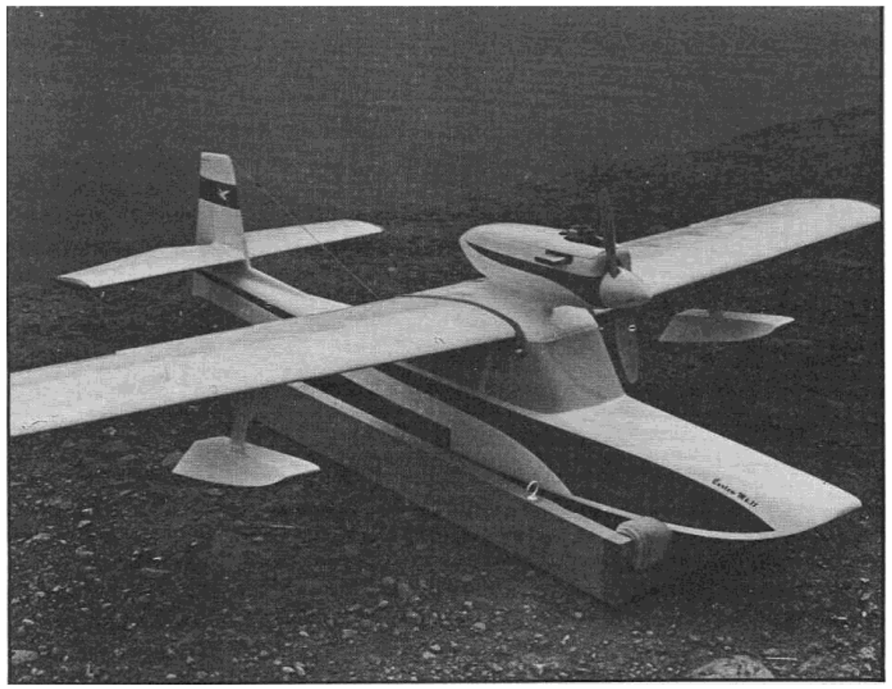
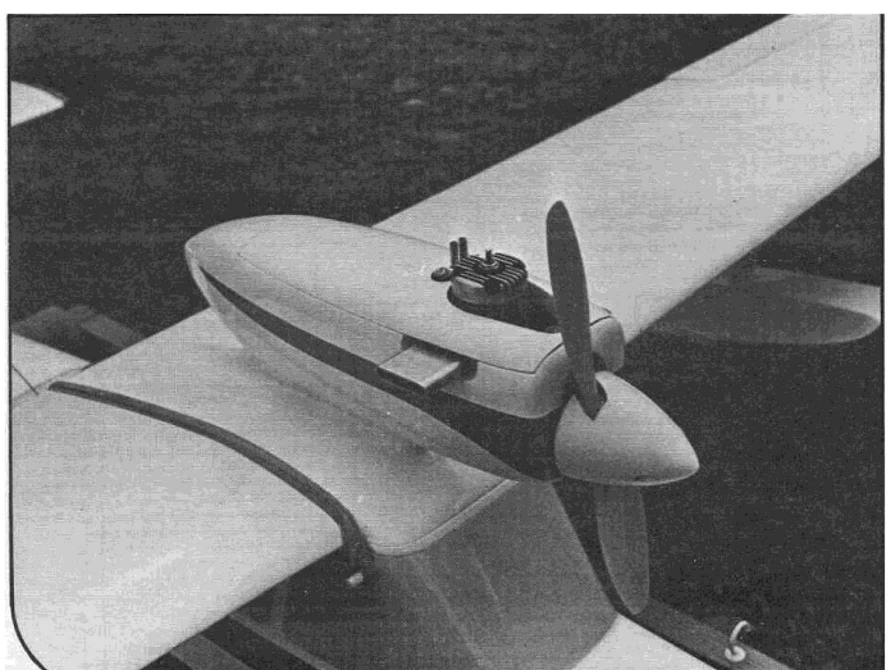
IN THE AIR, AT A FLYING WEIGHT OF UNDER THREE POUNDS, IT IS CAPABLE OF JUST ABOUT EVERYTHING IN THE BOOK.

curlew mark II

DESIGNED FOR .19 TO .29 ENGINES, THE CURLEW MK II EMPLOYS A UNIQUE HULL DESIGN THAT MAKES TAKE-OFFS AND LANDINGS A JOY.

