

AIR SKIMMER

A .19 sized Stand-Off Scale amphibian, designed for four-channel operation. If you're looking for a combination land and sea sportsplane, the Air Skimmer is for you.

When I decided to expand my modeling into radio controlled model airplanes, I went into it operating on the premise that not all airplanes capable of being flown by a novice had to be ugly and non-scale. My choice was a home-built seaplane known as the Osprey. The Osprey has undergone a name change and design change to make it amphibious. I offer it to you in this configuration.

I chose a Super Tigre .19 for power and a Blue Max radio for control. Being rather traditional, I chose balsa as the medium in which to work. The design is a natural for foam application, but wood provides the lightweight, strong construction I desired. The airplane builds fast and easily so the wood isn't a detriment.

Flying brought some moments of glee to the family and the local club because the Air Skimmer didn't fly. I had, in spite of careful thought about high thrust lines, built the neatest winged car in captivity! I did get lots of taxi time, though. A high thrust line has a tendency to tuck the nose at power increases and pitch it up at power decreases. To compensate, I built a negatively lifting horizontal tailplane and, following the taxi tests, a slight thrust modification cured the "kiwi complex". The controls are very sensitive and small amounts of movement go a long way in the air.

The only deviation from common building practices might be the landing gear that is silver soldered. Silver soldering isn't difficult and construction might well begin with the metal work. For those who haven't used silver solder, a few words of introduction. A Benzomatic torch will do a good job. Your local welding supply can furnish you with flux and silver solder. It is expensive, but a little goes a long way.

Cleanliness is the real secret to success. Sand and file all joints until they are clean and the flux will keep them clean. I use lots of flux to keep the area around the joint clear of oxidation and discoloration. The flux, which is either a paste or a liquid, will, when heated, dry out and then liquify again. When it is liquid, the temperature is getting nearly right and the silver solder should be put to the joint. 1100° silver solder is probably the best suited for model work. When it melts, if the metal isn't hot enough, a little ball will form. As soon as the temperature is right, it flows. Silver solder moves easily to the heat so, by moving the torch flame along the joint, the silver solder just follows it. One caution --- silver solder does not fill large holes so make your joints close fitting.

The landing gear is semi-scale and fully shock absorbing. It can be removed and filler bolted in place of the nose gear for operation off water. The main wire

components are simple to bend from 1/8" music wire. The shock cord mount is 3/32" music wire with washers soldered on and then filed down as retainers of the shock cord. The pivot point is .032" brass side plate and 5/32" brass tubing.

The throttle cable (nylon housing with brass cable) can be secured to the pylon with a small nylon landing gear clip with one end cut off. Be sure that the cable works smooth and free.

The elevator horn is a standard Sig control horn with a nylon link for control hookup.

The only other metal I used is aluminum templates of the wing and horizontal ribs. With sandpaper glued to one side, you can cut ribs with hardly any need of sanding.

The wing is built in three sections and is super simple and strong. I found that building the basic wing first and then the ailerons was the easiest way to get a nice, straight wing. The tabs on the ribs provide a straight, steady working situation while you install spars and spar webs. When you have the 1/16" leading edge cap, the four spars, all the webbing and the ribs assembled, glue a piece of 1/8" balsa to the vertical side of the trailing edge tabs. This will hold the aileron ribs as a single piece when you cut them free from the rest of the wing. Glue the aileron leading edge and sand to shape on the top. On the wing, glue in the aileron cut-out trailing edge and shape it. Install the nylon aileron torque tube assembly and set the aileron back into position on the wing. Be sure and use nylon for the torque tubes as there may be a tendency for the wire to rust causing a bind if brass or aluminum is used. Install the hinges. The top surface of the hinge is flush with the top of the uncovered wing and aileron. At this point, I covered the tops of both outboard panels with 1/16" balsa sheeting. Then I assembled the three pieces of the wing, blocking up the tip panels 1" at each tip. These tip panels are butt glued and reinforced with glass cloth and resin when complete and ready for covering. Threading the aileron nylon torque tubes through a covered center section would be a problem. Install the wing bolt mounting plates and the landing gear mounts and then plank the rest of the wing.

Cut out the wing tip blocks per the plan view and glue on to the wing. Sand to the plan form shown. Shape the top first by straight edging along the top of the wing skin. After the top is in, straight edge from the bottom contour at the last rib up to the line made by the plan form and the top contour. When I planked the wing, I covered right over the aileron cutouts and didn't cut the ailerons loose until I had finished sanding the wing. This makes a nice looking aileron.



Cut out the engine pylon and install it carefully. Small amounts of thrust line changes make significant flying differences. I mounted the engine before installing the pylon because the wing makes drilling motor mount holes a bit awkward. The fairing on the pylon can be added as shown in Section B-B. The only caution is to epoxy the engine pylon in place extremely well.

