ANDERSON

KINGFISHER

By Dennis Tapsfield

A 1/4 Scale reproduction of a beautiful amphibian. Flies in a "Cub-like" fashion.

The prototype Anderson Kingfisher was designed and built by Earl Anderson (a Boeing 747 Captain). It took him nine years to complete, and he made the first flight in April 1969. Interestingly, standard Piper Cub wings are used; drawings for the full size aircraft are available, and there are probably around fifteen of the aircraft flying at the present time in various parts of the world. Richard Warner, of Warner Aviation (who sell the full size plans) was very helpful, supplying photos and drawings from which the model was built.

My model is built to 1/4 scale, weighs in at around 16 lbs., and is powered by a Super Tigre 90 2-stroke. The layout of the aircraft is unusual, the engine being forward of the wing, with the tractor propeller rotating in front of the windscreen. This not only serves to lower the Centre of Gravity, but brings it forward, reducing the need for the weight in the nose. However, the hull is more heavily built in the nose to further offset the need for the nose weight. **Do try to keep the tail end light.**

The model flies in a "Cub-like" fashion, as one might expect. If you feel that you would like to build this unusual and versatile amphibian, I suggest that you start with the wings, then sort of graduate into the hull.

CONSTRUCTION

Note: Be sure to use a waterproof glue for building this model.

Wings:

Perhaps the first things to make should be the laminated wing tips. First decide on what material you intend to use and this will tell you the thickness of the completed tip, so that you can place a series of pins around what will be the **inside** of the tip. Using a waterproof white glue, join the laminations together and, while wet, gently wrap the tip around the pins, inserting pins on the outside as you go, and leave the whole thing to set. Make two. Cut the plywood root ribs and the centre section ribs. These should be drilled in a pack for the 1/2" dia. tubes at the same time as the wing root ribs to ensure the correct alignment. Be sure to allow for the dihedral angle in each of the ply root ribs on both wings, as they will have to be staggered for drilling.

When cutting the rest of the ribs from balsa, it is probably best to use a template cut from 1/16" ply to ensure consistency. The wing can be built over the plan in the usual way, but will have to be removed for sheeting, completing the spar tips, adding the

ANDERSON KINGFISHER

Designed By:
Dennis Tapsfield

TYPE AIRCRAFT
Sport Amphibian (1/4 Scale)

WINGSPAN
108 Inches

WING CHORD
15¾ Inches

TOTAL WING AREA
1584 Sq. In.

WING LOCATION
High

AIRFOIL
Clark "Y"

WING PLANFORM
Constant Chord

DIHEDRAL EACH TIP
1¼ Inches

OVERALL FUSELAGE LENGTH
70 Inches

RADIO COMPARTMENT SIZE
Very Large

STABILIZER SPAN
31½ Inches

STABILIZER CHORD (incl. elev.)
8 Inches (Avg.)

STABILIZER AREA
240 Sq. In.

STAB AIRFOIL SECTION
Flat

STABILIZER LOCATION
Mid T-Tail

VERTICAL FIN HEIGHT
13¼ Inches

VERTICAL FIN WIDTH (incl. rud.)
11¼ Inches (Avg.)

REC. ENGINE SIZE
.90 2-stroke/1.20 4-stroke

FUEL TANK SIZE
11 Oz.

LANDING GEAR
Plug In/Adjustable

REC. NO. OF CHANNELS
4

CONTROL FUNCTIONS
Rud., Elev., Throt., Ail.

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa & Ply
Wing	Balsa & Ply
Empennage	Balsa & Hardwood
Wt. Ready To Fly	260 Oz. (16¼ Lbs.)
Wing Loading	23-24 Oz./Sq. Ft.

tips proper, and then the spar webbing. Make the strut brackets at this time so that the 1/4" ply fillers between the spars can be drilled together prior to gluing them in place.

Complete the wing to drawing, including servo installation and aileron hinges, but do not separate the aileron yet; just make sure that all is complete first.

Tail:

We can now proceed to the fin and rudder, stabilizer and elevator. The tail unit is quite straightforward, and you should have no trouble here, except to say that the elevator horn must be silver soldered onto the brass tubular joiner prior to joining the elevators together. The tips are made in the same way as the wing tips. Note: Be sure to use **very** hard balsa for the spars as indicated, and don't forget to fit the hardwood blocks in the stabilizer for the strut screws. You can now cover the wings and the tail. I covered the wings, stabilizer, elevators, and rudder with Solarspan/Black Baron film on my model.

Hull:

You will need to splice the hard 1/4" x 1/4" balsa longerons since even 48" will not be long enough. Pin the longerons down on the drawing. Note that the 1/4" x 1/4" is spruce under the centre section. Build the two sides complete, but leave out everything between the longerons forward of the front former. Make the forward box of 3/16" sheet balsa. Cut the 1/4" ply uprights for both formers, joining them with the 1/4" sheet cross pieces (make sure they are correctly positioned as they support the box). These are now used to join the two halves together, and the box is now glued in place perfectly central, in the correct fore and aft position. Allow everything to set at this stage.

Cut some 1/4" sheet 9/16" wide and, measuring from the drawing, mark the top of the box for the positions of spaces 1 to 7. Measure the lengths from the plan view of the nose, and glue the spacers in place on top of the box. Do not forget to notch the top corners for the top longerons. It is also necessary to carefully slit the top and bottom longerons vertically with a balsa knife, back to spacer 4, to allow them to bend, and fill the slit with glue when gluing in place. Do a similar thing for the bottom spacers, except that each one is a different depth from the bottom of the box. Once again, measure the size from the drawing, and notch the bottom corners.

Once you have done this, and pulled the rear of the hull together with the ply former, the worst is over and you can now go on to complete the hull to the drawing. **Do not cover it yet!** Make the brackets for the centre wing section anchor nuts as shown, and fit in place. The centre section should now be made, and since you should already have the ribs cut and drilled, it's a simple procedure to build the base with front, back, and ribs glued and pinned in place. Do be sure that it sits nicely between front and rear formers in the hull, and that the wing joiners all line up correctly. The tricky bit is accurately drilling the holes for the four retaining bolts so that they all line up with the anchor nuts in the brackets.

The remainder is fairly straightforward with the engine thrust line being taken care of by the shape of the 1/4" side pieces. Don't forget the blocks for the bolts and the wing retaining pins, and temporarily fit the throttle servo with its cable, because it's easier to complete everything, and re-fit it last of all. The cowl is quite simple, just 1/32" ply wrapped around two formers, with the balsa front made by laminated 1/2" sheet. The fuel tank nestles inside the cowl, wrapped in foam, and rubber banded to the motor mount (I used an 11 oz. std. Kraft tank). Now, back to covering the hull. Use the balsa and ply as indicated, but leave the front deck and the top rear open to facilitate painting the inside to make it water resistant. (I used Clear Coat tinted with a little green so that I could see where I had been!) Also, install the Gold'N-Rod controls for the rudder and elevator, and the nylon tube for the radio antenna. The fin should be installed at this time to enable the control rods to be correctly positioned as they must both enter the fin and exit at the right place.

