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SEAHORSE II

By George A. Wilson, Jr.

● The Seahorse I was designed and built as a trainer for both land and water use. It worked so well that the design of Seahorse II was undertaken. The new design preserves the flying and water handling capabilities of Seahorse I and provides improved ease of construction.

Seahorse I has been flown many times by experts and many times by the author (a second grade novice) and the author's son (a complete novice). It is inherently stable and, given enough altitude, it will right itself "Hands-Off" from any of the weird attitudes that a novice may put it in. To demonstrate this ability, hands-off recoveries have been made from stalls, inverted flight, and several attitudes too difficult to describe. Maneuverability is as you would expect from a flat bottom airfoil and a lot of dihedral. However, Seahorse was not meant to be a stunt airplane.

As a landplane, and without excessive back pressure from an over ambitious muffler, a 19 is plenty of power for Seahorse II. As a float plane, a well muffled 29 can be used and good performance obtained. My expert friends (Ross, Richmond, McCarthy and others) keep wanting me to remove the muffler to add some more power and see what happens. I know too well what would happen with me flying! As for them, there are plenty of stuntable airplanes around; why ask for performance that was never meant to be?

The constructional information that follows will be limited to those aspects of building the Seahorse that are at all "tricky". The design has been made as simple as practical. Even the tricky parts will be simple, if you follow the instructions.

FUSELAGE. The fuselage is light, rugged and has lots of room to make it easy for the novice to install his R/C gear. The Nyrod type control rod installation provides good water proofing. A gasketed cover is provided under the wing to make the fuselage, as-a-whole, waterproof. The following steps should be followed for assembly of the fuselage.

1. Cut out the sides, doublers and bulkheads.
2. Install the doublers and motor bearers on the sides . . . left and right! . . . and sand the sides while held together to make them alike.
3. Join the sides, with the bulkheads, at the front and back of the wing location. Pin this assembly, bottom down, to your work surface. Check to see that all is square and let things dry thoroughly.
4. Add the remaining bulkheads and motor firewall.
5. Add the bottom covering under the wing. (*Note:* Install the blind nuts for the landing gear, floats and sub-rudder in all plywood bottom pieces *before* they are installed.) Draw a center-line on the bottom covering under the wing area and use this to align the rear of the fuselage as you progress with the bottom covering toward the tail.
6. Install the rudder and elevator push rods before the top covering is added.
7. Add the top covering, tank compartment floor, windshield block, and other finishing touches except those in 8, 9, and 10, below.
8. Install the servo supports, motor control push rod and nose wheel push rod.
9. Install the hatch ledge and cover. *Note:* Install the blind nuts in the side ledges before you install the ledges.
10. Cut the motor mounting plate to fit your motor. About 2 degrees right thrust was built into the original and found satisfactory.

WING. The wing ribs are in three pieces; the triangular trailing edge sections may be cut from scrap balsa.

Pin down over the plan (wax paper first) the bottom leading- and trailing-edge sheeting. Mark the rib locations on the sheeting and lightly draw lines at each rib location to help align the cap strips and ribs when they are installed. Add the bottom cap strips, center sheeting and the main spar. Install the rib center sections (except those on each side of the dihedral joint), the rear spar and the subleading-edge.

At this point, cut the central ribs to accept the dihedral braces, but don't install them. Trim the subleading-edge and aft spar flush with the tops of the wing ribs and install the rear sections of the wing ribs including those at the center. Allow this much of the wing assembly to dry well before it is unpinned from the work surface.

Make the dihedral joint by pinning one half the wing to your work surface, gluing the dihedral braces and center ribs in place in both halves of the wing and allowing the assembly to dry with a block supporting the end of the wing which is not pinned down. Make sure the assembly is true at this point; don't build in any warps! Before adding the top sheeting, dope or epoxy the inside of the wing structure, including the inside of the top sheeting. The top sheeting, cap strips, and tip sheeting complete the wing assembly. Don't forget to taper the trailing-edge of the rear top sheeting before it is installed. This is easily done using a razor plane. Pin each wing panel to your work surface while the top sheeting is glued in place. The washout under the wing tips is built in at this time. Raise the rear edge of the wing tips about 3/16 in. with shims of scrap balsa *before* the top sheeting is added. Washout reduces "tip stalling" and makes the model more stable; especially when making landings.

TAIL. The tail assembly is about as simple as can be devised, we feel. The vertical fin, rudder, elevators and sub-fin for float plane flying are made from medium-soft balsa sheet. The stabilizer is a flat, built-up structure. If plasticized dope (four to five drops of castor oil to the ounce of unthinned butyrate dope) is used, this structure should remain flat during the finishing process. Although Silron (or equivalent) covering is recommended, 1/16 balsa covering can also be used. Choose light sheet and sand it well when you go this route. After covering and finishing, assemble the elevators to the stabilizer and then add the vertical fin. *Make sure you remove the covering material* where the fin joins the stabilizer and where the tail assembly joins the fuselage. Install the fin and stabilizer assembly on the fuselage and then add the rudder.

