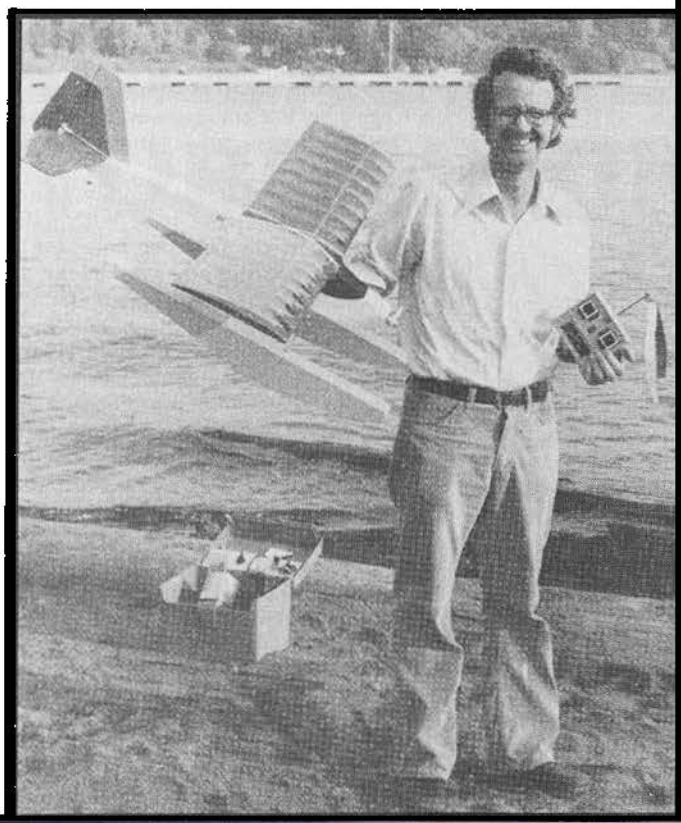
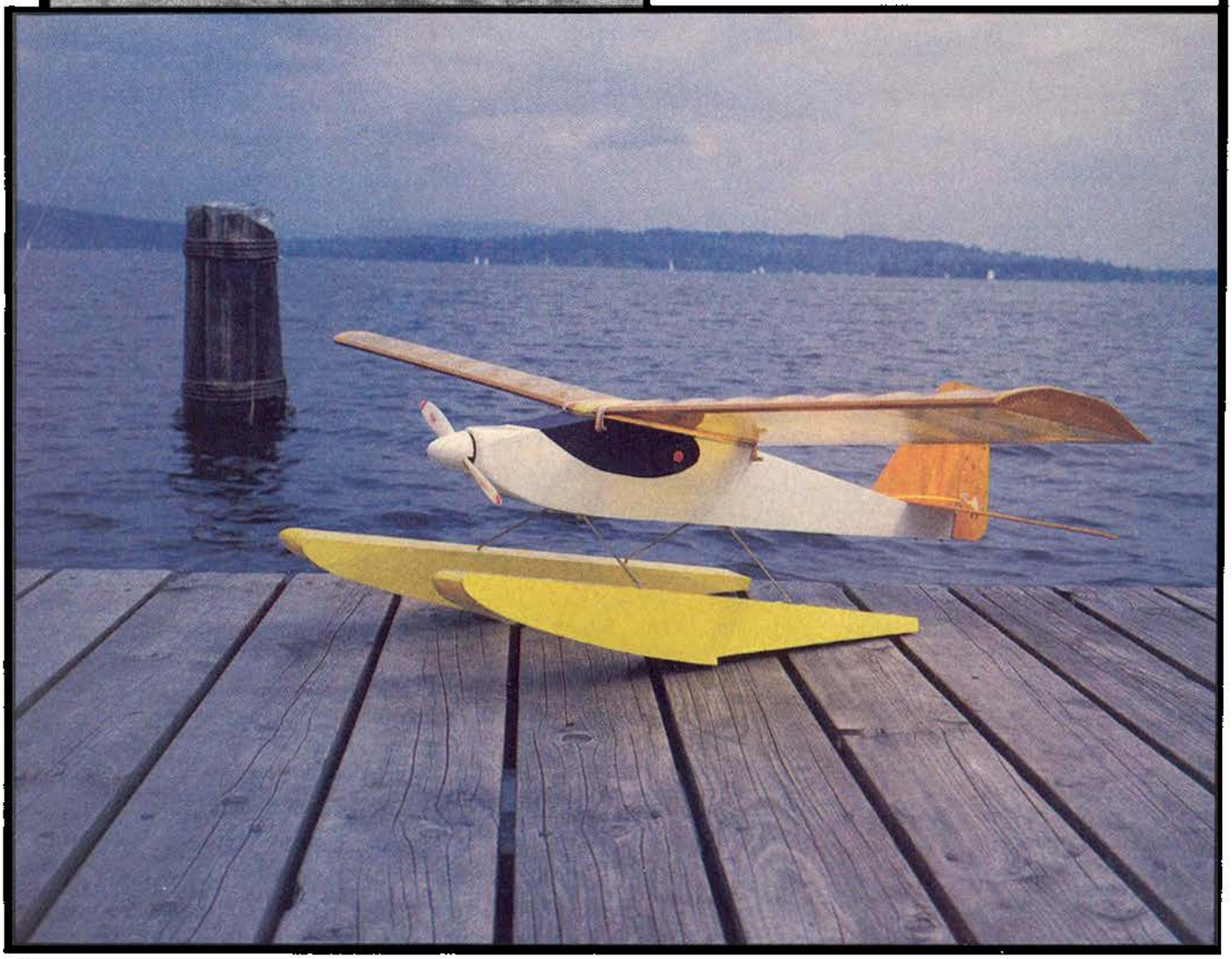
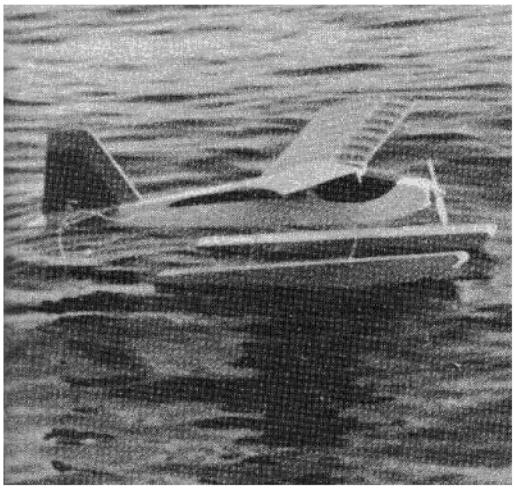