BY SCOTT CHRISTENSEN





If you are the same type of modeler I am, you will rarely, if ever, find exactly what you are looking for in a kit. Too big, too small, never quite what you had in mind. Well, if your interests take a turn towards seaplanes, you are really in a jam! To the best of my knowledge there are only, at the most, four seaplane kits in various stages of availability. None of these flying-boat designs with the exception of one .09 powered bird, is of the "small field" (or small lake) type, the balance being .45 to .60 powered ships.

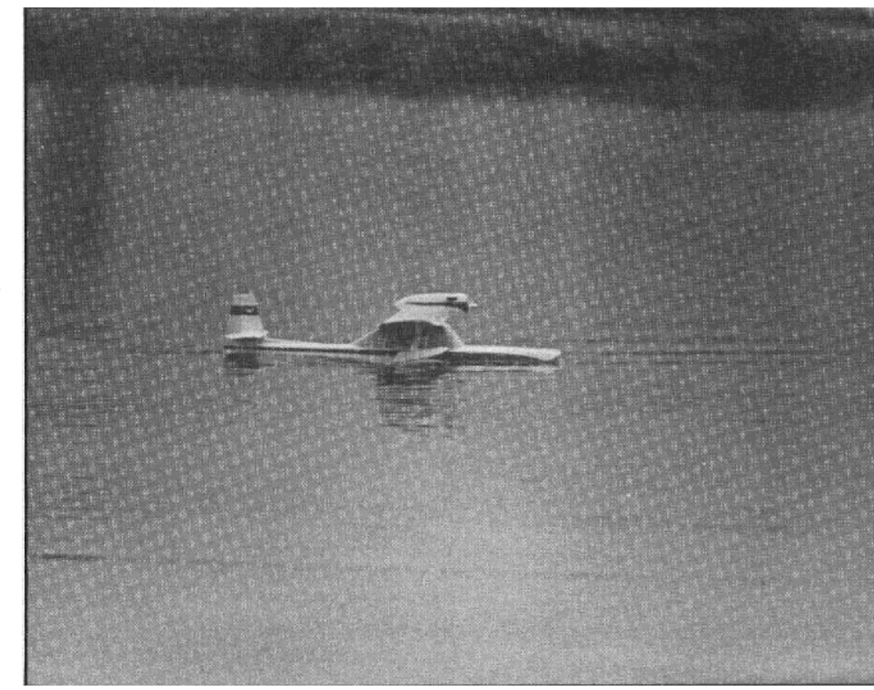
What I really wanted though, was a flying-boat type seaplane that could turn in a good performance using .19 to .29 size engines. This size of aircraft is quite popular these days and with the new, lightweight radio systems now available, full-house operation is very practical. Secondly, I wanted this ship to be attractive, easy to build, sturdy and innovative. I honestly believe, after building and flying two Curlews, that I have succeeded.

