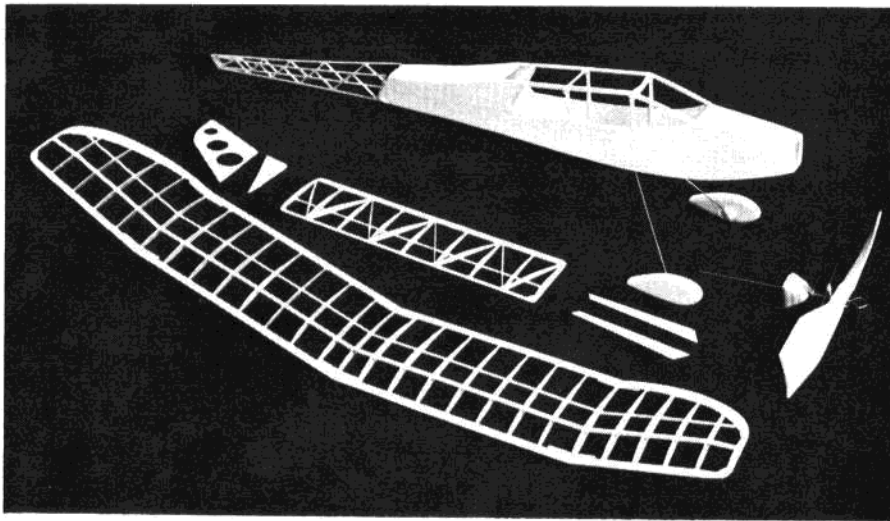
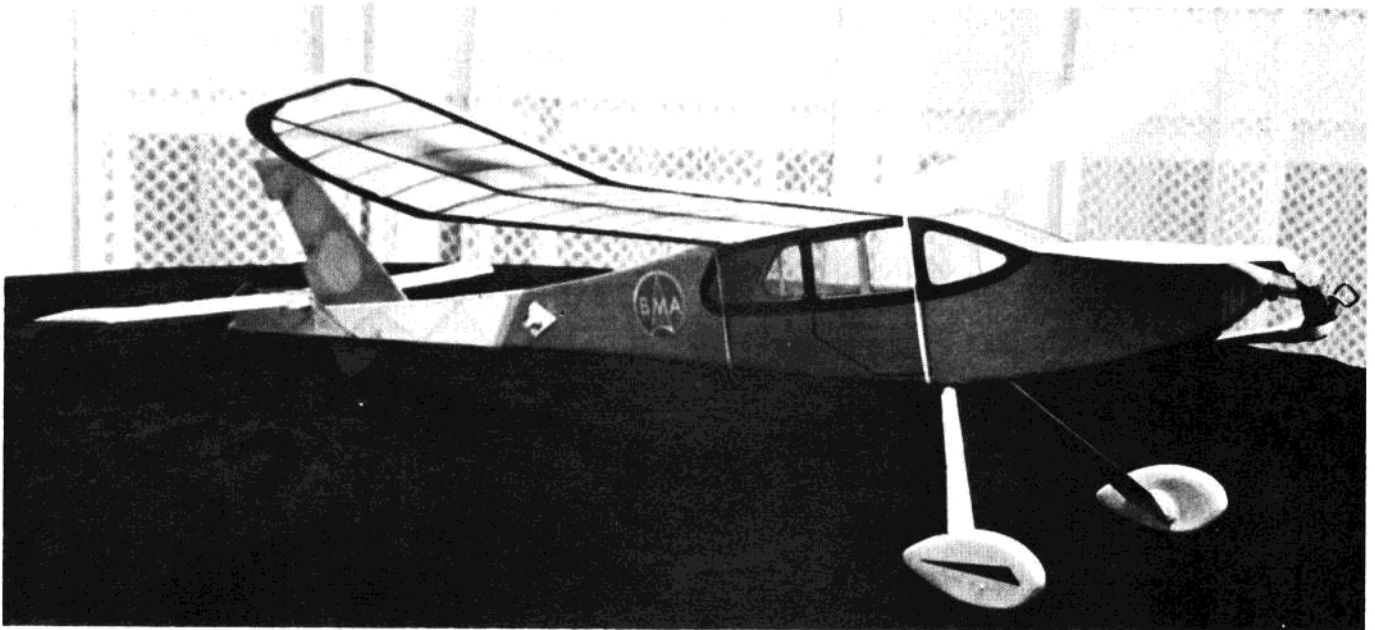


# CURLEW

Story begins on following page.



# CURLEW



Top: Ready for maiden flight. Her sporty paint scheme is really just colored tissue. Note the rear motor peg is aluminum tube which also serves as the dethermalizer fuse's snuffer tube. Above: That's all there is to it! Now it's time for tissueing. Wing is not a complicated, warp-proof structure, so use thinned dope sparingly.

Fred Bodsworth of Toronto, Canada, has written a book called *Last of the Curlews*, a classic. The Curlew, which winters on the Antarctic tip of South America and flies almost halfway around the world to breed in the Arctic Circle, has probably become extinct. My model, the Curlew, is a tribute to the stamina and courage of one of the world's most beautiful creatures.