The sub-fin is attached during float

plane operation and it serves to provide 1) added fin area to balance the area of the floats which is in front of the CG, and 2) a mounting means for the water rudder. The sub-fin attaches to the fuselage by means of a 4-40 screw at the front end and a piece of 1/8 dowel at the aft end, which passes through plywood mounting plates on the sub-fin and the rear of the fuselage. The water rudder plugs into the bottom of the air rudder to provide the necessary interconnection: The water rudder is *absolutely* necessary and should *not* be shortened. Seahorse planes on the flat parts of the float bottoms and it depends upon the water rudder for directional stability when it is planing.

FLOATS. If you perform the following steps, your floats will assemble easily and the port and starboard floats will be straight and parallel to each other.

1. Cut the formers from 3/32 by 1-3/8 strips of balsa with the former grain running vertically. By inverting every other former, you can minimize the wood you waste. Stiffen weak formers by gluing 1/16 x 3/16 scrap pieces across the grain.
2. Cut the keels from 1/8 hard balsa. Match the holes for the interfloat struts by cutting through both keels at the same time. Clean, round holes are easily cut with a piece of metal tubing that has been sharpened on the inside with a rat-tail file. Rotate the sharpened tube back and forth such that it saws its way through the balsa sheet.
3. Mark the former locations on the outsides of each keel and glue the outer half-formers in place on both keels.
4. Carefully cut and drill the eight soft pine inter-float socket blocks. Drill the holes for the struts using a drill press and a simple jig to assure that all the blocks are alike. Rough-cut the curved surface of these pieces; an approximate fit between the float covering and this surface is structurally OK.
5. Pin the two keels together, inside-to-inside, and align the strut holes using the 5/16 dowel inter-float struts.
6. Install the outer sockets, again using the 5/16 dowel struts to align the sockets. Leave the struts in place while the glue drys but make sure the struts don't get glued in place!
7. Firmly pin the two keels to your work board (insides down), install the outer chine strips and then the top outer sheeting. Use 1/16 scrap to block up the edge of the covering at the top; this will make room to glue the opposite side covering to the top of the keel when it is installed later. Moisten the outside of the outer sheeting to make it bend more easily. Allow to dry thoroughly.
8. At this point, the two float halves you have treated as *outer* halves will *become and remain* the *inner halves. (Surprise, Surprise! Ed.)* Carefully cut the holes in the outer covering for the inter-float struts using a piece of 5/16 O.D. tubing sharpened on inside with a rat-tail file. This will make a nice clean hole if you pass the tubing from the keel side through the socket block and twist the tube as it goes through the outer sheeting.
9. Insert the inter-float struts in their normal locations, pin the two floats upside down on your work surface and then install the outer interfloat strut sockets. This set-up aligns the two floats and all of the inter-float strut socket blocks.
10. Install the outer former-halves, chine strips and the top sheet covering on the outer sides.
11. Trim the outer sheeting at the steps and install the extra sheeting supports in these areas.
12. Dope or epoxy (dilute Hobby-Poxy Formula II 1:1 with isopropyl alcohol or thinner) the inside of the structure at this time. Also coat the inside of the bottom covering material.
13. Cover the aft bottoms with 1/16 sheet balsa.
14. Install the step risers and forward bottom covering.
15. Install the rough cut nose blocks, trim and sand to final shape.
16. Install the chine protectors.
17. Drill No. 28 holes for 1 inch, No. 6 round-head float retainer screws through the outer sheeting and outer inter-float socket blocks. Install the inter-float struts, mark the screw positions on the strut ends. Remove the struts and drill No. 36 starter holes at the marked locations. Reassemble the struts and floats and install the retainer screws.

Perhaps the most dreaded part of model airplane construction for many people is the construction of wire assemblies for mounting wings or floats. Fear not in this case! Follow the directions below and you will make a strong, straight set of struts without any trouble at all.

1. Carefully form the front and rear struts from music wire. Lay the formed wire over the true-length drawings on the plan to check them. Rough up the parts of these struts that will later be wrapped with thread to attach them to the inter-float struts. This is most easily done by nicking them liberally with a file.
2. Install the inter-float struts in the floats.
3. Temporarily attach the main struts to the inter-float struts with soft wire or spring type wooden clothes pins. Wrap wire firmly but leave enough play so that it will be possible to adjust the strut positions in the steps that follow.
4. Attach the front main strut to the fuselage using the clamps intended for that purpose.
5. Bridge the two floats with scrap lumber, boxes or what have you. Build the height of the bridge so that the fuselage will rest upon the bridge in a position approximating its final position. Shim as necessary until the rear main strut can be attached to the fuselage. Shift the bridging material as necessary to align the fuselage and floats in their final position.
6. One at a time, remove the temporary wire attaching the main and interfloat struts and replace it with a final wrap of heavy nylon thread. Coat each of these wraps with epoxy and allow them to dry thoroughly.
7. Remove the bridging material, fit and install the "X" braces. Wire and solder them as indicated on the plan. If you use clean copper wire, sand the music wire, and apply a bit of soldering paste, these joints will flow together easily and look very professional.

There now, easy wasn't it?

We found no bad traits in Seahorse II. It handles easily in the air, on the ground and on the water. My son was flying quite well after about five ten minute flights. His next step is to practice landings with his own airplane. Father reserves the right to complete his pilot training with the Seahorse!

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