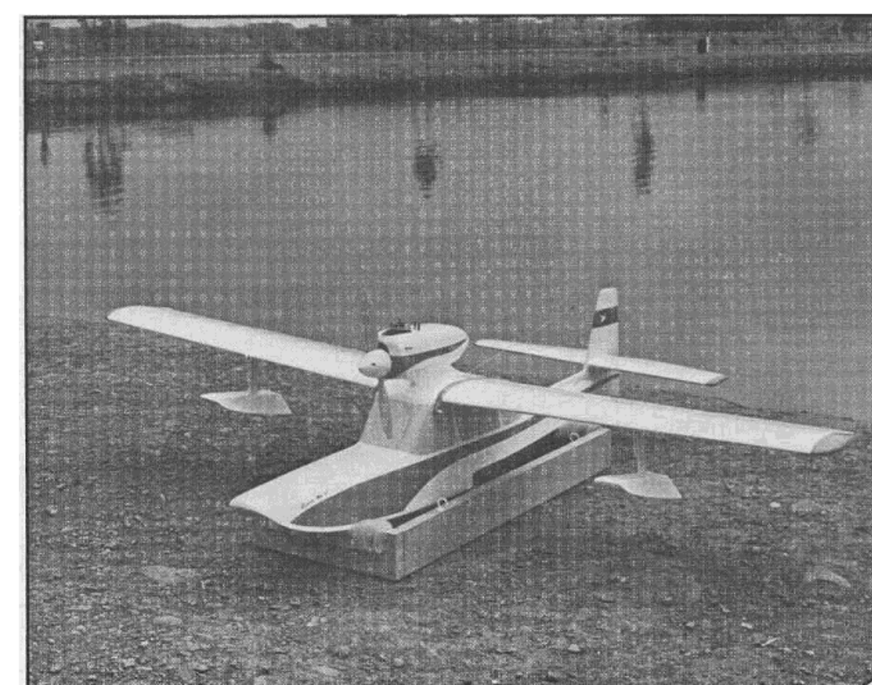
Obtaining useful information on R/C seaplanes, their design and operation is, at best, exasperating! Practically the only available data is that which can be gleaned from various construction articles that appear in model magazines. Since there is no real definitive R/C seaplane design data available, one either copies an existing design or forges ahead, leaning heavily on experience and common sense. I think the R/C seaplane is making a bid for popularity within the R/C community and that, as a result of this, many new-breed designs will be appearing in the near future. Along with these new designs could come such events as pylon racing (Schnieder Cup style?), pattern, scale etc. . . . the possibilities are exciting and probably fairly realistic.

The first Curlew was designed, built, and flown about a year ago. I would like very much to tell you that it flew off the board but I'll be honest and tell you that it took a month and a half of constant modification and test flying to get it to the point where it was a consistent performer. However, when the mod's were complete, the Curlew proved to be an outstanding seaplane. Because of the hull design, take-offs and landings were a joy. In the air – at a flying weight of 2 pounds and 13 ounces – it was capable of just about everything in the book.

The Mk. II version is a distillation of all of the modifications and improvements made to the original plus slight construction modifications to lessen weight, increase strength and enhance the appearance. I honestly do not feel that the Curlew Mk.II would make a good first R/C ship – it's fast, nimble and goes exactly where it is aimed. But, I am confident that this ship would make an excellent first R/C seaplane for the pilot who has some R/C flying under his belt.

If you have taken a look at the plans, I'm sure you noticed that a cross-section of the fuselage, forward of the step, is an inverted "V". The information on this hull design was obtained from a construction article authored by Mr. Willem Aarts of Holland. The theory behind this hull was intriguing and, as I later found out, quite successful on several full scale seaplanes built during the 30's and 40's. Mr Aarts explains how this hull works much better than I ever could but, in essence, the inverted "V" hull section performs two functions: (1) It literally swallows its own bow wave by funneling the passing water into the center of the hull which, in turn, (2) pushes the hull out of the water and onto the step. At this point the hull is acting very similar to a





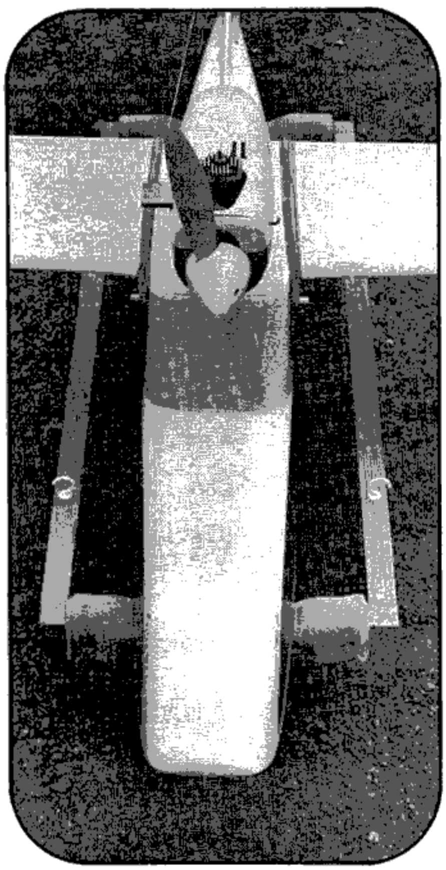
racing-type hydroplane that is up on its sponsons, which is the optimum speed mode for the hydro and, in the Curlew's case, the optimum position to be in for take-off. This entire sequence of events takes place very quickly, allowing the Curlew to take-off from a standing start in 20 to 30 feet. I have studied slow motion films of the Curlew – shot with a telephoto lens – during its take-off runs and everything that I have told you about this hull really happens! The complete absence of engine-killing bow waves is almost uncanny as is the aircraft's ability to leave the water so quickly and in such short distances. As if there was not enough incentive to build this type of hull, there is still another plus, and that is the extreme stability that you have at high speeds on the water, such as take-off and landing speeds. This is due to the sponson effect on each side of the hull.