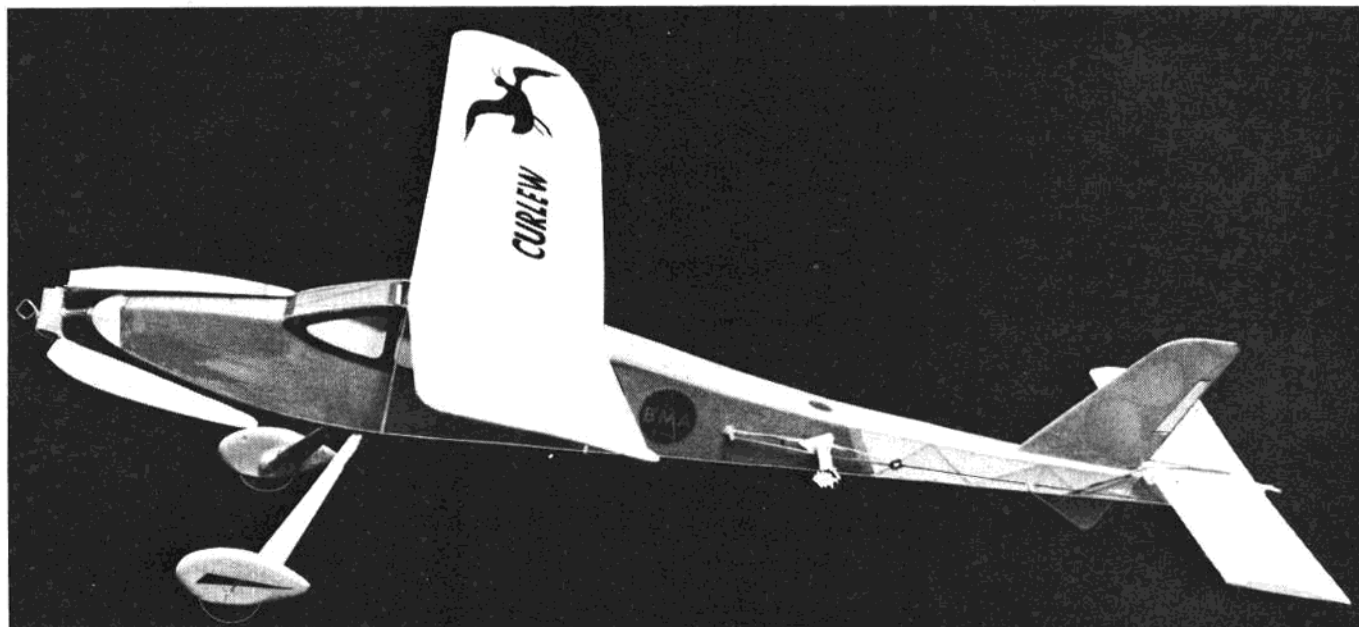
## Construction

**Fuselage:** Trace one side carefully on a 1/32" medium quarter grain sheet using a sharp, medium hard pencil and carbon paper. Cut a second sheet the same length and stack them together with a small piece of masking tape on each end so they will not slip when you cut through both sheets. Now cut out the sides going slowly around the little radius on the back window. Both sides will be identical using this method. Pin the sides down over the plans and glue in the cabin struts and the front window frame.

After cabin struts are dry on both halves, trace the 1/16" stiffeners on the inside of each fuselage half, being careful not to press too hard. Glue the longerons on first by rolling them lightly with a dowel or a round pencil. The 1/16" square stringers will nearly take on the same curve of the body and simplify gluing them in place. Cut each stiffener and glue in place. Don't forget the landing gear angle pieces, which should be glued well.

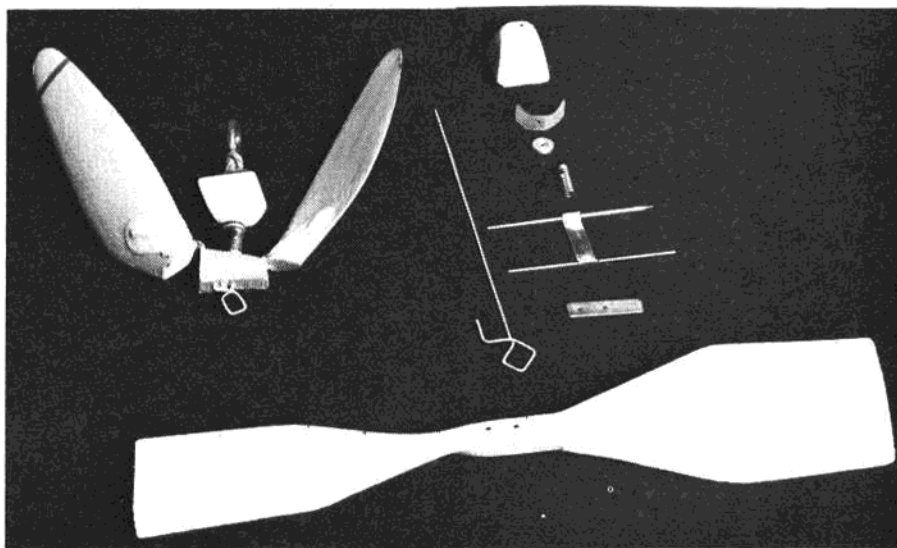
Joining the two fuselage halves isn't difficult, but it does take a little patience and care to insure proper alignment. Prop the sides upright on your workboard and glue in the front dihedral cross brace and the bottom cross brace. Join the fuselage ends at the back with the cross members directly behind