This is probably a good time to make the landing gear. Epoxy the square tube into the hull, and drill the solid aluminum blocks to suit the wire as drawn. Burr the ends of the vertical slots to retain the wire, then bend to the shape and lengths shown. Of

course, the landing gear on the full size aircraft is retractable, but as a concession to simplicity, the ones on this model are fixed in either the up or down position; the angles are arranged so that if the left wheel becomes the right, and vice versa for water operation, the gear moves effectively through about 100 degrees of rotation to clear the water, as on the full size aircraft.

Make the tailwheel bracket from a piece of aluminum. This is a cut, file, and drill job which is not too difficult. Or, if you prefer, you can fabricate it from brass sheet and silver solder. Just remember, alloy is much lighter! Make sure that your four screws enter the ply former and not the ends of the longerons!

Tip Floats:

These are made from foam, using the hot wire method. First, cut out all six templates from 1/16" ply as shown on the drawing, making sure that all the profiles are smooth so that the hot wire will move over them without snagging. Drill two or three holes in the templates to take wire nails or brads; about 1"-1½" long by approx. 14 swg. These nails will be pushed through the templates into the foam holding them in place. Cut two blocks of foam, each piece should be 12" long x 3½" wide x 3¾" deep (one for each float). Draw a centreline around the blocks in the middle of the 3½" width. Next, using the nails, position the top template flush with the front of the block, then the bottom template on the underside, also flush with the front of the block and hot wire the float out.

Do not discard the offcuts, they must be taped or tack glued back in place **now** before continuing. Next cut the top profile and tape it back in place for the next operation. Take the side templates and, using the nails, attach "A" to one side of the block keeping the straightedge flush with the top of the

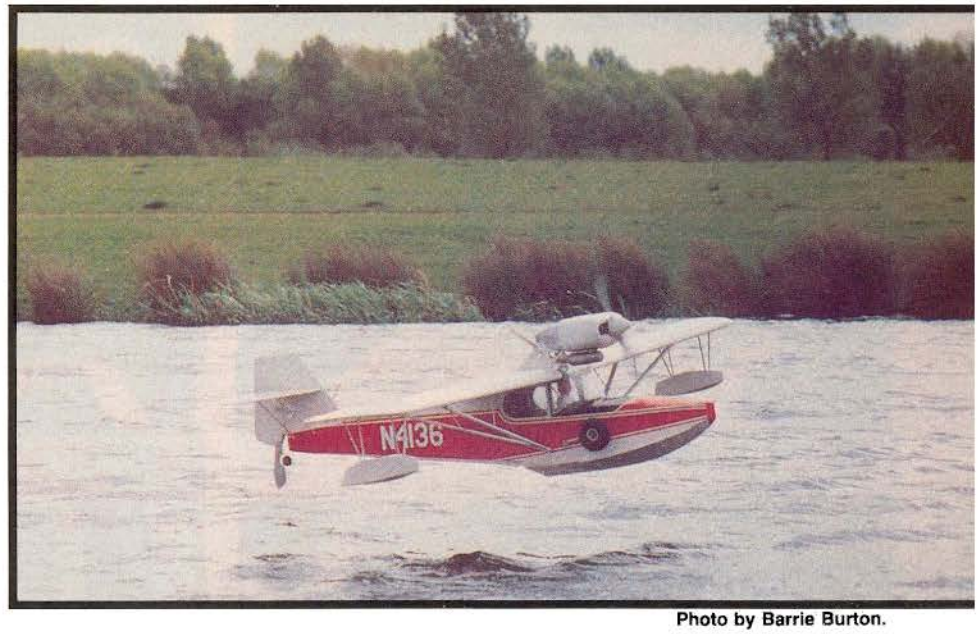
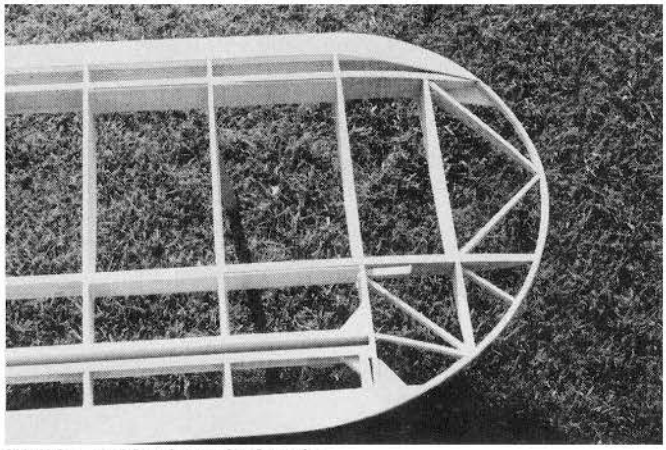
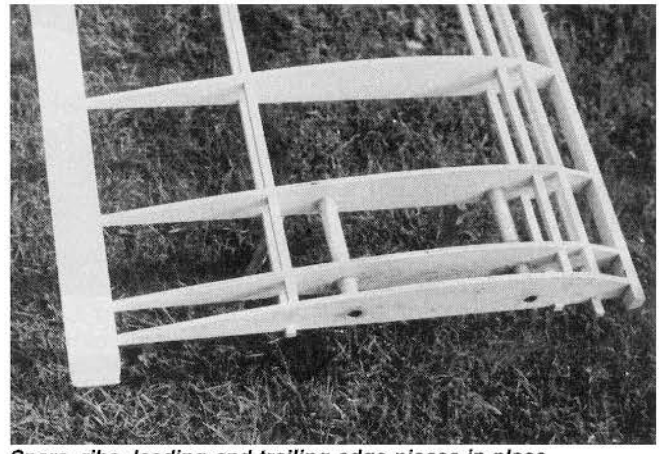
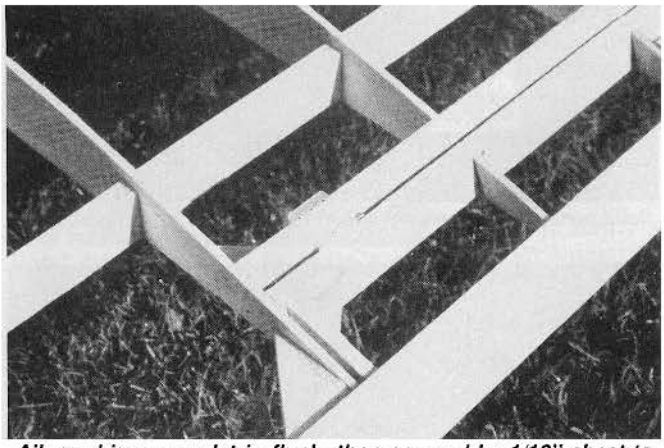
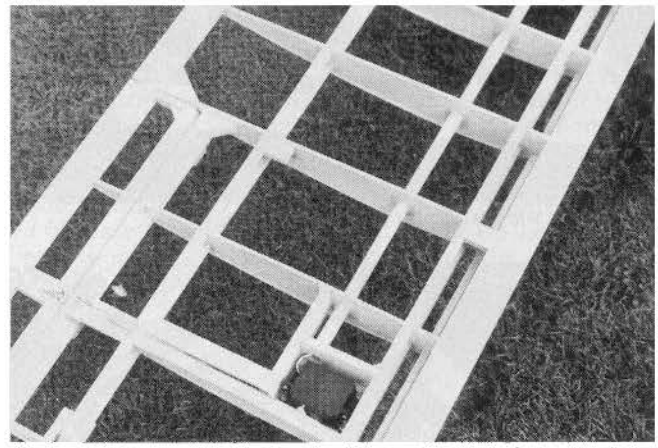


