One job that can't spring a leak—no covering to puncture! Wing, with nacelle, knocks off in crackup to prevent damage. Wheels come off for R.O.W.

THE PELICAN

by KEN WILLARD

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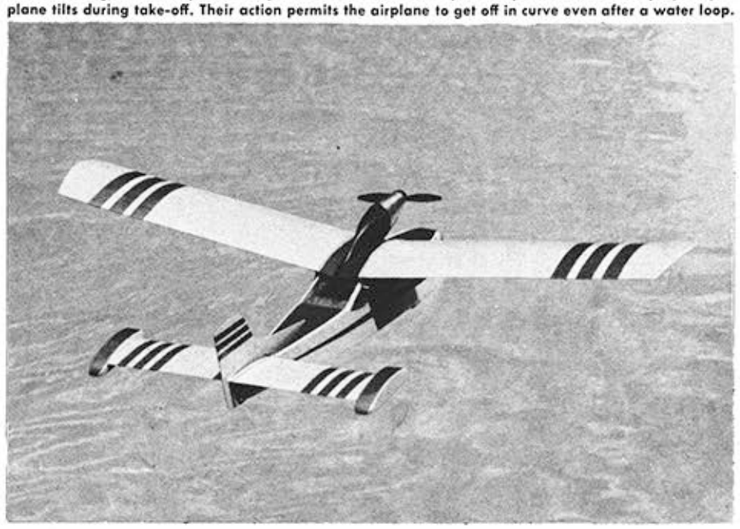
Remember the Drake? Its designer does even better with this amphibian for Half A power. Features all-balsa construction and tail tip floats to avoid digging in on water.

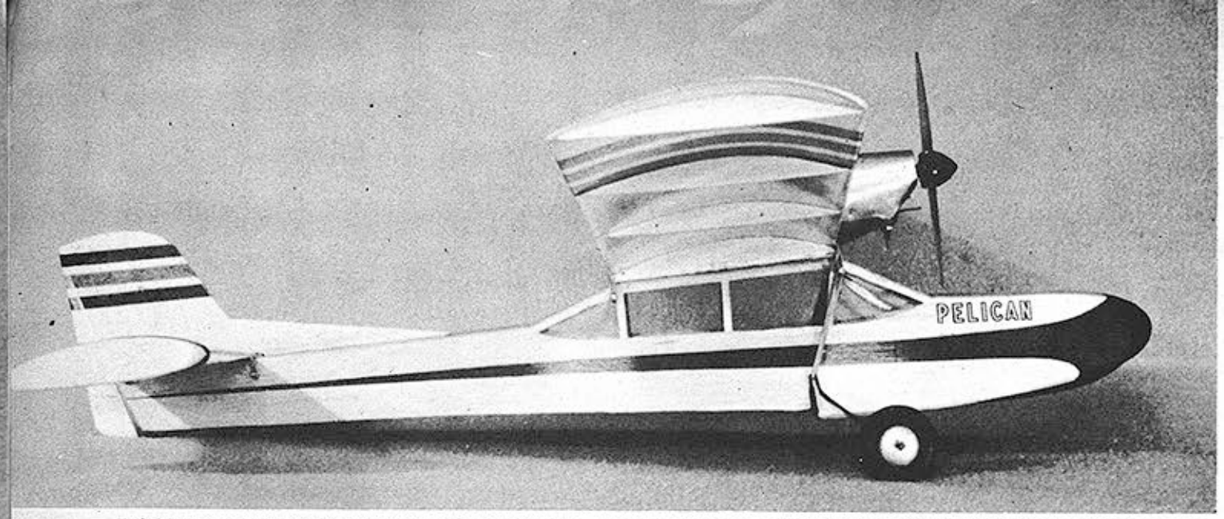
When floating, model requires no tip floats for water stability. Tail tip floats come into play only if plane tilts during take-off. Their action permits the airplane to get off in curve even after a water loop.



▶ Every time you design and build a model amphibian, you get another idea which you hope to incorporate in your next model. Some of the ideas are good; some are bad. The net result should be a better model with each succeeding design. The many MAN readers who built the *Drake* will be interested in the *Pelican,* a model amphibian which was designed to fulfill several purposes:

(A) It is all balsa. This eliminates not only the covering job, but also the possibility of having holes punctured in the surfaces, which would allow water to get inside. The sheet balsa wing and tail give very satisfactory flight characteristics; however, some modelers will probably decide to make built-up wings and tail. It is probably true that by modifying the *Pelican* in this way, slightly better performance will result; however, the writer was looking for simplicity.