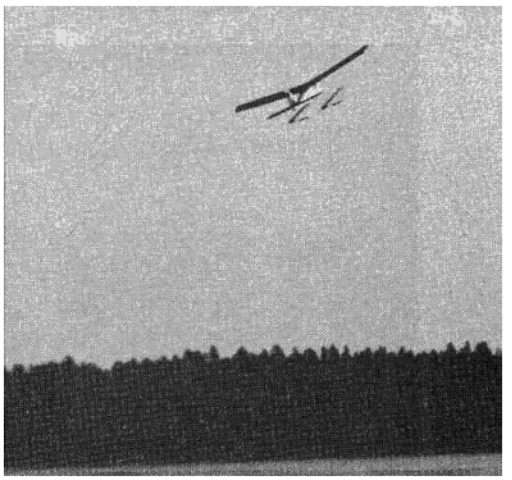
AQUA SPORT





ABOUT THE AUTHOR

Mitch Poling has been writing about electric planes since 1974, starting with an R/C conversion of the Mattel Super Star. His main interests in R/C are sport, gliders, water planes, and Stand-Off Scale. Mitch lives in Seattle, Washington, an ideal place for seaplanes and, in addition to his R/C hobby, he is busy raising a brand new daughter, teaching chemistry, learning to fly full scale seaplanes, writing, and enjoying life with his wife, Sandra Smith Poling, M.D.



The Aqua Sport is a lively water plane that is a blast at the lake or pond. It picks up speed quickly and is off in a 50 to 75 foot water run, with a rapid climb rate. The Astro 15 has the power to handle windy days and reasonable wave conditions, plus the ability to take off easily in glass smooth water. I've been flying this plane for three years, including four float plane contests. In all the contests it competed on equal terms with the gas planes and always came out near the middle of the pack. It could do a lot better than that, but the pilot is a definite handicap! Somehow, I always manage to snag a buoy, and I once even hit a tree! Oh well, next year.

It is a delight to do touch and goes (excellent), loops (slow), and rolls (surprisingly quick). Best of all, no neighbors complain about noise, it starts every time, it can start and stop out in the middle of the pond, and always taxies back to shore (the engine doesn't quit!). An extra bonus is the construction; it follows the rule of KISS (keep it simple ---), with a sheet fuselage, sheet floats and tail, and a simple wing with a minimum of parts and no sanding or shaping. This means you are out at the pond having fun in minimum time. So try it, the water's fine!

Wing Construction:

The plans show the 50" wingspan version. I have also flown it with a 62" wingspan; this is exactly the same as the 50" wing, except that two more bays are in each wing panel. If you wish the 62" version, just sketch in the two extra bays and build ahead! I do recommend the 62" size if you wish a slower flying plane or if you are new to float flying, since the handling is more easygoing. The 50" version is quite snappy in its handling, and quicker in the air, which would suit the more advanced flier or the experienced water pilot.

Do pick light balsa for all parts of the plane. A small postal or diet scale works well for weighing balsa (the ones that have grams as well as ounces are the best). My guideline is 1/2 ounce for a 3" x 36" x 1/16" sheet, 3/4" ounces for a 3" x 36" x 3/32" sheet, and 1 ounce for a 3" x 36" x 1/8" sheet. If the scale has grams, this would be 14, 21, and 28 grams.