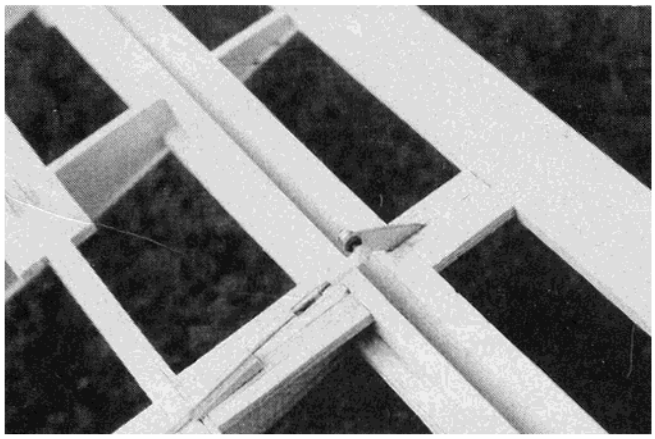
Photo by Barrie Burton.


Well braced laminated wing tip.

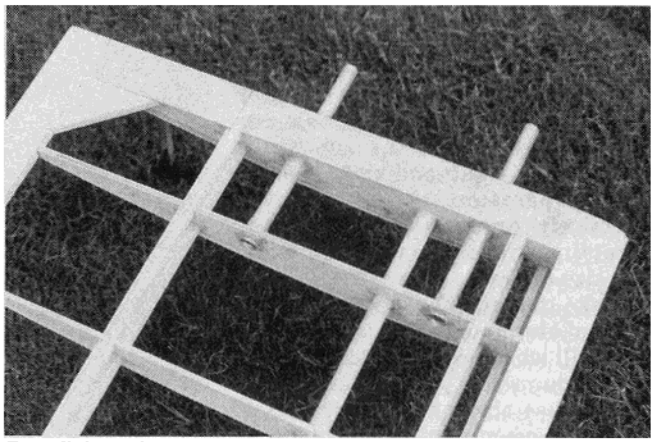

Spars, ribs, leading and trailing edge pieces in place.


Aileron hinges are let in flush, then covered by 1/16" sheet to produce hinge slot.

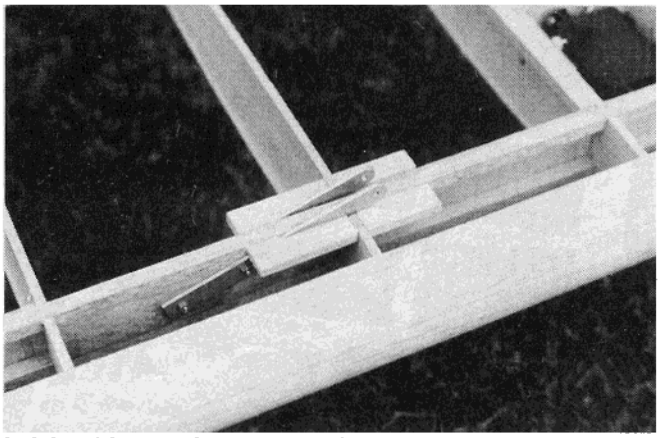

The aileron servos use standard mounting brackets to retain them in their boxes.



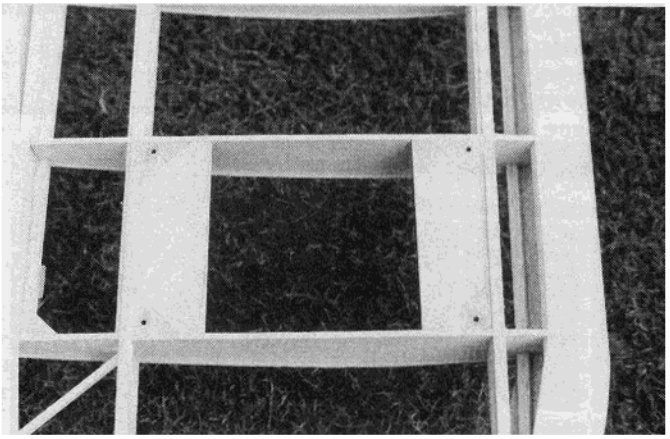
Ball links are fine for all linkages.



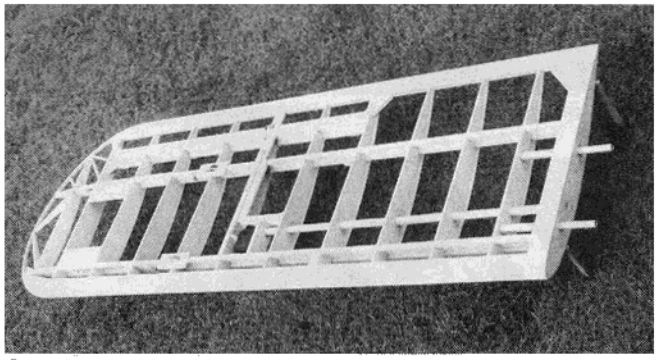
Root fixing tubes must be firmly epoxied in place, after roughing the tubes.



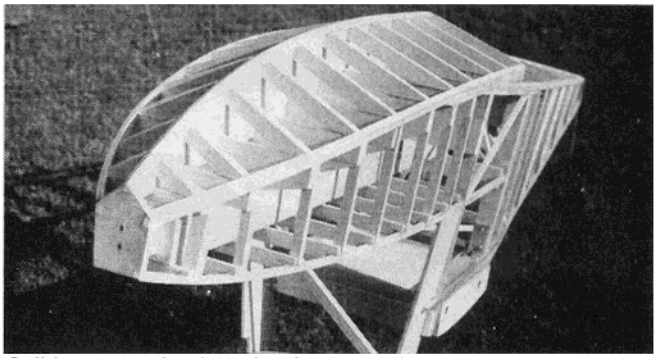
Left hand front main strut mounting.