Float construction is of hollow blocks of balsa. The shape of these floats is a bit unique in that they are square across the back. On the bottom, the float is slightly V'd in the front but flattens out about two-thirds of the way back. At the wing intersection, the float is streamlined. From this intersection down, it tapers into the square trailing edge of the float. I spot glued two pieces of balsa together and made the outer contour. Then I popped it into two halves and hollowed each half. The floats are epoxied to the bottom of the wing and a small fillet is run around each. I recommend fiberglassing the bottom of the floats to help protect them when the airplane is on wheels.

The horizontal stabilizer is built like the wing. Choose the wood carefully to get the optimum strength to weight ratio. Throughout construction of the horizontal tail, bear in mind that it is mounted on the vertical fin and every fraction of an ounce of weight increases the destructive force it can wield in a ground loop, sudden stop or crush. Don't cut the elevator loose until after the final sanding. It will be easier to sand and will acquire a nice, final contour. When mounting the horizontal stabilizer on the vertical fin, careful alignment is a must to prevent poor flying characteristics. On a T-tail, a misaligned horizontal stab can be seen for a mile and that judge is only 10 feet away! Note the high hinge line and that the horizontal stab appears to be upside down. If you were to turn it over, it would compound the problems of the high thrust line.

The fuselage is relatively simple but a few words are in order to start it on the right track. Build the formers by epoxying the pieces together to form a rec-

tangle and then sand in the top contour. I have found that this gives a stronger, lighter former than any other type. When they are ready, glue in the three formers that are within the plywood doubler area. This box, made up of the doublers and the formers, can then have the rest of the airplane built around it. The temptation to glue the ply doublers to the sides first will produce a non-bending lamination that will probably break on the first landing. The rudder post is the rearmost former of the fuselage and care must be taken to get this one in straight as the alignment of the T-tail is at stake. Spruce may be substituted for this piece for strength. After the sides and the bulkheads are assembled, the bottom should be glued in place. The nosegear mount is made of hardwood block with a hole drilled for the wire and a slot cut for the key. The retaining block is also hardwood and is drilled for a 4-40 bolt with a blind nut. For use on water, with the nosegear removed, the holes can be covered with scotch tape. This is the simplest method. Use your own favorite method.

Before the top decking goes on the fuselage, I recommend a coat of fiberglass and cloth for the inside of the hull. Later, the outside needs the same treatment.

The top deck at the front is not drastically compound curved and can be installed as a single piece. The switch can be mounted on the cockpit floor right behind the windshield. It can be waterproofed with a piece of balloon, vinyl, etc. This material should be sandwiched between switch and plate. The rudder should be built and installed and the control system mounted. The rear decking can then be installed and the construction of the fin commence.

Rather than having control horns and pushrods all over the outside of my airplane, I put a step down lever and a horn similar to a large airplane's into the rudder system. I made the horn of nylon and the connector of a brass tube. The nylon horn is just another rudder rib with the horn part cutting through the right side of the rudder leading edge. Drill holes through the nylon and sandwich it between two 1/16" balsa ribs. Clear a little of the leading edge away so as not to bind the rod connector. The connector is a piece of 3/32" brass tubing split horizontally about 1/4" and drilled for a good sized pin. Drill the horn pin size and install it. Put a small bit of solder on to the pin to prevent it from coming out. I filed down a Kwik-Link rod to slip into the connector tube and soldered it in. Due to the angle between the rudder hinge line and the rod direction, the rod must be left to turn in the Kwik-Link so choose one with good threads and do not jam nut it as usual. The lever itself is half an aireron bellcrank. When building the verti-

AIR SKIMMER

Designed By: Al Culver

TYPE AIRCRAFT

Stand-Off Scale Amphibian

WINGSPAN

47 1/4 Inches

WING CHORD

8 Inches

TOTAL WING AREA

372 Square Inches

WING LOCATION

Shoulder Wing

AIRFOIL

Semi-symmetrical

WING PLANFORM

Constant Chord

DIHEDRAL, EACH TIP

1"

O.A. FUSELAGE LENGTH

32 Inches

RADIO COMPARTMENT AREA

(L) 10 1/2" X (W) 4" X (H) 2 1/2"

STABILIZER SPAN

13 1/2 Inches

STABILIZER CHORD (incl. elev.)

