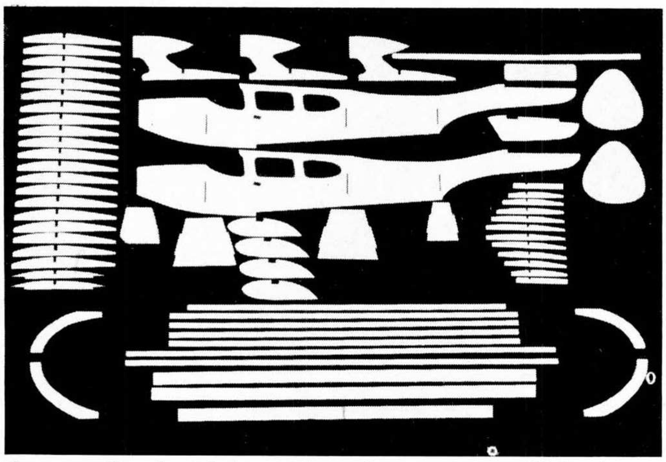
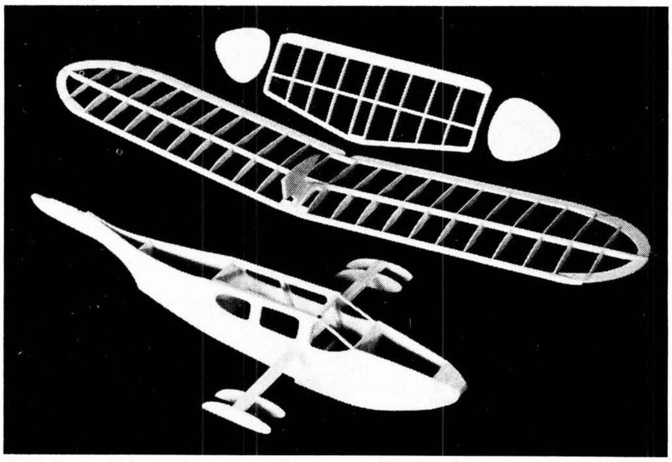
the Drake... *by Ken Willard*

Flying surfaces and gear attach with rubber bands. Flat-bottom hull insures good take-offs, keeps sponsons clear of surface when model gets on step.

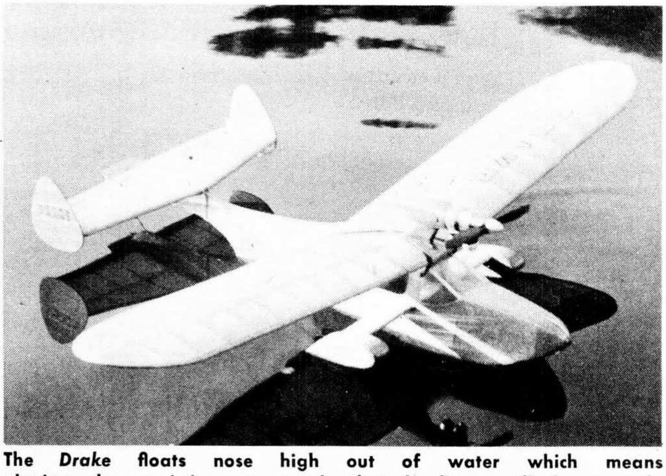


These are the sheet balsa parts used on prototype. Slight changes were incorporated in the drawings. Looks like prefabrication!



Skilled model designers will rave about the ingenuity, realism, and simplicity so nicely combined in both structure, assembly.

Once in a blue moon do you see an amphibian as nice as this one. It flies on .02 to .049's.



The *Drake* floats nose high out of water which means planing characteristics are good, that landings will be smooth.

Model amphibians present a unique challenge. Not only must they have air and water stability, they must have a hull and float design that permits water take-offs. Yet, when the wheels are down, the hull and the floats are protected and flying on land won't damage their structure.

The *Drake* was designed to meet this challenge. It flies equally well on field, or lake. Only minor adjustments are required to make the transition from landplane to seaplane, and the effect on flight characteristics is hardly noticeable.