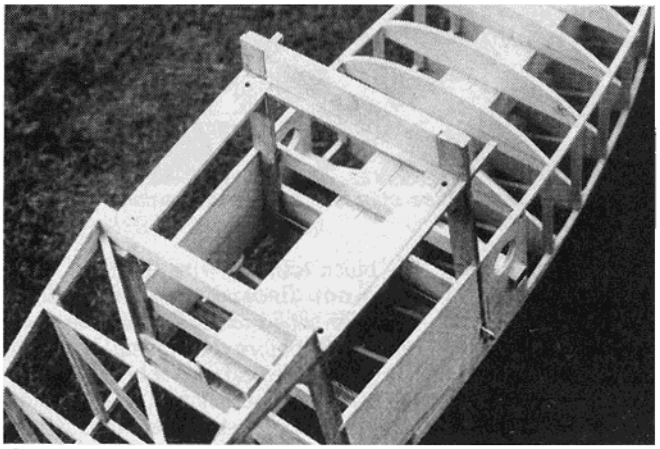
Tip float mounting plates.



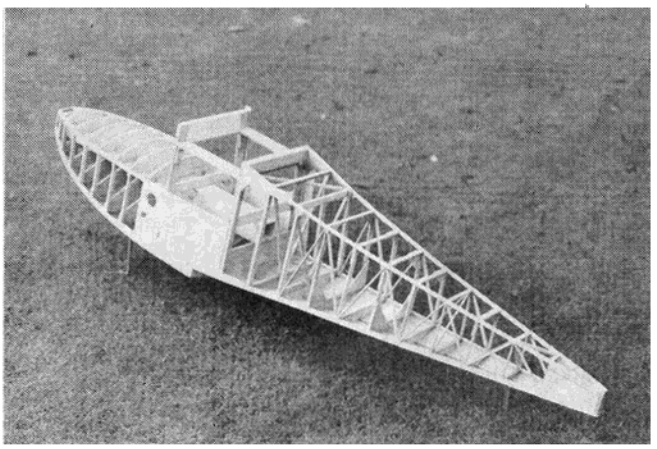
Completed wing with root mounting tubes.



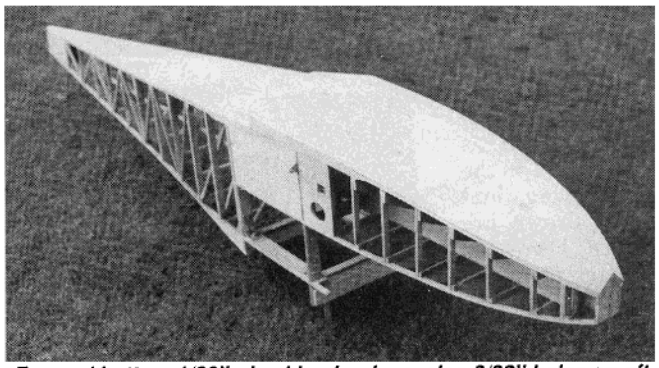
Solid construction here for those rough water operations.



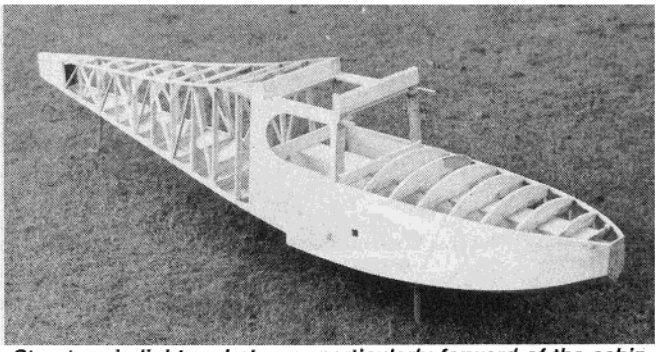
Structural box at front end, doubles as battery and ballast weight box.



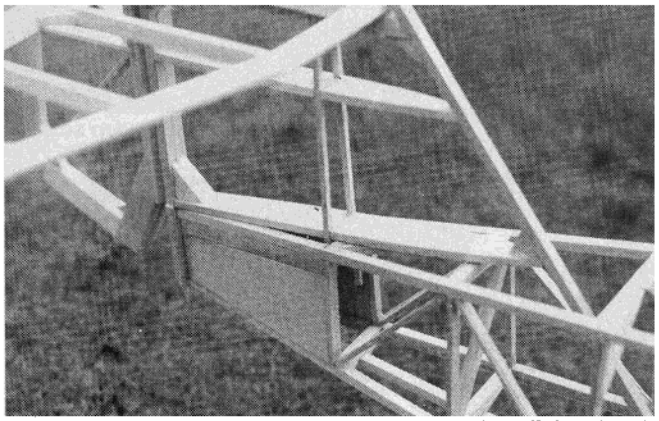
Structure looks complicated, but goes together conventionally.



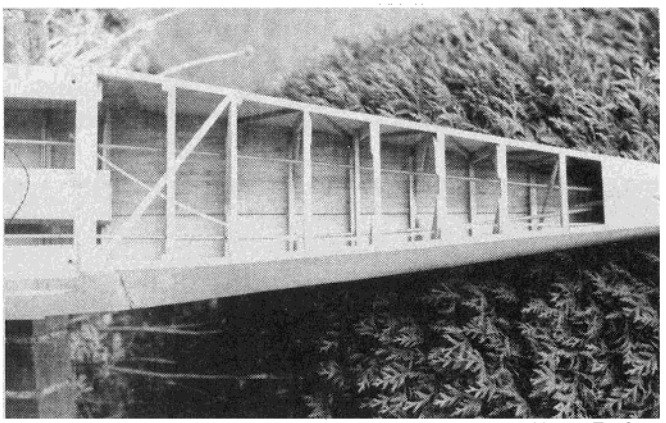
Forward bottom 1/32" ply skins in place, also 3/32" balsa on aft bottom behind step.



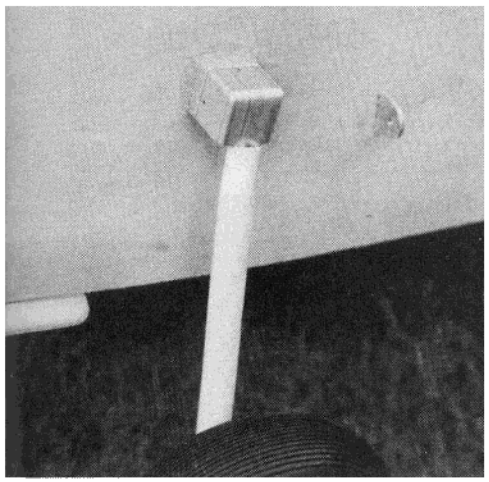
Structure is light and strong, particularly forward of the cabin. 1/32" plywood skin used on hull sides in this area. 1/8" balsa sheet is used to cover top nose section.