You can certainly build the Curlew using a conventional stabilizer and elevator set-up. It will fly just as well except in the inverted maneuvers. But there is a great deal to be said for using a "flying stab" or stabilator. First, the flying stab used on the Curlew is easier to build, lighter and uses less area than conventional stab and elevator systems. The flying stab also offers you instant dynamic flight trim which, in turn, eliminates the need for leading or trailing edge shims (the use of shims in a flying-boat type aircraft may lead to areas of potential water leakage through the fuselage/wing seals). You really ought to give it a try. The system that is depicted on the plans has been completely flight tested and has proved to be extremely strong, smooth, and vibration free.

If I've managed to hold your interest so far, you probably are interested, but not quite convinced, because you heard "somewhere" that water is not good for your radio. Did you know that prolonged exposure to dust, spent fuel, and bits of gravel and weeds are just as, if not more, harmful to your radio? "But, my airplanes are sealed to avoid those hazards," is the standard reply. Well, friend, you can bet your sweet life that seaplanes need the same treatment with just a few precautions thrown in. The Curlew has requirements for four openings in its fuselage; the biggest is that area covered by the wing, the second is the outlet for the rudder control, the third is the on/off switch location and the last is the antenna exit. Protection against water leakage in these four areas are simple; a good quality of fuse-seal around the top of the fuselage; the use of NyRod for the rudder; and an internally mounted switch with a 1/16" wire push/pull extension through the side of the fuselage. Exit the antenna through the highest possible point in the fuselage and pass it through a piece of slightly over-size tubing filled with Vasoline.

Does that sound familiar – it ought to because most of you do the same thing to your land-based aircraft!

There is one last precaution that I take with my seaplanes that I feel is worthy of note. I make it a rule to **never** mount any of the radio gear in such a manner as to allow it to stand



in any place where water might pool inside the fuselage. Servos are mounted up on the fuselage sides with servo mounting tape. The receiver and batteries are raised up off the fuselage floor with ½" foam rubber. The switch is mounted as high up inside the fuselage as possible and, finally, during construction, the radio compartment receives a liberal coat of surfacing resin. That's all there is to it and as long as your seaplane flying is restricted to fresh water, I can practically guarantee no more radio problems that you would encounter with land-plane flying. If you must operate in salt water, I would strongly recommend the use of an "all-dry" plexiglass canister for the entire radio system, and even then, you are taking a big chance.

When built per the plans, your Curlew Mk. II will quickly introduce you to an entirely new dimension of R/C flying. Lots of take-off and landing room on a surface that is never dusty and a seaplane that is capable of just about anything you might want it to do.

GENERAL CONSTRUCTION NOTES

It really pays to look over the plans carefully. At the same time, have the "how-to" text of the article handy for reference. Many times the plans will clear up what the text didn't mention and vice versa.

Choose your wood carefully. Try to match, in weight and density, all of those pieces of wood that will oppose one another – spars, ribs, sheeting, fuselage sides, etc. . . . this small extra effort will help ensure that you finish up with a well-balanced model.

I would recommend avoiding the use of white glues in the construction of the Curlew. I used Ambroid for the general construction and epoxy for critical stress areas (ply-to-balsa joints, engine pod, dihedral braces, etc. . . .).

Cut out your fuselage sides from medium 3/32" balsa sheet. Note that the top part of each fuselage side (upper cabin area) is a separate piece of 3/32" balsa sheet, that is butt-glued to the top of the lower fuselage side. Make sure the wing saddle incidence angle shown on the plans is duplicated on each of your fuselage sides. Lay the completed fuselage sides on your work surface with the inside of each facing up. Glue in the 3/16" square balsa wing saddle longerons, letting ¾" of them extend out in front. At this point fabricate all of the fuselage formers – F-1 through F-10. Be sure to draw a centerline on each of the formers as this will be handy for fuselage alignment later.