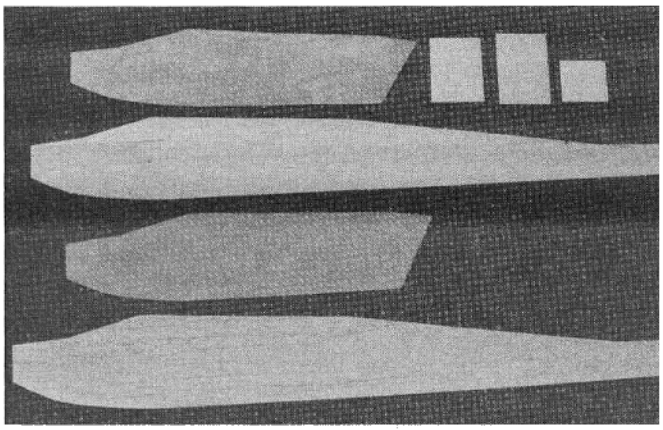
Since the wing ribs are all the same, it saves some time to stack blanks and do them on a jig saw, however, the good old standby, the razor blade, works fine, it just takes longer. The trailing edge is notched to fit the rib ends tightly. This not only makes the wing stronger but makes it easier to build, since the ribs are spaced and jigged at the same time by the trailing edge. The spars are 1/2" x 1/4" spruce. If this size of spruce is not available, the spars can be made by gluing two 1/4" square spruce pieces together, or use basswood. Do not use balsa, unless you like to watch airplane pieces fall out of the sky! All glue in this construction, by the way, is thick cyanoacrylate (thick Hot Stuff, Super Jet, etc.), unless otherwise stated. The leading edges are also spruce. Once the trailing edge, spar and leading edge are glued in, glue on the center rib doubler and the wing tips. Since the left and right wing panels are identical, just put the tips on opposite ends of the panel to get the two wing halves. Install the aluminum tube for the dihedral wire below the spar. This tube is the K & S 12" long, 3/16" internal diameter stock. Use the tube as its own drill by notching one end of it slightly, then bore through the ribs by hand with the tube. Hold a balsa block behind each rib as you do so, to

AQUA SPORT

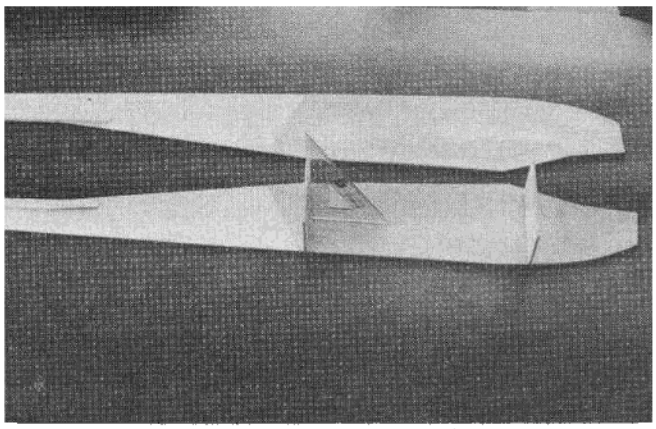
DESIGNED BY:
Mitch Poling
TYPE AIRCRAFT
Electric or Glow Sport
WINGSPAN
49 Inches
WING CHORD
9⅛ Inches
TOTAL WING AREA
447 Sq. In.
WING LOCATION
High Wing
AIRFOIL
Flat Bottom (11%)
WING PLANFORM
Constant Chord
DIHEDRAL EACH TIP
3"
O.A. FUSELAGE LENGTH
34"
RADIO COMPARTMENT SIZE
(L) 10" X (W) 2½" X (H) 3½"
STABILIZER SPAN
20 Inches
STABILIZER CHORD (incl. elev.)
5½"
STABILIZER AREA
97 Sq. In.
STAB. AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
7 Inches
VERTICAL FIN WIDTH (incl. rud.)
7" (Avg.)
REC. ENGINE SIZE
Astro 15 Elec.
.10-.15 Glow
FUEL TANK SIZE
4 Oz./Glow
LANDING GEAR
Conventional
W/Wheels or Floats
REC. NO. OF CHANNELS
3
CONTROL FUNCTIONS
Rud., Elev., Motor On-Off Or Throt.
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa & Ply
Wing ..... Balsa, & Spruce
Empennage ..... Balsa
Wt. Ready To Fly ..... 60-72 Oz.
Wing Loading ..... 20-24 Oz./Sq. Ft.

Build it as an electric or glow powered, wheels or floats. It's a good performer.

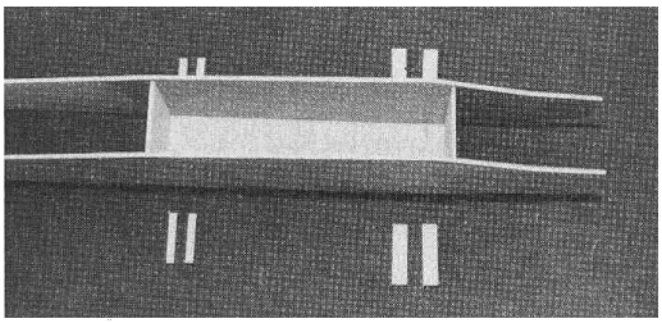
By Mitch Poling



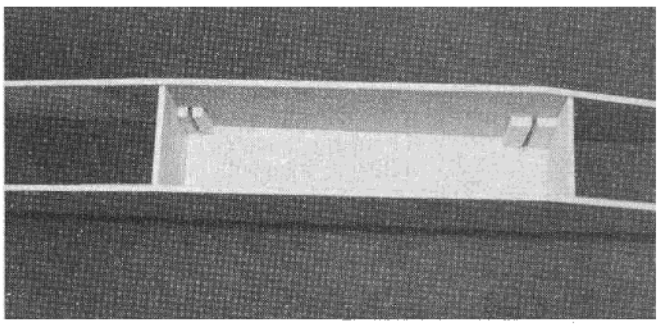
Fuselage sides and parts ready to assemble.