Fin before covering with balsa, note ply inserts for tailplane strut attachment screws.



Elevator and rudder "NyRods" installed in the hull. Note: Entire inside of hull is sealed to protect against moisture.



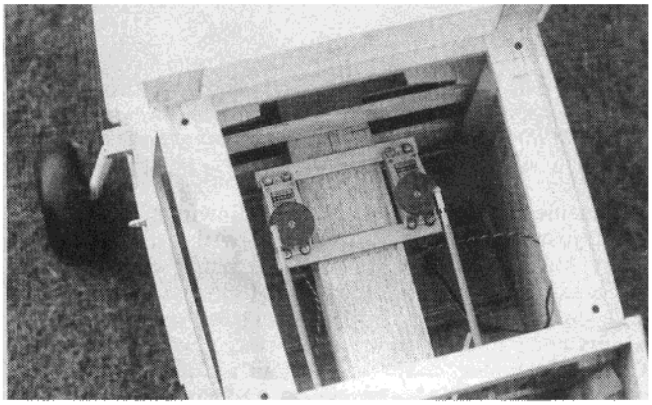
Landing gear plugs in, note strut attachment point.

block, and the "B" template on the opposite side also flush with the top of the block, and hot wire across the two at the angle they produce; it may look weird, but it works!

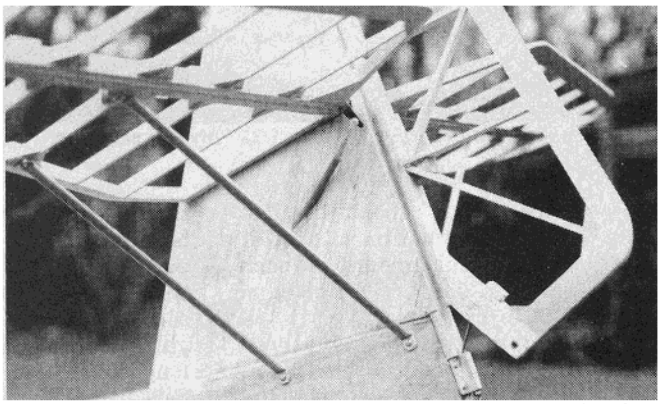
Now remove both templates and replace them, exchanging positions, and hot wire across them; you should now have a float! All that remains is to clean them up generally with a sandpaper block. The floats are covered either in balsa or plywood veneer, using "Copydex" or similar adhesive, and finished in the same way as the hull. The holes for the attachment struts are cut using a 1/4" diameter tube with a sharpened end, and the struts epoxied in place after establishing their respective lengths. These will vary depending on the weight of the model, the heavier it is, the shorter the struts will need to be. A good guide is that when one float is supporting a wing, the other float should be about 4" clear of the water. You may wish to increase this if you normally fly in rough conditions. Use 1/4-20 x 1/2" or equivalent **nylon** screws to mount the floats on the wing.

Struts:

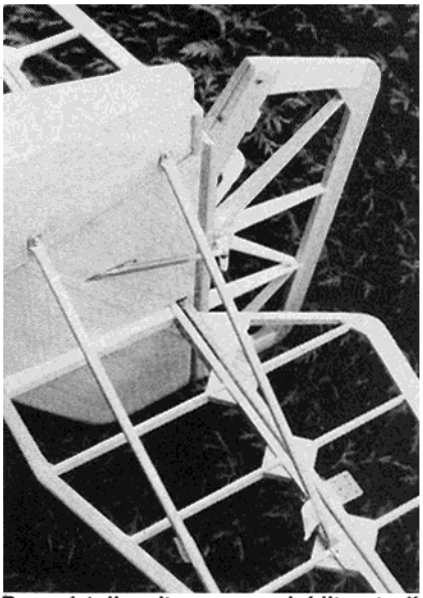
The last major components are the wing struts. If you have built accurately, they should be the same length for the left and the right side. Mine, however, were about 1/8" different, so if yours vary a little, do not worry. Check the required lengths using the following method: Set the model up by bolting the centre wing section in place, and pass a straight



Elevator and rudder servos mounting location.



Note elevator horn angled to the rear, square to the pushrod.

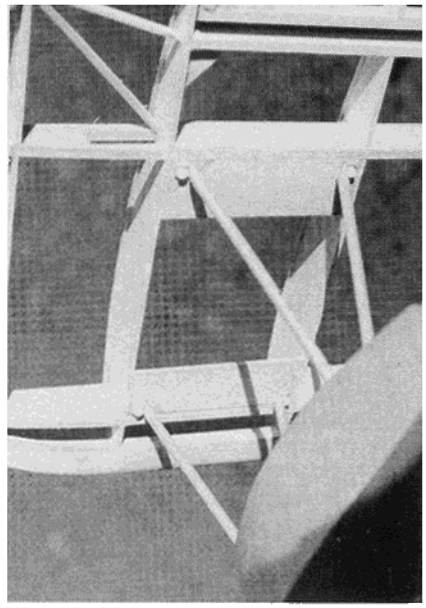


Braced tail unit ensures rigidity at all times.

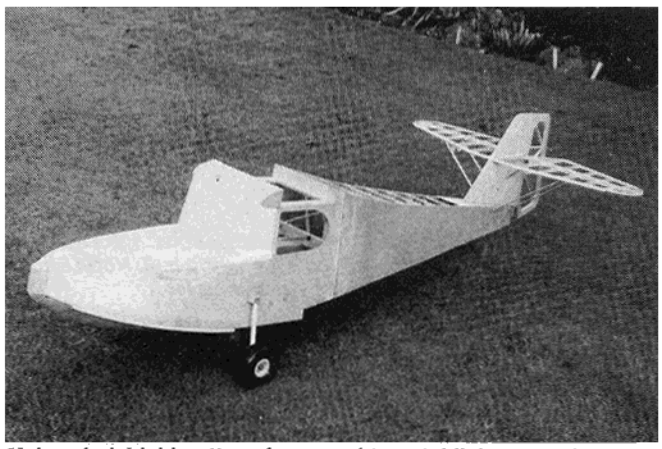
cabin depth about 1/2"). The centre distance between the main lift strut (front) fixing holes on the hull and in each wing can be recorded and the struts made that length. The rear struts are adjustable for length, as they control the twist (wash out) in the wing, and must be set during final assembly. The struts as drawn are aluminum, but you can use hardwood if you wish, just employ your favourite method so long as they do the job, and make metal fittings for the attachment points. The tailplane struts are of aluminum tube with the ends flattened and drilled as shown.