Some may question the flat-bottomed hull, but experiments show that for model work this type of hull is highly satisfactory; the author has used the basic hull design of the *Drake* on models all the way from 18" jobs powered by the Campus *A-100* up to the design shown here with equal success. The flat bottom gives a "sea sled" effect which makes water take-offs very successful. It also assures that the sponson-pontoons, which provide water stability when the model is at rest, will ride free of the water during take-off. When the model is "on the step" the sponson-pontoons are well out of the water; also, the flat bottom of the hull resists lateral tipping when the model has attained "step speed."

The Drake

Simplicity is the keynote in the *Drake*. A brief look at the photos and the plans will show how sheet balsa and strip balsa are used to yield the lines with a minimum of carving and fitting. Once you've collected the 1/16" sheet and the 3/16 x 1/4, 3/16 x 3/16, and the trailing edge stock from your local hobby dealer, you're ready to start. Enlarge the plans to full size, cut out the templates from 1/16" sheet as called for on the plans, follow the step-by-step instructions for assembling them, and in a few hours you'll be ready to test fly the *Drake*.

HULL

1. Cement 3/16" sq. braces to sides in cabin and wing mount area as shown.
2. Cement tail former to one side, then cement other side to tail former, aligning sides carefully. Let dry.
3. Insert all bulkheads, except noseblock, and cement. Pin together if necessary until dry.
4. Cement 3/16" sq. crosspieces in place at top of windshield and on bottom at step. Trim ends to fit angle at which sides are set by bulkheads.
5. Press forward part of hull sides inward and cement nose bulkhead block in place. Hold together with pins until thoroughly dry.
6. Insert 3/16 x 9/16 x 11" sponson crosspiece (made out of three pieces of 3/16" sq.) in hull sides. Make sure it is centered, then cement into place. Reinforce with gussets of 1/8" flat scrap balsa, cut to fit snugly against crosspiece and the 3/16" sq. side braces.
7. Cement dowels for windshield and wing and tail mounting rubber bands in place.
8. Cover top and bottom with 1/16" sheet, grain running croswise of hull.
9. Cut out windshield and windows from cellulose acetate and cement in place. Crease windshield slightly where it curves around dowels. This makes it easier to install.
10. Add tail platform, making sure it will hold tail surface level with the wing.
11. Add the piece of trailing edge stock on top of fuselage which serves as a wing aligning block.
12. Sand smooth. Round the corners slightly at top of hull, but keep corners sharp on the bottom.
13. Finish by covering entire hull with colored paper doped to the wood; dope the paper with four coats of thin clear dope, then fuel proof it.

SPONSON-PONTOONS

1. The two sides of each sponson-pontoon are cemented to the 3/16 sq. x 11/8 long leading edge and trailing edge braces, which are trimmed to shape shown on side view.
2. Cement the pontoons on the crosspiece. The notch at top of sides slides on crosspiece and provides the proper angle.
3. Cover top and bottom with 1/16" flat stock, wrapped completely around nose. Wet the outside of the balsa to help in curving it around nose.
4. Sand smooth, cover with paper, and dope.
5. Add 1/4 x 3/16 leading edge to crosspiece between hull and pontoon. Round to shape.
6. Add piece of trailing edge stock to rear of crosspiece between hull and pontoon. Trim crosspiece to fit trailing edge smoothly.
7. Sand the streamlined crosspiece smooth, cover and dope as on hull.

LANDING GEAR

1. This is optional for flying as landplane. Bend the wire to the shape shown, and hold main gear in place with rubber bands looped over dowels at top of hull. Gear is shock absorbing.
2. Tail skid can be permanent if desired.