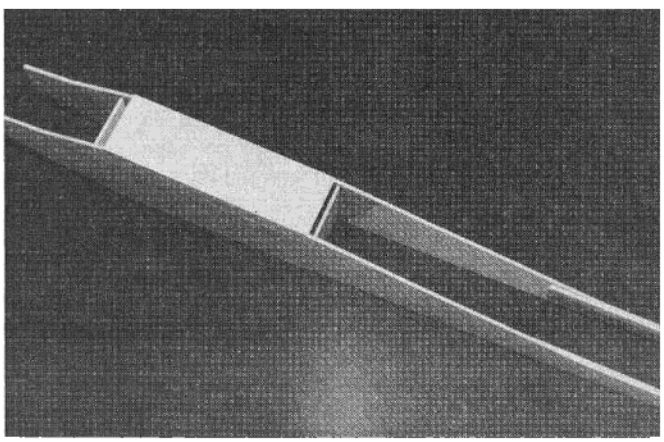
Doublers and bulkheads glued in place with CA. Use triangle for alignment.



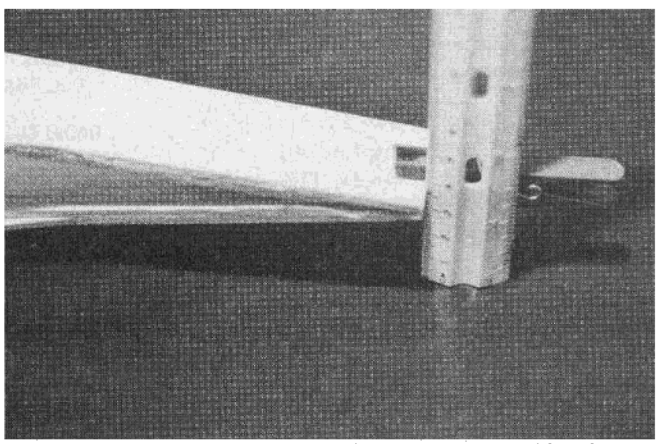
Sides assembled with bottom sheeting in place. L.G. blocks cut and ready to install.



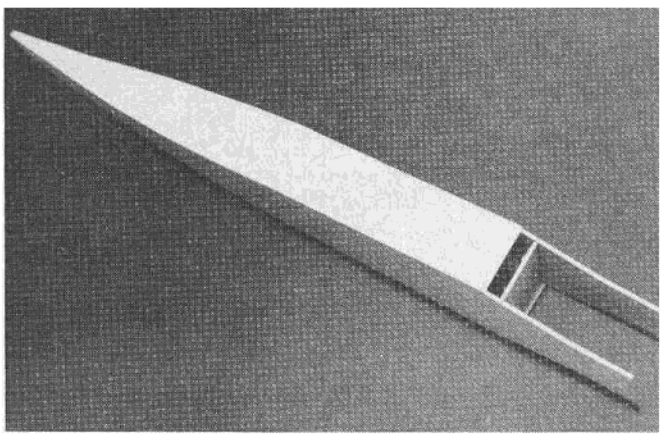
L.G. blocks installed with epoxy or CA.



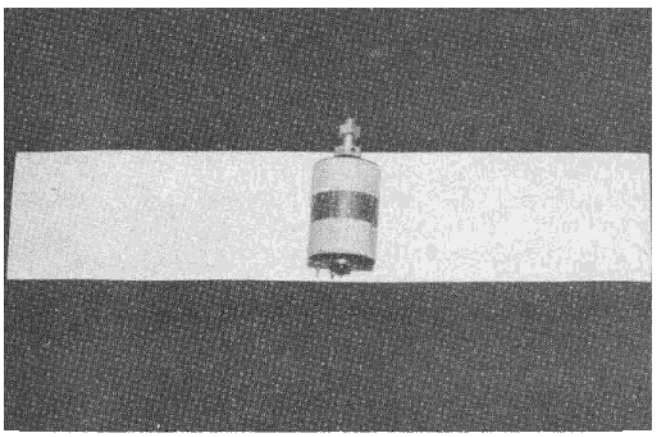
Sheet cabin top to keep alignment square. Hatch will be cut out later.



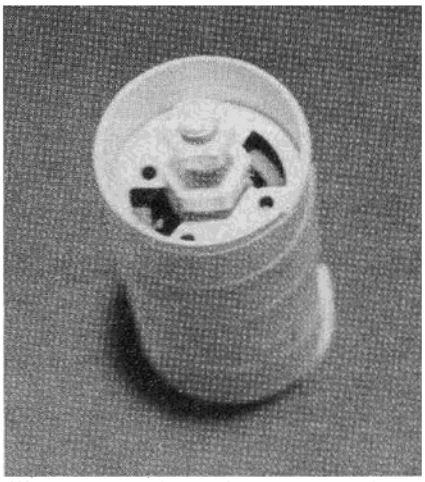
Glue rear of fuselage together. Check alignment with ruler on table top.



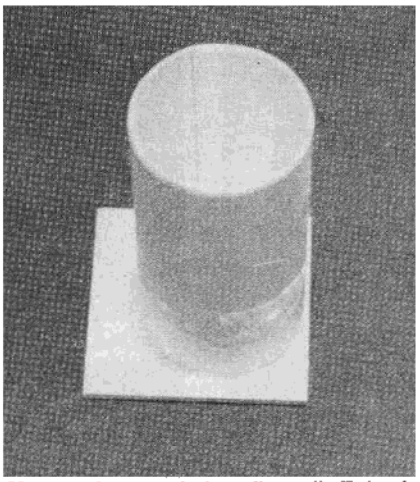
Sheet top and bottom up to front of cabin.