Radio:

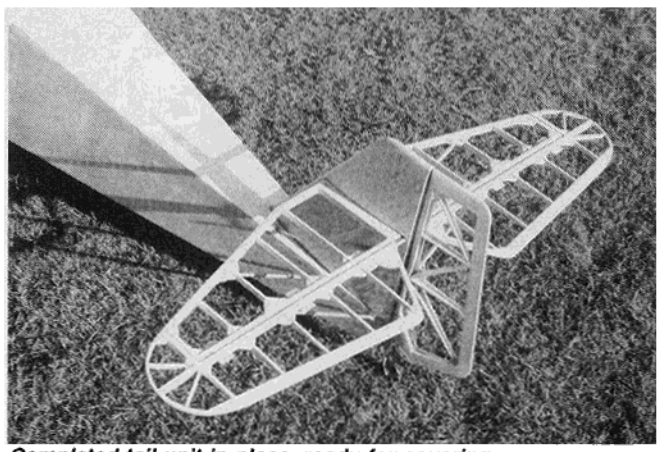
I usually install the system before covering. In the interest of waterproofing, the aileron servos, in this case have no hatches for access. If you ever need to get at them, just cut



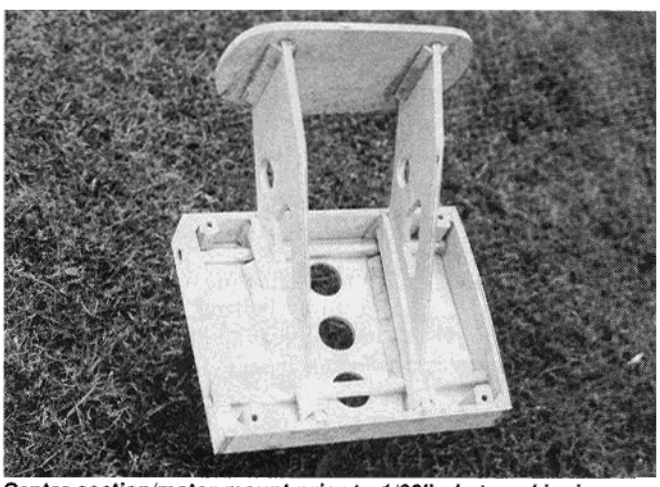
Wing tip float attachment, nylon screws.



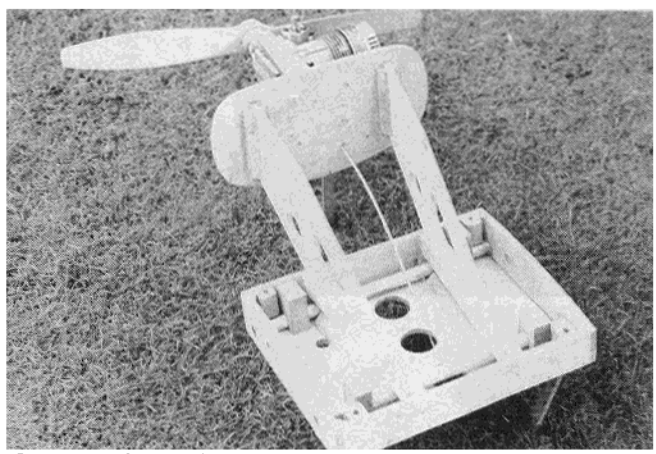
Make windshield pattern from card to establish exact shape.



Completed tail unit in place, ready for covering.



Center section/motor mount prior to 1/32" ply top skinning.



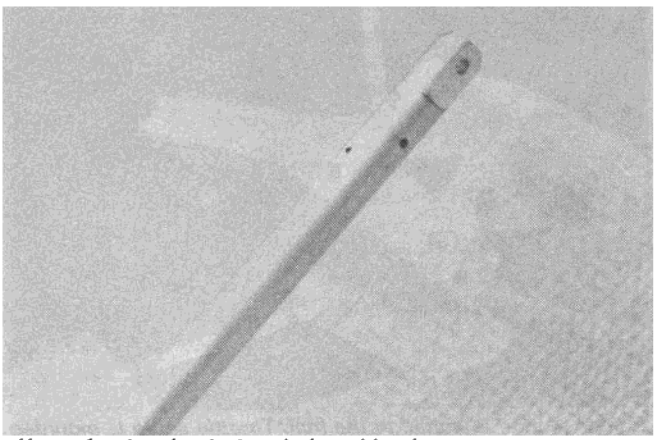
Center section/engine mount; note blocks where wing fixing pins will enter the tubes, also blocks for mounting bolts seen here drilled.

piece of wood 2" x 1" about nine feet long through the cabin so that it protrudes an equal amount on each side. If you can support the piece of wood, allowing the model to rest on it, that is fine, you will probably need some help here. Fit the wings in place, and if necessary, block them up to the right dihedral, e.g., 1¼" under each tip rib (don't forget to allow for the

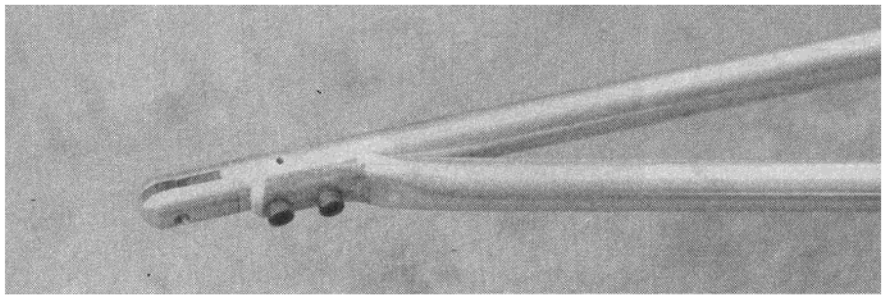
the covering around the inside of the box, and when all is well, just iron a patch on over the box, easy! Make sure that the long extension leads for the aileron servos do not cause any glitching. Some radios just don't like long cables, and may require a choke to be fitted. Before covering, I used the tinted Clear Coat on all the structure. I then covered the hull with tissue and

dope by the following method: Coat the entire hull with a thinned brush coat of non-shrinking clear dope and allow to dry; lightly sand to remove fuzz, etc., then cover with **dampened** lightweight tissue by doping through the tissue and allow to dry. Lightly sand again, and apply two or three brushed coats of sanding sealer, lightly sanding between coats to a

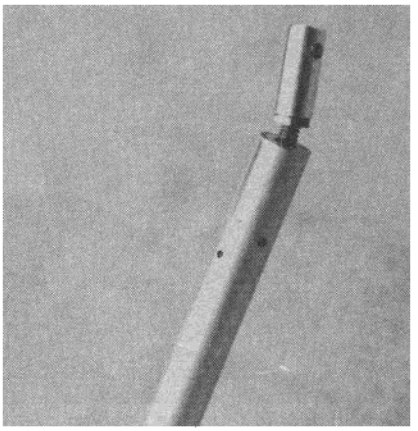
Left wing tip with float attached.



Upper front main strut end pinned in place.