(B) One of the difficulties with an amphibian when flying off the water is the tendency to have spiral instability, caused by either a wingtip pontoon or a sea wing on one side dipping into the water, creating drag on that side and causing the model to proceed in a tight circle from which it cannot break loose and subsequently take off. In an attempt to eliminate this, the *Pelican* has a modified planing hull type of bottom. When the hull sides are bent together to meet at the tall, there is a slight downward bend



High lift wing makes plane relatively insensitive to adjustments, as does moderate power. If scaled up, the *Pelican* would make an interesting r.c. job.

which is due to the slant in the sides. This gives a slightly concave line to the rear planing area, and the model planes on the step and the rear of the hull. Since the rear of the hull comes to a point and a portion of the rudder is still in the water, this gives good water directional characteristics. The location of the pontoons on the tips of the stabilizers is somewhat of a novelty. They are not flotation surfaces as is the case with contest models, where the model sits on the front float and the two rear floats. The pontoons on the *Pelican* are for water stability only. Except in a crosswind, the *Pelican* floats level with the pontoons out of the water. On take-off, if one wing drops and a pontoon drags, its location at the rear reduces the tendency to pull the model into a tight circle. Only a slightly curved path results, and the model gains enough forward speed to level off and break the dragging pontoon free. Also, when flying the *Pelican* as a land plane, the pontoons are out of danger in rough landings.

(C) Since the *Pelican* is amphibious, it has to be able to take rough landings on land with a minimum of damage. For that reason the wing and tail are mounted with rubber bands, which allows them to break away from the hull without doing any damage in the event of a rough landing.

By studying the plans and looking at the photos you will be able to complete most of the construction without difficulty. However, since the model is simple enough for the modeler just out of the beginner stage, step by step construction procedure is presented. Also, for the modeler who is not too familiar with materials, the detailed bill of materials will assist in obtaining the proper grade of wood for each part. With the full size plans, the bill of materials, and the building instructions, you should have no difficulty in building the *Pelican* over a couple of weekends in your spare time.

Because of the high camber to the sheet balsa wing, the *Pelican* is not too sensitive as to its balance point. If you get the balance point about 40 to 45 percent back from the leading edge of the wing, you can make any necessary adjustments by adding weight to the nose or the tail, and subsequently by shimming up the leading edge of the stabilizer if the model has a stalling tendency, or shimming up the trailing edge of the stabilizer if there is a slight diving tendency.

The model should balance pretty close to the desired point with the landing gear attached. When the landing gear is removed for flying off the water, some weight in the nose will be required to compensate for the weight of the removed gear. Modeling clay is the usual material. The writer used a length of 1/4" rubber tubing filled with strip solder and screwed into the nose block to look like a bumper.

Because the model is not greatly overpowered, it is not too sensitive as to its flight path. However, in order to keep the model from flying too far away, a flight path in a large left circle is recommended. This keeps the ship within range, yet it does not impair the take-off characteristics.

Take-offs, either from the land or the water, are extremely simple. After you have the engine running, just set the model down, head it into the wind, and let go of it. There is no necessity on water take-off to make sure that the plane is level so that the pontoons are out of the water. Even if they dip into the water they will break loose and the model will take off.

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Unusual but very successful lines of the hull are revealed in this shot. The engine cowling is optional. Also note non-permanent landing gear design.

The Pelican

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One last word of warning. No matter how good a model's characteristics are, it is subject to the vagaries of wind and water. Be sure that your *Pelican* is watertight all over. It's bound to get dunked at one time or another. If it does and it is watertight, you have no problems except that of getting the water out of the engine. In order to do that, particularly with an inverted engine, make sure that you don't get water trapped in the top of the cylinder. It's a good idea to turn the engine over slowly in the upright position, then on its side a few times, then blow out the fuel tank. That will get rid of most of the water, but you will still have to work at it a little bit, if water does get in the engine, to get it completely clean before the next takeoff.

Hull. Mark location of 3/16" sq. braces on hull sides and cement braces in place. Be sure to make one right side and one left. Also be sure the cabin sides are identical, with the 3/16" sq. top strips parallel. Cement bulkheads one and three in place, lining up the hull sides so the bulkheads are perpendicular to the sides. Cement the 3/16" crosspieces in the cabin area in place. Pinch the tails of the two hull sides together and cement, making sure that both sides are bent evenly so the hull will be uniform. Install bulkhead four. Bend the nose portions of the hull sides in to fit against the sides of the nose block and cement, again making sure both sides bend equally.