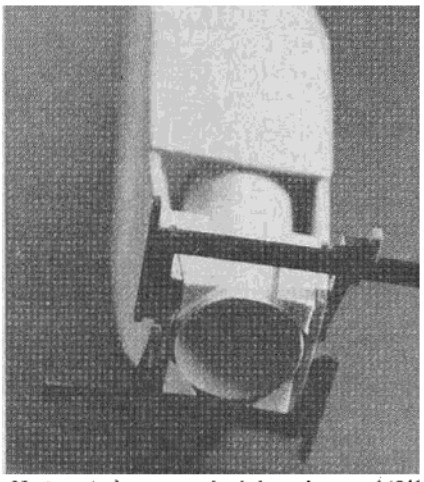
Roll motor tube from file card stock.



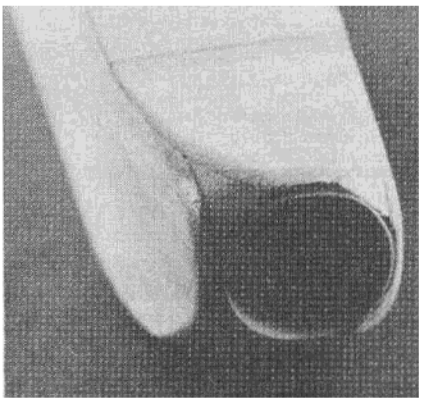
Wrap motor tube, using motor as form, several turns using 5-minute epoxy.



Motor tube epoxied to firewall. Tube is offset to give 3° down and 3° right.



Motor tube epoxied in place. 1/2" triangular stock used to fill in around tube.



Top sheeted and corners rounded off to fair nose in.

prevent breakage. Bind the tube to the spar with 3/4" wide nylon tape and Hot Stuff. Three turns of tape is enough, in each rib bay.

Cover the wing with Solarfilm or equivalent, and make the dihedral wire from 3/16" music wire. I recommend using transparent colors for the wings so that water can be spotted if it gets in. Water doesn't cause any problems if it is drained out and left to dry at room temperature. Slip the panels together on the dihedral wire, and tape around the center joint with vinyl tape. Don't worry about gaps at the center, the tape covers them nicely and seals out water.

Put in about 1/4" washout at the trailing edge at the tips by using a MonoKote iron. Twist the wing so that the trailing edge at the tip is 1/4" above the table when the center rib is flat on the table, and use the iron to take out any wrinkles. This should lock in the washout. By the way, there is no need to glue the wing center seam together, and I do not recommend doing so. This way the wing panels can be taken apart easily, an advantage in storing it, traveling, and drying it out if water does get in. "Long time" builders will also notice that there is no center sheeting. This is on purpose — invariably a wing will break at the sheeting, because stress concentrates there; it's better to leave it off.

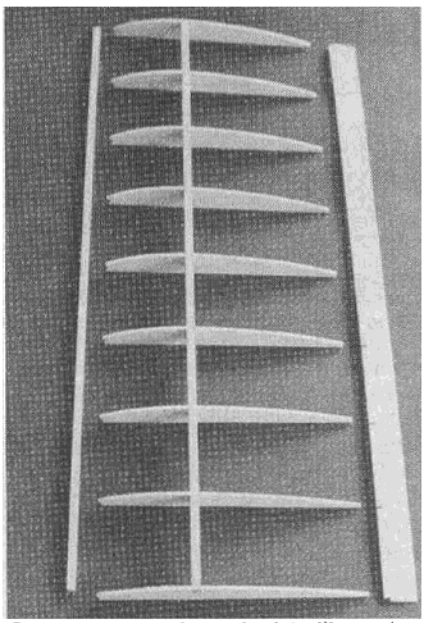
Tail Group:

The rudder and stabilizer are cut from light 1/8" balsa sheet (1 ounce for a 3" x 36" x 1/8" sheet). I make Solarfilm hinges by beveling the hinging edges to 45°, then I cover the elevator and stabilizer in one piece, ditto for the fin and rudder. This makes a strong hinge, with no air gaps. The areas where the fin glues to the stabilizer and the stabilizer to the fuselage are then stripped of film so that 5-minute epoxy will hold firmly. Alternatively, you can make the fin and stabilizer removable, as shown in the plans. This is what I do; it is very handy for travel and repairs if necessary.

Fuselage:

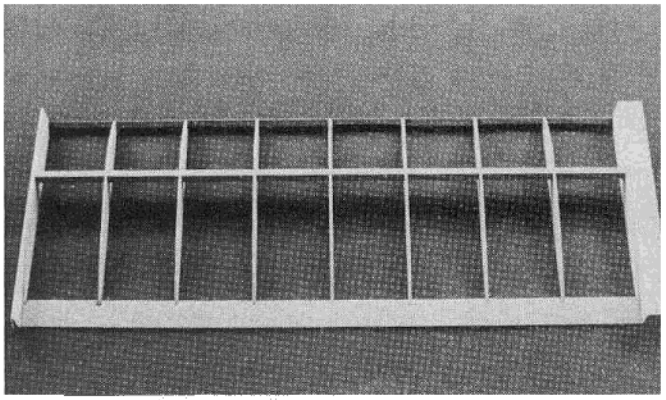
The sides are cut from light 1/8" balsa, and the doublers from 1/64" plywood (1/32" ply, or 1/16" balsa will do if you can't get 1/64" ply). Use scissors to cut the 1/64" ply; it makes the job easy. Lay lines of Hot Stuff on the fuselage where the doublers go (be generous), and press the side and doublers together. Trim any excess with scissors. Glue in F2 and F4, then cover the cabin floor with 3/32" balsa crosswise, between F2 and F4. Glue in the landing gear blocks (leave a 3/16" slot between the front blocks for the slip in wheel landing gear), then cover the cabin top with 3/32" balsa crosswise between F2 to F4. Now you have a rigid, enclosed box, which will ensure that the next step, alignment, will be true. Trim all edges, then use a clothespin to hold the tail end together.