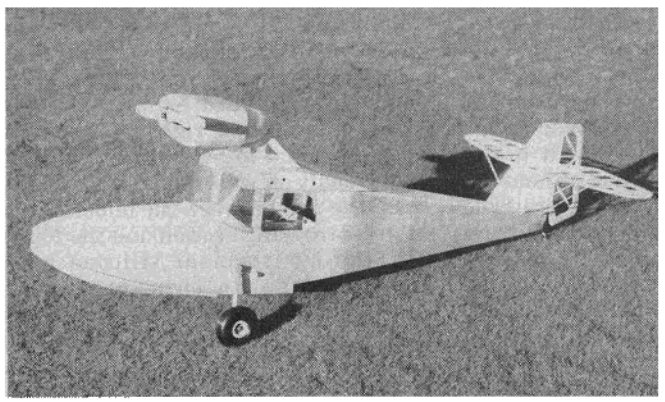
Main strut bottom junction joint.



Adjustable top end of rear strut.

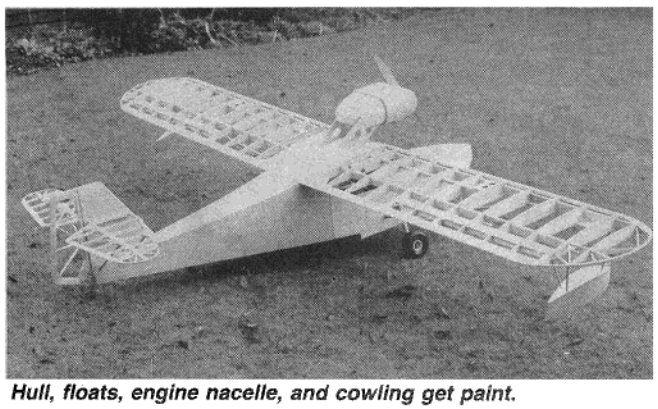
smooth finish. Then, apply your chosen colour scheme, spraying if possible, using coloured dope or automotive spray paint, and finally **Tuf Kote the hull all over**.

The side windows and windscreen can be fitted once the paint job is complete. If you have acetate,

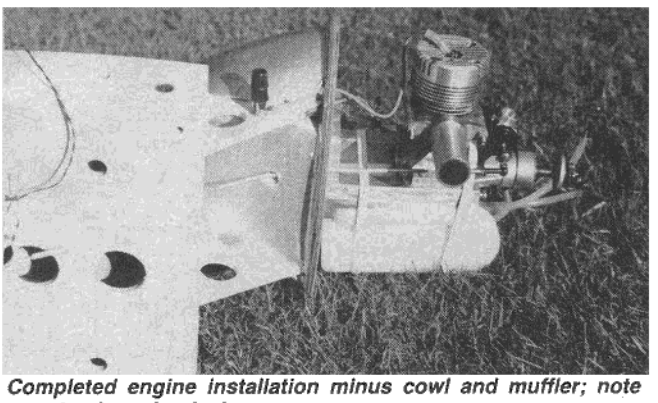


The hull sits on its wheels ready for covering.

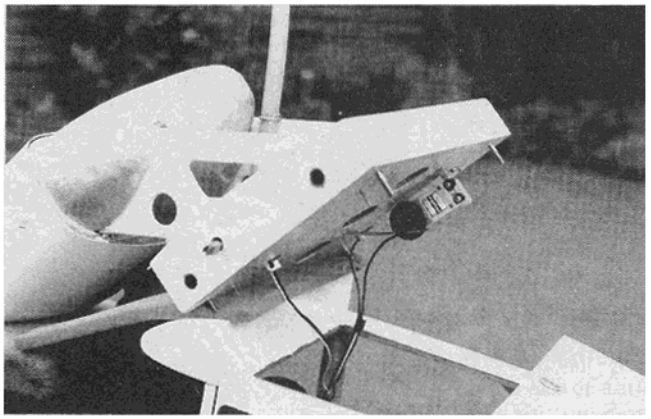
Completed model ready for covering.



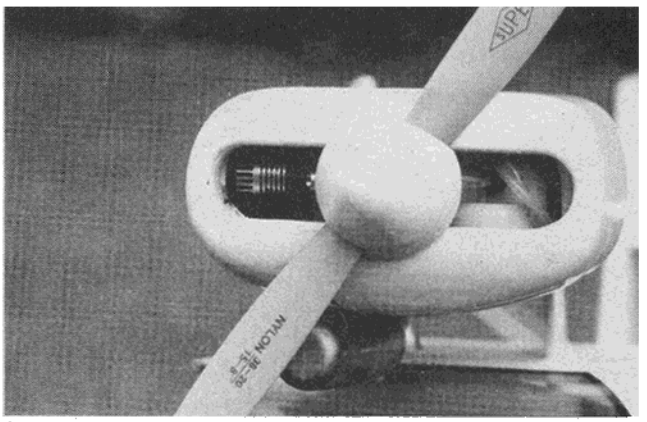
Hull, floats, engine nacelle, and cowling get paint.



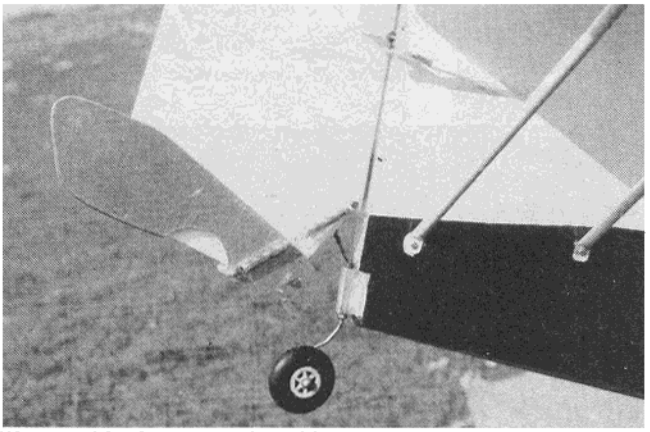
Completed engine installation minus cowl and muffler; note remote glow plug jack.

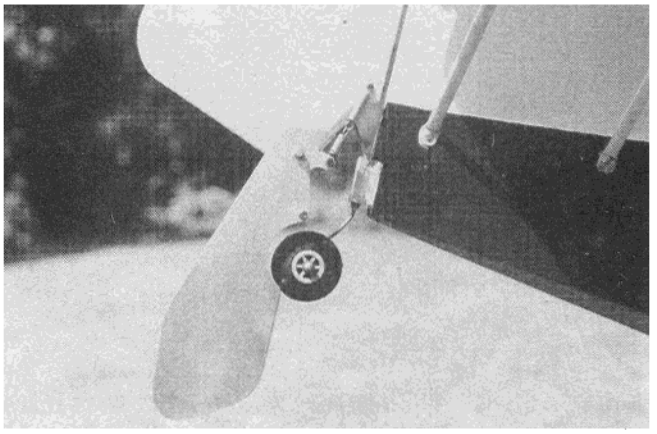


Center section is bolted to the hull. Throttle servo is mounted underneath, inside of cabin.