Cut out your fuselage doublers from medium 1/16" balsa sheet. Note that these doublers are trimmed to fit **inside** of formers F-4, F-6 and the 3/16" square wing saddle longeron. Using contact cement or smeared Ambroid, laminate doublers to their appropriate fuselage sides. Pin the whole thing down as flat as possible and let it dry completely.

Framing of the fuselage sides is next. But first, put the two fuselage sides together and "match" them using a sanding block. Now, using a triangle, stabilator drive mechanism up against the fin with the hardwood sides facing out. Slip a bond paper spacer over the tubing, up against the fillets. Then insert the right and left stab halves onto the fin, up against the bond paper spacers. Since you haven't sheeted the top forward part of the stabs, you should be able to see the tip of the stab drive mechanism come out of the stabilator tubing. Block up the whole assembly so that (1) The stab halves are perfectly aligned with each other. (2) The fin is approximately in the correct relationship to the stabs – 0 degrees, and that (3) the exposed tip of the horn is where you want it to be for neutral elevator. When this assembly is firmly blocked in place, drill a 1/16" diameter hole through each end of the female stab tubing, ¼" inside the outer ends. Drill these two holes (one in each stab) at an angle so that the leading edge sheeting of the stab halves will clear the wire inserts that will soon be installed.

Unblock the assembly and pull off the stabs and the spacers. Epoxy a short length of 1/16" music wire into the holes at each end of each stab half. Now, slot each end of the male ¼" O.D. tubing so that it will just barely accept the 1/16" music wire retainers. Shape the fillets to the root section of each stab half and epoxy them onto each side of the fin in the **neutral** or 0 degree position. The final location of these fillets is important, do it carefully.

When the fillets are dry, test fit the stab halves. The whole assembly should be slop-free, well aligned and easily activated by the exposed horn tip. When you are satisfied, finish sheeting the stab halves, add the tips, and sand the whole assembly to final shape.

WING AND MOTOR MOUNT

The wing is built in three pieces – the two panels and the center section. The engine/tank pod, mounted on its pylon, simply keys into the center section, between the two ¼" ribs shown on the plans.

I built my wing panels at the same time I built the fuselage because of the "downtime" between gluing operations. The wing panels build up very quickly. The tip float stub boxes must be installed prior to sheeting the top leading edges of the panels, as must the aileron linkages. In fact, the only practical way to do this is to join the wing panels together with the center section, complete with dihedral braces and sheet the top of the wing after all is installed. You may have your own preference for aileron linkages but mine were simply 1/16" music wire pushrods, connected in the center section with a piece of square brass tubing. This tubing is then drilled vertically and a length of 1/16" music wire inserted so that it protrudes down through the wing and into the cabin area. Your servo simply drives this wire left and right for aileron action. When the linkages are installed and working freely the leading edges of the two wing panels can be sheeted and the tips glued in place.

The engine/tank pod is made from soft ½" balsa sheet epoxied around a 1/8" ply floor with hardwood engine bearers epoxied in place as shown on the plans. Be sure to slot the 1/8" ply floor of the pod to accept the tabs on the ¼" ply pylon. Also be sure to angle-cut the two engine bearers aft of MR-1. This must be done so that the tank will fit. Also, pre-drill your engine bearers and install blind mounting nuts on the bottom of the 1/8" ply floor.

The throttle linkage is embedded in one of the 1/8" balsa laminates used in making the pylon. Before you commit yourself by epoxying the whole assembly in place in the wing center section, make very sure the linkages are free. First, key the pod onto the top of the pylon and then key this assembly into the wing. Epoxy well, let it dry completely. When dry, place the wing onto the fuselage and shape the center section forward overhang to match the forward windshield – see plans. Sand the whole wing to final shape.

To strengthen the center section of the wing and the pylon, I fiberglassed the entire area from ½" outside the wing panel joints all the way up to the engine/tank pod. This really keeps vibration from the engine to a minimum.

Now you can install your tip float stubs into the boxes in the wing and start building the tip floats.