Check whether the fuselage is true (aligned) by laying it on its side on the table, then measure the distance between the table top and the fuselage end. Turn the fuselage on its other side and repeat the measurement. If both measurements are the same, the fuselage is straight and true, and you can Hot Stuff the ends together with the clothespin still in place. Now plank the top and bottom from F4 to the tail.

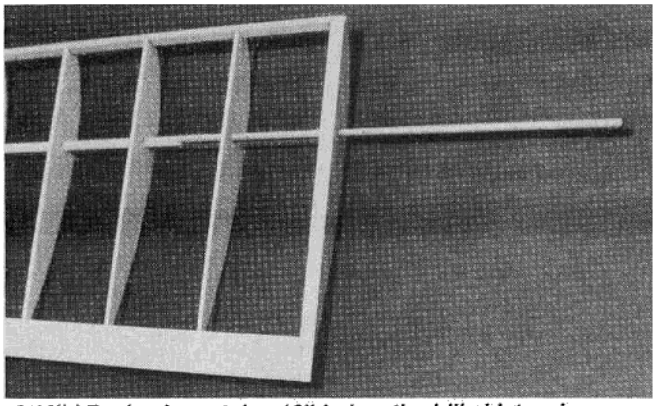


Spruce spar and notched trailing edge make a simple and strong wing.

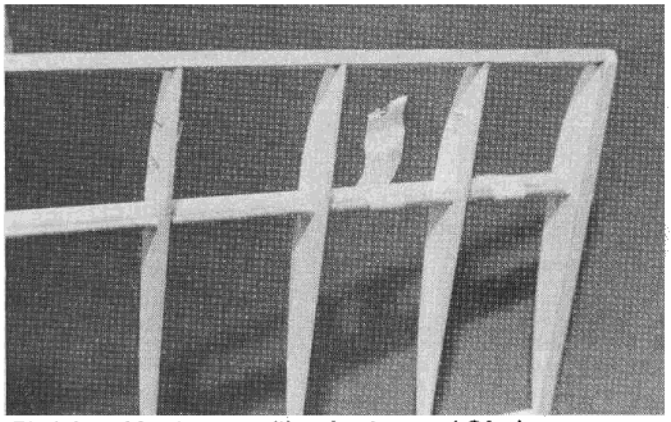
Roll the motor tube from file card, four turns around the motor. Secure the last three turns with 5-minute epoxy. I mix the epoxy directly on the file card, then roll it up, and hold everything in place with masking tape until the epoxy sets. Epoxy the tube to F1 (note the offset), then epoxy F1 in place, using clamps to hold the nose together. Hot Stuff 1/2" triangle stock in the nose around the motor tube, then plank the nose from F2 to the nose tip. Round the nose to match the



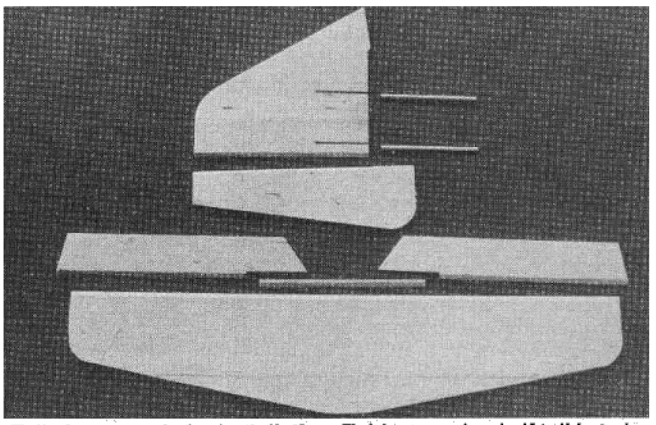
Wing tip 1/8" sheet or block. Center rib doubler from trailing edge stock.



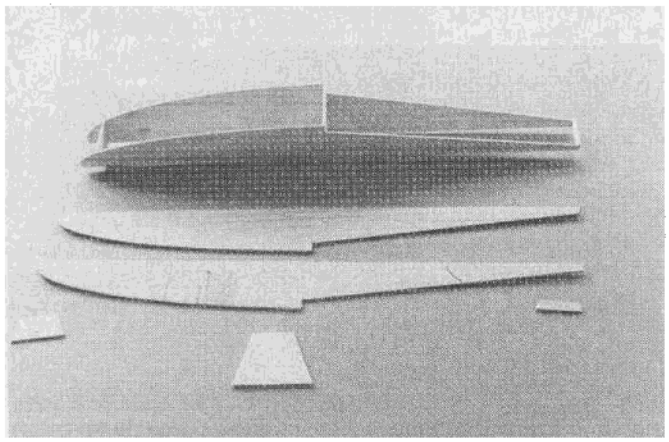
3/16" I.D. aluminum tube, 12" in length, drilled into wing.