5"

STABILIZER AREA

64 Sq. In.

STAB AIRFOIL SECTION

Semi-symmetrical

STABILIZER LOCATION

T-tail

VERTICAL FIN HEIGHT

5 Inches

VERTICAL FIN WIDTH (incl. rudder)

5 Inches (Avg.)

REC. ENGINE SIZE

.19

FUEL TANK SIZE

4 Ounces

LANDING GEAR

Tricycle

REC. NO. OF CHANNELS

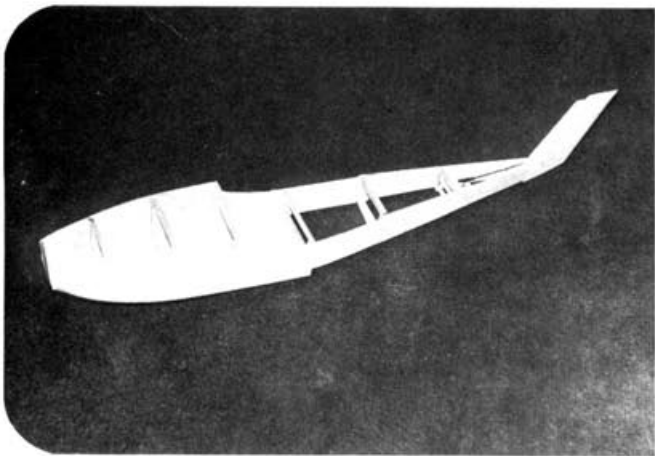
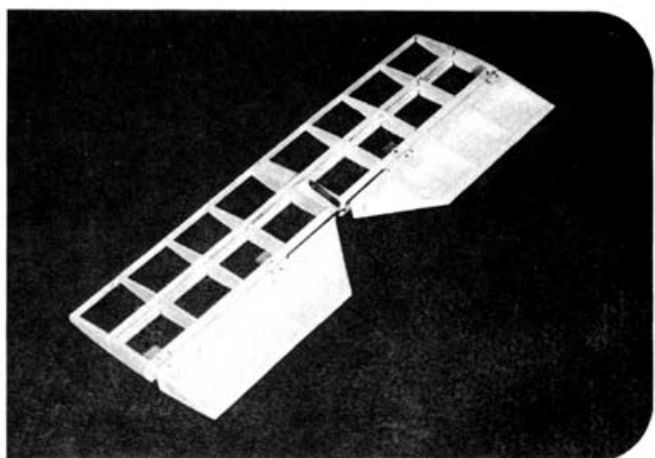
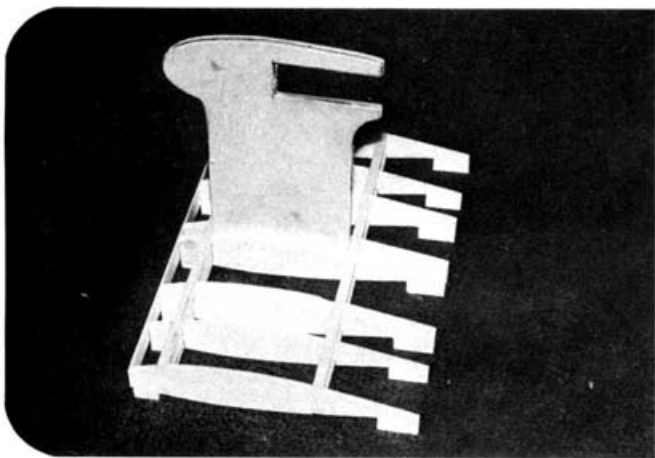
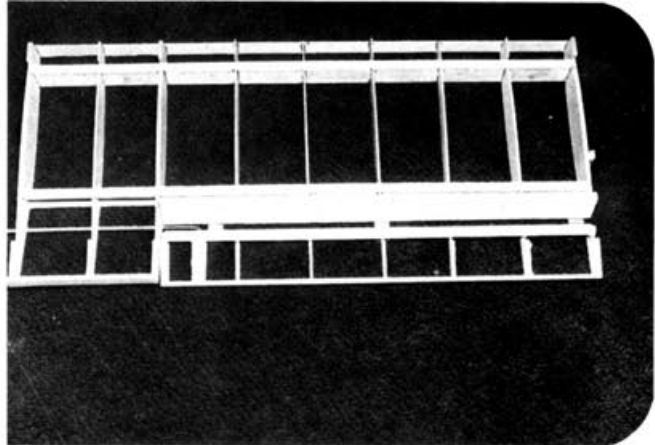
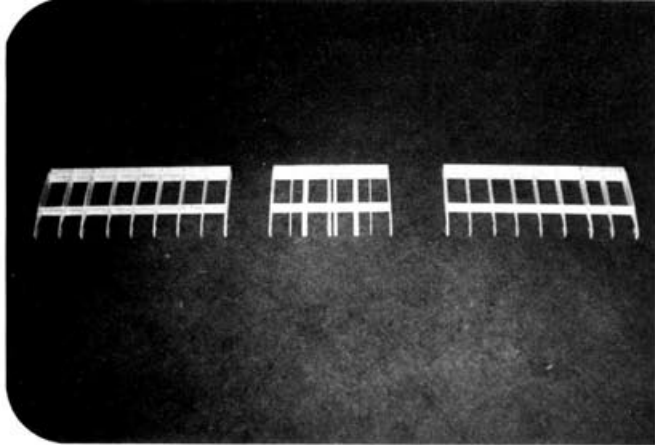
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CONTROL FUNCTIONS