WING

1. The wing is of conventional construction except for the engine mount. Build each panel flat on the table, except the tip pieces which should be sloped up to meet the spar. Trim the tip rib to fit snugly. Notching the trailing edge to receive the ribs is optional, but adds to the strength.
2. To join the left and right panels and obtain proper dihedral, block up each tip 2-1/2" from the table top, trim the bottom of the leading edges and trailing edges at the center so bottom edge of center section ribs can lie flush on table. L.E., T.E. and spar of each panel should be trimmed to proper length to butt joint at center of wing.
3. Cut two spar joining plates from 1/16" hard flat stock to fit in center section when wing is joined and dihedral blocks are in place, then cement spar center sections and plates firmly in place.
4. Cement 1/16" flat bracer across center section at L.E. and 3/16" sq. brace at trailing edge. Trim to fit.
5. Engine mount pylon can be 1/8" plywood, or three laminated pieces of 1/16" hard balsa, with grains running in different directions for strength. Shape is shown in side view (piece going into center section is shown in heavy dotted lines.)
6. Line engine pylon up, fore and aft, and cement in place. Brace thoroughly with 3/16" sq. braces running from pylon to center section ribs, and along pylon from L.E. to spar. Braces should be trimmed to snug fit, and placed so as to be well inside the wing center section after it has been covered.
7. Cover top and bottom of center section with 1/16" flat stock.
8. Shape the leading edge, sand the entire wing structure smooth, and cover with colored paper.
9. Providing a mounting wall for the engine on the pylon is a matter of individual

taste. The author used two pieces of white pine, shaped to provide a circular mounting wall, and cemented to the pylon sides, grain running vertical. Mounting holes were drilled, and balsa fairing added to streamline the pylon. Cutouts in the balsa fairing were provided to allow access to mounting nuts.

TAIL-SURFACES

1. Build the stabilizer flat on the table in the conventional manner. Make tab from 1/16″ flat stock and attach with soft wire hinges which will bend for adjustments.
2. Make rudders from 1/16″ flat sheet. Put tab as shown on left rudder only.

ADJUSTING AND FLYING

1. The model should balance at the spar. Add weight to nose or tail if required. Nose weight can be 3″ strips of solder, running straight back from nose block along bottom of hull. They serve also as skids when the model noses up.
2. Note the angle shown on the stabilizer tab. This is because of the high mounting on the engine. The model should be adjusted to glide with the tab setting as shown; then, under power, the propeller blast on the tab overcomes the nosing down tendency which would ordinarily occur with a high mounted engine. When the engine quits, the tab is not so effective, and a smooth transition from power flight to gliding flight results.
3. The wing and tail are held on by rubber bands. The aligning block at the trailing edge of the wing on the hull helps to keep the wing on straight. The stabilizer is aligned by setting the center ribs parallel to the edges of the tail platform. It can then be pinned in place, or dowels can be inserted in the tail former, projecting up, and holes made in the stab leading edge center brace and trailing edge to fit the dowels. This is optional.
4. The model flies equally well either to the right or to the left. Whichever direction is your preference, offset the engine thrust line slightly in the opposite direction, and use the rudder tab to get the desired turn. When flying from the water, don't try to get small circles, as they will hamper the take-off characteristics.
5. Before flying from the water, the entire model should be checked for leaks. It must be completely water tight; otherwise it will absorb water which will destroy the balance. If all joints have been properly cemented, and the paper covering goes over the whole structure, the doping and fuel proofing will also waterproof the model. To check for leaks, dunk the hull in the bathtub briefly. If bubbles appear, note where they come from, dry the hull and seal the leak with cement. Check the wing and tail also. Rough landings on the water during testing may make the model nose over, and then everything gets wet. But no harm is done if the structure is water tight.
6. Test flights with the prototype were made first with the *Infant .020* (yes, the *Infant* not only flies this 7-1/2 oz. model, but will lift it from the water) to check the adjustments, then the *Torp .035* and *.049* were successively installed. Beautiful 20 feet long take-offs with the *Infant* were replaced by snappy four foot runs with the *Torp .049*. The model flies well with any of the half A motors, but unless you have an *Infant* for moderate power tests, better run your engine a little rich at first. Dunking won't hurt the model, but sometimes the water makes the engine very balky, even though you blow the water out thoroughly and squirt in fuel following a ducking.
7. When flying as a landplane, the wheels change the balance slightly and you'll have to readjust the model. A little modeling clay added to the tail will reestablish the balance, since it will have a much longer moment arm from the balance point than the wheels.
8. The wheels are so located as to protect the pontoons from crash landings, but the position does have the slight drawback of causing the model to nose forward on the hull on some landings, then drop back on the tail skid. This is where the strip solder nose weights prove doubly useful, as they protect the hull.