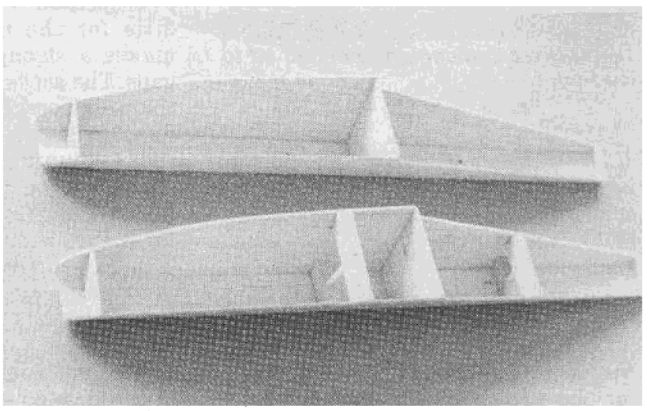
Bind the tubing to spar with nylon tape and CA glue.



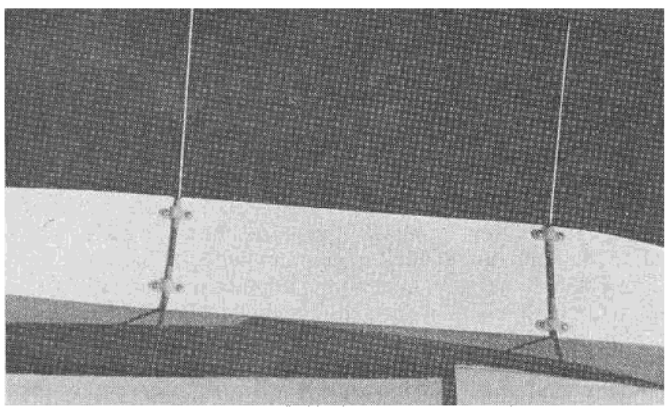
Tail pieces ready for installation. Tubing used only if tail is to be removable.



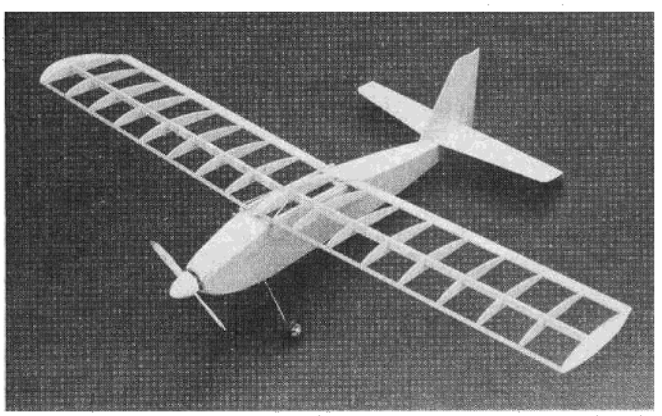
Float pieces with one partially assembled.



Landing gear braces and top sheeting in place.



Float mount straps secured to cabin bottom. No cross struts necessary.



Complete and ready to cover. Wheel option shown. Note hatch opening cut-out under wing.

spinner curve. Paint the fuselage with one coat of Balsarite (Coverite) and cover with Solarfilm. The Balsarite keeps the Solarfilm from wrinkling even if the plane gets wet from a dunking. Strip some Solarfilm away from the cabin top and glue on the 1/4" square rails. Cut out the cabin hatch, 2¼" x 8", and save the cut-out to use as the hatch cover. Install the wing dowels, and that's it!

Floats:

Cut the float sides from 3/32" balsa, and glue in all the formers. Epoxy in the 1/4" thick balsa cross pieces that hold the 1/8" inner diameter Structoplast tubing, then glue in the tubing. Plank the top and bottom with 3/32" balsa crosswise. You do not need to try to chamfer the edges, instead, trim the edges flat with the sides, then sand balsa dust into the gaps and use Hot Stuff to secure the balsa dust as filler. Leave nice sharp edges on the float bottoms for clean breakaway from the water on take-offs. The curve on the front of the floats is fairly sharp, so groove the planking, and lay strips of masking tape over it so it won't crack as you cover the float fronts.

Paint the floats with one coat of Balsarite, then cover with Solarfilm, covering the sides first, then the top and bottom. I cover the bottom in one piece, but the step does take some care, start the covering at the step, then work towards the ends of the float. Seal all edges with Balsarite.

Radio Installation:

I recommend a light radio, servos in the one ounce bracket, and a 250 mah receiver battery. However, I use larger servos (1.25 ounce) and a 500 mah receiver battery, so most radios will do. Use NyRod for the rudder and elevator, since it does a good job of keeping water out of the fuselage. Run the NyRod out the top of the fuselage, just before the stabilizer, for both the rudder and elevator. You must have an on-off control for water taxiing, I use a throttle servo that activates a Cherry Electronics E22 microswitch substituted or the toggle switch that comes with the Astro 15. This switch is secured on the servo by double sided foam tape (servo tape), and the servo arm rides over the lever arm of the switch. This switch requires very little pressure to turn on and does an excellent job. This switch is available from Leisure Electronics (11 Deerspring, Irvine, California 92714). Radio Shack has a similar switch, but it can't handle the current (learned by experience!). All the servos are mounted with double sided foam tape to the cabin sides.