Cover top and bottom with 1/16" sheet, grain running across the hull. Cement forward keel of 1/8" plywood in place. Cement cabin side windows in place. Insert wing mounting dowels through side windows (drill hole just large enough for dowel to pass through) and cement firmly in place. Install dowels for tail. Cement windshield and rear window in place.

Wing. If your hobby shop can't supply 3/32" flat stock in 6" width, cement two pieces of 3/32" x 3" x 21" together, with a butt joint at the edge, for each wing panel. Use

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medium light balsa. Mark the location of the ribs on the wing panels.

To curve the sheet stock over the ribs, several methods may be employed. Simplest method is first to cement the second rib in from the wingtip to the sheet stock, holding the two together with clothespins at the leading and trailing edges and pinning the rib to the sheet stock at any point where the sheet stock may tend to lift away from the rib. Then repeat with the rest of the ribs. When using this method there is danger of twisting the panel slightly due to variations in the wood. Care must be used to assure that the leading and trailing edges are parallel after the ribs are mounted. A safer but somewhat longer way is to lay the drawing of the wing on a flat surface, spot cement the ribs in place, run a bead of slow drying cement along the rib tops and then pin the sheet stock to the ribs and also to the table top along the leading and trailing edges. When dry, cut the spot cement points loose. This method assures the alignment of the leading and trailing edges. At the center section, cement the two center ribs together with a piece of 3/4" x 3/16" x 6" trailing edge stock in between. This automatically forms the right dihedral. Trim the excess away on top and add a 3/4" x 3/32" x 6" cap strip over the joint with grain along the wing.

Add 1/8" x 1/8" x 6" strips to the bottom of the two ribs which line up with the top of the cabin sides. Block sand so the bottoms are level with the center ribs; then cover bottom of the center section with 1/16" sheet. Add 1/8" x 1/4" end plates to leading and trailing edges of center to keep fuel and water out.

Nacelle. Cut the nacelle center pylon from 1/2" medium stock and cement to the center section cap strip. Cement firewall to pylon. Firewall is a cylinder of 5/8" pine, 1-1/8" in diameter, if *Torp* is used; otherwise use 1/8" plywood for engines with case mounted tanks, such as the *Wasp*. Your choice of engine will dictate the type of mounting required. Dowels through the firewall, cemented into the nacelle pylon, make a strong joint. Carve nacelle fairings to shape from 1/2" soft balsa, hollow out slightly, and cement to pylon. Sand the structure smooth. Engine cowl is optional.

Make the horizontal tail surface just like you made one wing panel, cementing the pontoons to the tip ribs as shown. Cut the vertical tail from 1/16" sheet stock to shape. To make the pontoons, cement 1/16" sides to leading edge and trailing edge blocks. Cover top and bottom 1/16" sheet, grain crosswise.

Sand all surfaces smooth. Corners on the top of the hull can be rounded, but keep the bottom edges sharp. Dope with one thin coat of clear dope. Sand again, dope again, and sand again. Choose your color scheme. It can be applied either with colored dope or colored jap tissue. If you use tissue, dope it on, then apply at least two more coats of thin dope. Bend landing gear wire to shape. Fuel proof the entire model.

Bill of Materials

HULL	
2—1/16" x 3" x 36"	Medium balsa
2—1/16" x 3" x 36"	Medium balsa
2—3/16" x 3/16" x 36"	Medium balsa
1—1½" x 2½" x 2"	Medium balsa
1—2¾" x ¼" x ⅜"	Plywood
1—9" x 2" x 1/16"	Plywood
1—5" x 8" x .01	Cellulose Acetate
1—¼" x 36"	Dowel
WING	
2—3/32" x 6" x 21"	Medium balsa
8—⅛" x ⅝" x 6"	Medium hard balsa
1—1" x 5/32" x 6"	Hard trailing edge stock
TAIL	
1—1/16" x 4" x 24"	Medium balsa
1—⅛" x ¼" x 16"	Medium hard balsa
NACELLE	
1—½" x 3" x 6"	Medium hard balsa
1—⅝" x 1⅛" x 1⅛"	Pine
1—2" x 2" x 1¼"	Soft balsa
2—2" x 4" x ½"	Soft balsa
LANDING GEAR	
2—2"	Rubber or wood
1—3/32" x 15"	Wire
PONTOONS	
1—½" x ½" x 2	Medium balsa
1—⅝" x ½" x 2"	Medium balsa

THE END