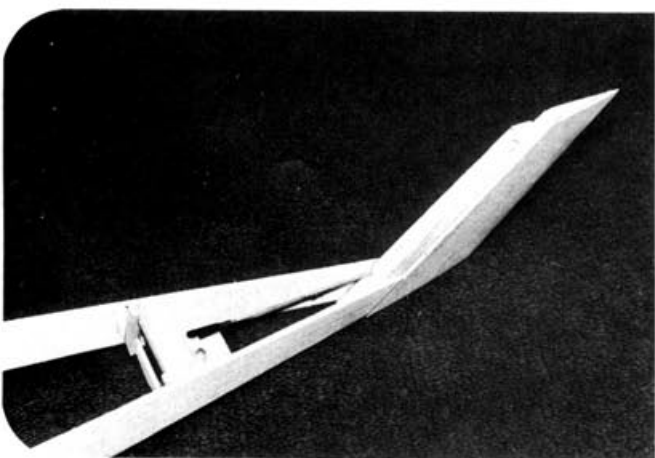
Rud., Elev., Ail., & Throt.

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa & Ply
Wing	Balsa & Ply
Empennage	Balsa
Wt. Ready-To-Fly	47 Oz.
Wing Loading	18.2 Oz/Sq. Ft.



TOP, LEFT: Three basic wing panels. These sections are butt joined with epoxy and wrapped with lightweight glass cloth and resin. **TOP, RIGHT:** Bottom side of outer wing panel showing aileron and torque rod. **ABOVE, LEFT:** Center section of wing with engine pylon in place. Check for accurate thrust alignment of engine. **ABOVE, RIGHT:** Top side of horizontal stabilizer showing control horn. **LEFT:** Basic fuselage assembled with rudder and linkage in place. **BELOW, LEFT:** Close-up of rudder linkage in place. **BELOW, RIGHT:** View of landing gear. One shown on right is completely assembled and ready for installation.



cal fin, cover only one side until the T-tail and control linkage is hooked up.

In modifying the tank tubes, there is an extremely sharp bend required to stay inside of the cowling. It may be necessary to replace the original tubing with a softer brass or aluminum tubing. Be sure not to pinch the tubing as to restrict the fuel flow.

Finishing is, naturally, the builder's choice. I did design the airplane to give minimum glue joint exposure so finishing resin would be practical. This model has small fillets everywhere, around the floats, engine strut, T-tail and wing. Microballoon fillets are small, lightweight, and easy to make. Be sure and use a bead of silicone around the wing saddle to make the wing mount watertight.

The windshield is simple and, with a little time and a piece of light cardboard, a pattern can be made. The aluminum frame is made from a piece of 3/32" tubing. File one side flat until the tube is split. Then slip it over a piece of light metal and flatten it. It will then slip right over the windshield. Leave about 1/4" on each end and embed them in the fuselage to add strength to the installation.

The full size prototype was bought by the Navy and makes a very attractive model. However, there are several others around so color isn't a problem.

The most serious problem I have encountered is resisting the temptation to build a full size Air Skimmer!

When flying, you will find it very responsive to control, so start off carefully. The airplane has very large control surfaces and it reacts accordingly. I use an 8/6 Tornado pusher prop and Missle Mist fuel in my Tigre. Trim the gear so the airplane rolls straight under power at first. Then the rudder will handle it. On take-off, feed the power in slowly and fly it off easily. The airplane rotates freely and has a tendency to come off at low airspeeds which means I stall it frequently! Don't hurry the take-off.

On this type of pusher design, caution should be taken on running the engine in the stationary position for any length of time. Keep it to a minimum, especially at full throttle. There is not sufficient cooling unless the aircraft is flying.

My inexperience dictates that I not tell most of you more, for I'm not certain can distinguish my own inadequacies. I cannot honestly recommend it as a beginner's plane, but can't imagine a better second airplane. It flies more like a Quarter Midget than a trainer. The power loadings and weights are very comparable. Mine weighed 2 lbs., 15 ozs. before it was flown. The airplane is small enough to throw in with the fishing tackle or vacation gear and enough fun that you won't leave it home. □