Float Installation:

Plug the landing gear struts into the floats and secure them with Hot Stuff. Mount the struts to the underside of the cabin with landing gear straps. The mounting screws should be routed to go into the blocks in the cabin. Check that the floats are parallel straight ahead, and that the tops are parallel fore and aft. The floats should be slightly negative (pointed down) about 1½° relative to the stabilizer. This is important! It makes the take-offs easy and quick. The step should be at the balance point.

Power Package:

The Astro 15 is recommended for this plane. An optional installation for .10 to .15 glow engines is shown on the plans. If this is done, omit installation of the motor tube, and mount the engine on the front of the nose on a 1/4" plywood firewall.

I have used quite a variety of combinations with the Astro 15. The first Astro 15's had a plain metal front on them, and I found that 9/4 prop was best for them. Next came Astro 15's with a black front, a Top Flite 8/4 is best for these. I have also used an Astro 25 battery pack with the black front Astro 15's, for longer motor runs, using an 8/6 prop. This combination is quite good. Most recently I have been using the Astro Challenger 15 (Cobalt) with 12 sub C cells and an 8/4 prop. This is the best of all for power and duration (from five to eight minutes).

The Challenger and the newest line of 15's have brush holders that project out the back, so they cannot be pushed into the motor tube from the front. Omit the motor tube for this type of motor, and install a 1/8" plywood firewall in the front of the nose. Cut a 5/8" diameter hole in the center to accommodate the front bearing, and drill two holes to match up with the mounting bolt holes in the front of the motor. Cut a 3½" long hatch in the top of the nose so the motor can be installed from behind the firewall. Use 3/16" or 1/4" long bolts to mount the motor to the back of the firewall (longer bolts may strike the armature and damage it). Down and side thrust can be adjusted by shims inside the firewall.

Wheel Option:

The wheel option is a plug-in landing gear; for this, you do have to cut a slot in the bottom of the cabin. When you are using floats, this can be covered with tape. Be sure to use glass fiber tape as shown on the plans so that the landing gear will not spread on hard landings — this can crack the cabin sides. No problem with the float version, there it is better for the gear to spread on a hard landing, as it works as a shock absorber, so no cross struts are used.

Dunkings:

There is sure to be some dunkings in the life of any float plane, and since water is much softer than land, there usually is no damage. However, you do want to be sure that everything gets dried out. Remove the motor, its battery, and the radio equipment, and remove all the plastic cases, then let it all dry at room temperature for a day or so. I mount the servos well away from the cabin floor, so usually they do not get wet and I leave them in place. I do leave the cabin open so that any water that got in there will evaporate. After all is dry, check the servos to be sure the foam tape didn't loosen. Then go fly! I have dunked many times, with no damage to either the radio or the Astro 15. I fly only from fresh water, all bets are off if you wish to fly from salt water; I wouldn't recommend it.

Flying:

At last, the fun part! The plane should balance at the balance point; in fact, I usually fly a little nose heavy, it helps on stability. The flying weights vary from 3¾ lbs., with the regular Astro 15 to 4½ lbs., with the Astro 15 with the Astro 25 battery. Since there are no cooling vents (to keep water out), leave the battery cases off, and after every two flights, check the temperature of the motor and battery. If they are hot to the touch, let them cool off. Body temperature is just right, the batteries work best at that temperature. The first flight of the day will be shorter and not as peppy, since the batteries do need to warm up some. For your first flights, pick a day when the winds are 5 mph or less, and wave height is less than four inches. Take off into the wind, let it get up onto the step by itself and, once it has flying speed, give it a blip of up elevator to break it loose, then back to neutral. Let it fly level for a count of four to let it build up flying speed, then let it climb out. If there are waves, chop, or wind, the plane can easily jump into the air before it has full flying speed and, in this case, hold it level, using down if necessary, until it is safely "at speed." It is better to wind up skipping and doing a few hops than the alternative, which is a stall and dive, which always gives a dunking. Down elevator is your friend, up elevator can bite, in those first few seconds. Once you have mastered the take-off on calm water, go ahead and try it in more wind. If the waves are high enough to occasionally break over the floats, and the propeller occasionally hits a wave, the conditions are rough enough that take-offs will be quite hard to do. Wait until you are expert for that. One big no-no is cross wind take-offs. Right at lift-off, ten times out of ten, the wing will flip up on the upwind side, and over it goes! In conditions like that, a downwind take-off can be done if an upwind

take-off is not convenient. It takes a longer take-off run, but it beats getting wet in a cross wind attempt.

Taxiing is done with lots of rudder and on-off blasts of the motor. I have used a water rudder, but the extra drag is too much on take-off, and the water rudder is of use only at slow speeds anyhow. If the wind is too stiff to use the air rudder and the plane insists on weather vaning (points into the wind), just turn off the motor and let it sail into shore. It takes longer, but it works just fine. The real ones have to do that occasionally too.

If you use the wheel option, take off from pavement, not grass, or, alternatively, hand launch. Both versions do nice rolls, especially to the right; just pull the stick back into the right corner, and watch out! Loops require a little dive to build up speed, then lots of up elevator. The float version tries to roll out at the top of a loop due to the weight of the floats, so be quick on the rudder, or you will get the world's largest barrel roll! Touch and goes on water are a blast, and really pretty to see. Turn off the motor, come in fairly fast, skip (no power), then as the plane comes up on the skip, turn on the motor and go. You can do that all day! Nothing beats a float plane for fun --- let's go! □

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