TIP FLOATS

A big problem with most R/C seaplanes that use tip floats is that they usually do not have sufficient bouyancy to keep the wing out of the water under windy conditions. Not so with the Curlews wing tip floats! They were specifically designed to handle windy weather and yet remain relatively "clean" in flight.

These floats are simple and quick to build. Build them upside-down, gluing one former at a time. Then epoxy in the stub receptacle box, sheet the sides, the bottom, and cap the ends. Sand to final shape and set them aside for finishing.

FINAL ASSEMBLY

Remember when I said to draw a centerline down each of the formers? Well now you get to use them. Mark off the true center of the rear ½" balsa decking, using the centerline of F-6 and F-10 as reference points. With a jigsaw, cut a 5/16" wide slot for the fin assembly using the centerline drawn on the decking as centerline for the fin. Rough-cut rear decking to shape and hollow it out per the plans.

Your rudder and stabilator controls (I suggest NyRods) must now be fed through the holes in the formers. Securely connect your stabilator linkage to the exposed horn on the bottom of the fin. The rudder control is fed through a drilled hole in the decking. Now, epoxy the fin into the slot in the decking and glue the decking in place, always checking for alignment. When this assembly is dry, shape the aft deck to final configuration and install the rear wing dowel and windshield, the same as you did for the forward windshield.

FINISH

I prepared my Curlew for finishing by filling the nicks and dings in the wood with DAP White Vinyl Spackling compound. I also used this material for fairing in the fillets on the fin. Sig Epoxolite was used to fillet the pylon to the engine/tank pod and the top of the wing center section.

Any finish that you use on your land based aircraft is suitable for finishing seaplanes. This includes MonoKote or Solarfilm. I really liked the way the new K & B Super Poxy was written up in the December 1971 issue of RCM (From The Shop) and I decided to give it a try. My wing was first covered with silkspan, doped, sanded and allowed to dry for at least 72 hours. The Super Poxy was then sprayed on. The finish is beautiful and really tough – one of the best I've ever been able to achieve.

FLYING

Choose your engine carefully, reliability is a must! The Curlew flies well with a .19, .20, .23, .25, .29 or .30. That's quite a choice of engines for one airplane, but then, the Curlew is quite an airplane. I would imagine that your Curlew will weigh-in around 3 to 4 pounds and, with seaplanes, a little extra "horse push" is convenient to break loose from the water, so don't be afraid of the larger engines.

Your tip floats rubber band onto the tip float stubs in the wing. This arrangement allows them to pop-off on a hard wing-low landing. These floats must be adjusted so that they allow the airplane to lean just slightly when at rest with one float just out of the water.

O.K., check your radio and make sure left is left and up is up and that your ailerons are hooked up correctly. Start your engine and make the radio check again. If you are having vibration problems – shut it down, go home and repack the radio. Assuming all was well, release the Curlew out into the water. Taxi around a bit at different speeds. This will help acquaint you with the controls. You will notice several things right away. There is no need for additional water rudder. The Curlew's rudder shape should be more than adequate for the job even in windy weather. Secondly, you'll notice that the airplane sits low in the water. This is partly true because inverted "V" hulls seem to have this characteristic. But because the Curlew's profile is somewhat low, this also contributes to the "low in the water" look.

Enough playing around – give yourself some take-off room and head her into the wind. Steadily advance the throttle to wide open and hold her straight with a little right rudder. Almost immediately she will be up on the step and her forward speed will just about triple. Flying speed is attained quickly but you will have to fly her off because she will stay on the step all day long. Keep the ship climbing at a shallow angle until you've got about 50 feet of altitude. At this point feed in a turn and head her back toward you. Trim as necessary on the transmitter but if the trim requirement is drastic, set-up a landing and take care of it **on the ground**. Landing the Curlew is about as much fun as taking off. The airplane has a low stall speed but I still try to keep the nose down on approach and I start my flare at around 5 feet off the water and just let her settle in as smooth as can be. Due to the inverted "V" hull, there is very little tendency to skip like flat bottom types – once it's down it's down.

I guess I've taken you as far as I can with this project. I hope that it is as satisfying and rewarding for you as it's been for me. I would appreciate hearing from you about your Curlew Mk. II and perhaps if you're ever in the San Francisco Bay Area, we can get together and tear up a lake or two. You can write to me through RCM.

Happy Flying . . . . □

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