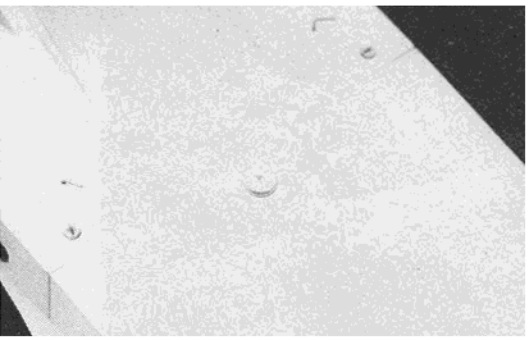


S.T. 90 engine is fully enclosed. Exhaust is routed up, above the wing.





Water rudder in retracted position over center spring, holds it either up or down.

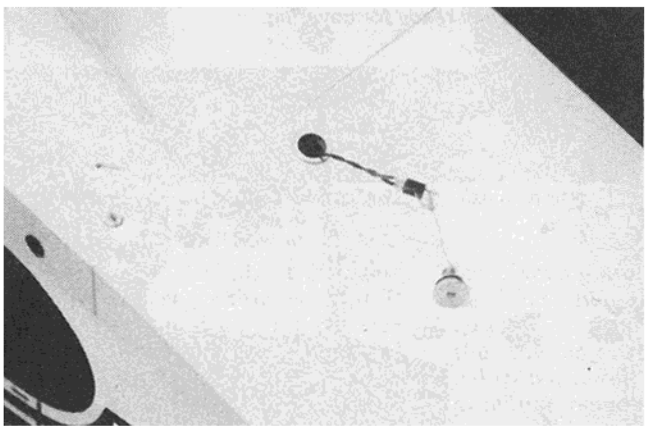


Center section is bolted to the hull, and 1/16" dia. steel pins retain the wing mounting tubes.

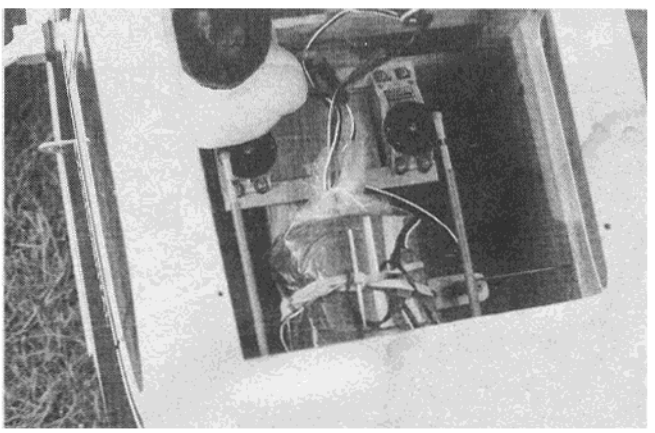
butyrate, or similar sheet, you can use balsa cement, but clear Bostik cement is probably the best; be careful not to spoil the job by getting it where you don't need it! If your screen fits well, it is easier to cement the screen to the top leading edge and allow it to dry before pulling it down and around the cabin, and cementing it there. The registration letters are cut from Solartrim (Black Baron "Presto").

Now is the time to get the model together and check the balance point. Get this right and you will be able to use your airborne battery pack for the final balance trim by sliding it down into the box in the nose. Establish its position, in conjunction with any lead that may be necessary, and pack it fore and aft with hard foam. Use piano wire pins pushed right through the box and foam to hold it all in place.

If you fly off water, it is important to seal the gap between the underside of the centre wing section and the top of the hull with clear silicone bath sealant. To do this, cover the underside of the wing centre section with clingfilm (Saran Wrap) to prevent the sealant from sticking.



Small access cap has line attached to battery charging receptacle.



Receiver is mounted on top of structural box. Note location of receiver switch.

Squeeze out a thin bead of sealant all around the top outer edge of the opening on the hull, bolt the centre section in place and allow the sealant to cure. Remove the centre section and peel off the clingfilm (Saran Wrap). This will leave a good, permanent waterproof seating which should last for a long time. Since you should use a switch extension for the radio, and have an external charge point for the batteries, there is no need to remove the centre section during normal operations. Any other openings such as pushrod exits should be sealed with petroleum jelly.

Preparing the Model For Flight:

Completely assemble the model with everything connected up, and adjust the ailerons so that they are about 1/10" higher than the wing trailing edge. This helps to provide more differential movement (i.e., when the down-going aileron is flush with the wing, the up-going will be about 1/5" above), it also will tend to delay tip stall. As a belt and braces exercise, I also incorporated about 1° washout as on the full size aircraft, at the outer end of each wing panel (this is equal to about 1/4" at the trailing edge of the wing), by adjusting the length of the rear struts. A Robart incidence meter can be used for this, but a general critical view from the tail end of the model, to a reasonably trained eye will reveal any distortion in the wing and tail surfaces. When you're satisfied, and **only** when you're satisfied, start the engine and taxi the model around to ensure that it is running dependably, and will idle without any chance of stopping. With a model of this type, particularly when used on water, a reliable engine is of paramount importance. When you are sure that you have complied with the foregoing, re-check your balance point!

Flying:

I chose to make my first flights in the landplane configuration, mainly to confirm the engine reliability, but I also have to travel a lot further to fly off of water. Assemble your model, check that all controls operate correctly and in the right sense (some of us have taken off with the aileron function reversed!). Fuel up, start the engine, then taxi around to get the feel of everything. You can try a short hop if you like; I did, it took off in a gust, and was six feet up in a trice! I decided to open the throttle wide and keep going; I did, and it flew beautifully! All the work and worry was suddenly worth it. As I said earlier, it is Cub-like in its flying characteristics, but has more built-in headwind (drag) due to its type, with its tip floats and bulky hull. You will find that if you reduce power abruptly it almost stops; so pull off the power gradually when setting up for a landing, and fly her down with about 1/2 to 1/3 power and literally fly it on the ground or water, the landing technique for both is the same.

Should you have the engine stop during a flight, it is important to get the nose down to overcome the drag of the model, and keep up flying speed to maintain control; just level out and land when a few feet up. If you have got your engine set up correctly, you should never find yourself in that situation. As far as general flying is concerned, the full size aircraft is

certainly not aerobatic. You can of course, throw in the occasional loop or chandelle, but if you are in a competition, remember that such things are not necessarily pro-typical, and you could lose points for being too clever! I find that the model is quite stable and easy to fly. In gusty conditions it is more comfortable if you couple aileron and rudder, should you have that facility on your transmitter. One last tip, when taxiing on water using full up elevator going downwind and full down elevator when going into wind, will give the best control.

I hope you enjoy building this model. It is a builder's model after all, and a good winter project, one which will give hours of pleasure flying both from land and water.

Good luck and happy landings! □

From RCModeler Feb. 1990