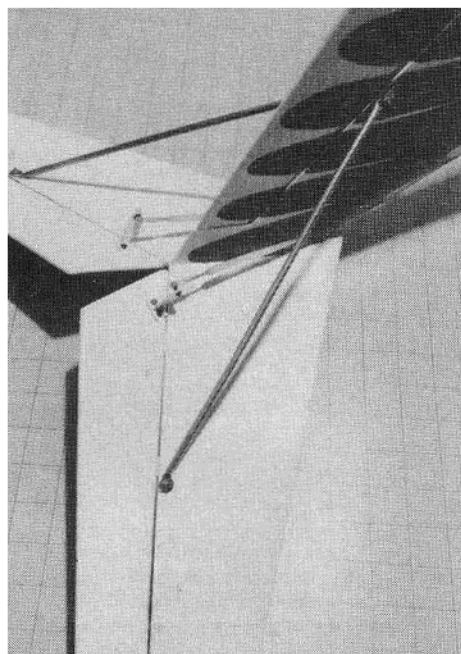
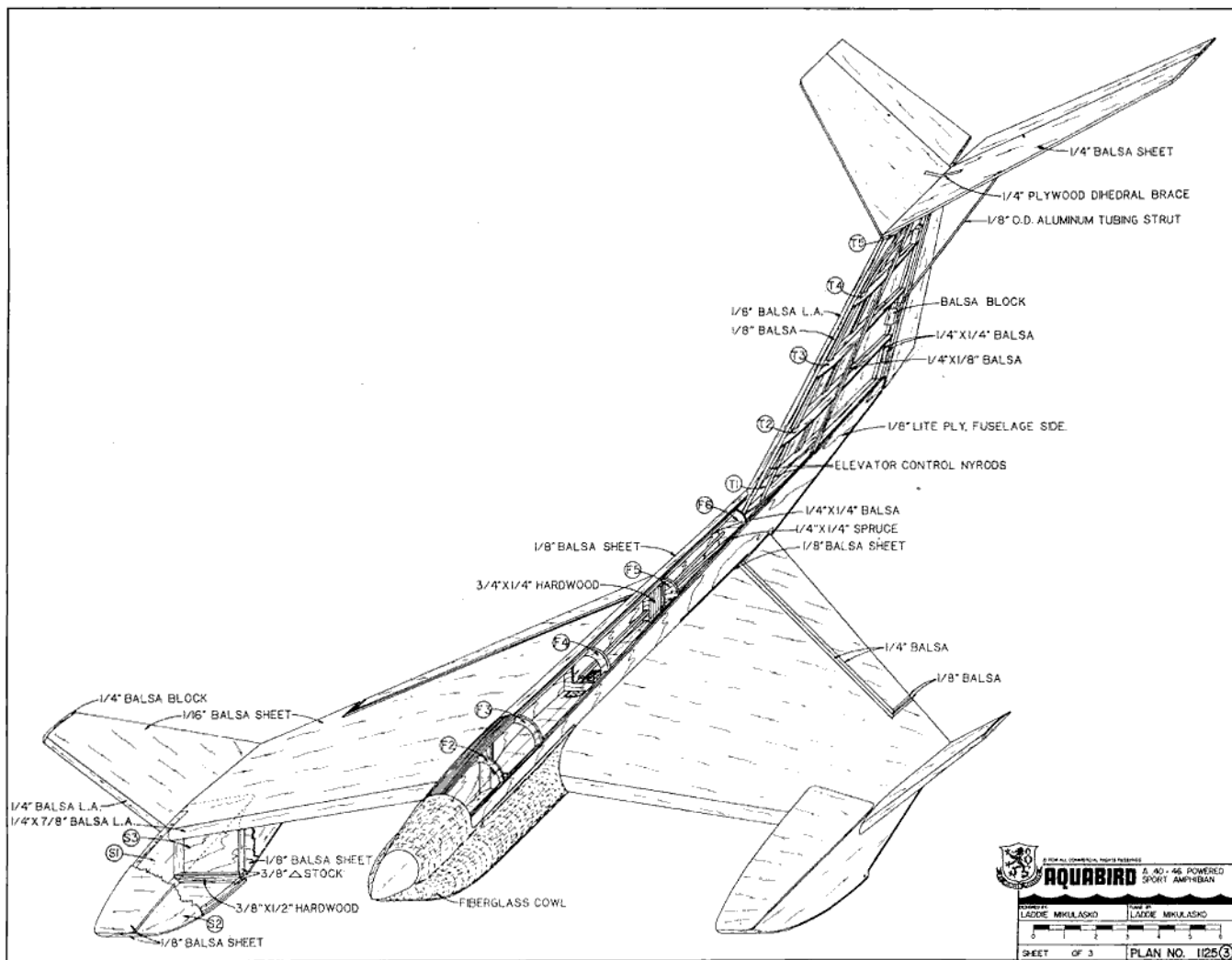
Fuselage Balsa & Ply

Wing Balsa, Ply & Foam

Empennage Balsa

Wt. Ready To Fly 112 Ozs. (7 Lbs.)

Wing Loading 21.5 Oz./Sq. Ft.



LEFT: The elevator controls and strut attachment details are shown. RIGHT: Wingtip and float shape shown.

make the cooling opening in the cowl below the spinner. I cut mine in the shape of shark teeth.

Install the engine mount and screw the engine to it. Install the muffler and slide the cowl over to see how it fits. Glue on the

stabilizer to the top of the fin. Check the alignment. During one of my flights, I encountered elevator flutter, so I added the

strut between the fin and stabilizer.

The inside of the fuselage must be protected by dope or preferably with epoxy or polyester resin. The model can now be finished using your favorite technique.

My model was painted with SIG white dope using a brush. I put on three coats followed by a coat of the clear dope. Because I wanted the model to represent an imaginary bird, I painted feathers, claws, and a shark head with teeth.

To draw feathers, I first cut out the cardboard templates and then positioned them one at a time on the wing. With a soft pencil I drew an outline of each feather. With the fine tip brush, I freehand painted an outline of each feather.

Using a wider brush I filled the inside. The paint scheme may look time consuming but it is not.

After the model is painted, install the engine, fuel tank, and radio. With the fuel tank empty check position of the C.G. Make sure that the C.G. is exactly in the spot shown on the plan. Check the deflection of the control surfaces.

The model is now ready for the first flight. I think that I have written enough about its flight characteristics in the introduction, therefore, the only other thing I want to add is: Have fun!



**From
RCModeler
Sep. 1992**