A most handsome and stylish rubber model adaptable to Coupe but really intended for sport flying. Duration—about two minutes in dead air. / by George Brownfield



the aluminum rubber holding tube. Check that the sides are drying squarely with no twist built into the fuselage. When thoroughly dry, the rest of the cross braces are quite easy to install. Bring the nose together with its cross members in place and hold with a strip of masking tape. Make sure the members have no crooked pieces and double glue for extra strength. Set the fuselage aside to dry and proceed to build the rear part of the fuselage directly over the plans. Build both halves with 1/16" square balsa. When dry, butt the two pieces up against the main fuselage and glue the tips together. Set the fuselage on the top view of the plans to make certain the back two rear fuselage halves dry in line with the cabin section. Add cross members seeing that nothing dries out of line. When the whole body is dry, lightly sand all joints to eliminate any bumps of glue. Bend the landing gear out of 1/32" music wire and sandwich it in place with the pieces shown in the small diagram.

When dry, glue the whole assembly in the fuselage. This area should be securely plastered with glue. After the gear is dry, proceed with the planking of the top and bottom of the cabin section as shown in the small illustrations. Construct the wheel pants and sand a radius on the outer edge. When both have identical shapes, glue the plywood oval disk on the side of the wheel pant which butts up against the wire landing gear. Slip the wheel inside the wheel cover and install the assembly on the axle, making sure the oval plywood rests up against the landing gear. Mix up a small batch of epoxy and secure the wheel pant to the landing gear with the wheel installed. Set the fuselage on your workboard with the wheel pants propped up



Top: She's even equipped with a dethermalizer. The glide is excellent. (Plans show complete folding prop assembly which is essential for a good glide.) Above: The propeller— assembled and partially assembled.

(Text continued on page 95)

at the right until the epoxy cures. The landing gear fairings are made from 1/16" sheet and glued to the inside of the wheel pant.

**Wing and Stabilizer:** Cut all ribs from 1/32" quarter grain wood. Rub a bar of soap or a white candle on your plans where all glue joints will be made to prevent the structure from sticking to the plans. Pin down the leading edge and trailing edge on the wing, and the leading, trailing edges and the 1/16 x 1/8" spar on the stabilizer. The trailing edge of the wing will have to be shimmed up with small pieces of balsa to allow the ribs to enter the notches in the trailing edge at the right angle. (See plans for detail.) For the ribs on the tip of the wing, cut to proper length and sand the oversize areas away after the wing has been removed from your work-board.

Glue spars in now! Note that the dotted-line ribs are left out until the dihedral gussets have been installed inside the leading edge and spars. When the dihedral has dried in the wing, cut the standard rib to fit in the dihedral break areas and glue them in place. Be sure the center dihedral break has been glued well! The stabilizer has two different size ribs. Be careful to put the longer rib in as the angle brace and the shorter one in as the conventional rib. This helps to discourage warping in the stabilizer. When both wing and stabilizer are dry, sand carefully to the airfoil shape shown on the plans.

**Propeller:** Making a successful folding propeller may seem complicated at first, but if the steps are followed, you should turn out a fairly high performance rubber folding propeller. The success you have in this particular area of construction will make a big difference in the performance of your Curlew, so take your time in carving the propeller block. Use a sharp knife and sandpaper—and don't hurry!

A standard block this size can be purchased at any hobby shop in a 12-in. length. Cut off the extra three in. and very accurately trace the dimensions on the face and sides of the block. A hacksaw blade makes an excellent tool with which to cut out the block. Start carving the front of the propeller from the leading edge down to the trailing edge of the block. (Check drawing and you will see what I mean.) Carving is actually fun, but you must be careful not to slice out too large a piece. Whittle away small pieces rather than hacking out big ones.

Watch the grain of the propeller as you carve away the balsa. It will be necessary to turn the propeller blank around and carve in the opposite direction many times because the grain of the balsa changes as you carve the shape of the blade. The partially finished blade in step No. 2 should have an airfoil shape similar to the cross section drawing in the propeller blade template.

After you have carved the propeller to look like step No. 2, position the finished blade template on the front of the blades and trace around the template. Cut away the excess balsa and resand the blades to their final shape as shown in step No. 3. The front and back bear-

ing plates are made from a tin can or thin brass strips 1/64" thick. Drill .046 holes in the front bearing plate and the one hole in the back bearing plate. 1/16" OD aluminum tubing 1/4" long is attached with epoxy in the area shown in step No. 4. Slip a straight .046 wire through the propeller hole and install the front and back bearing plates. Bind with thread or gauze and glue. The hinge wires are 1/32" music wire 2 1/4" long. Slip wires through the little tubes and bend one end to fit on the front surface of the propeller blade and the other end on the back side of the blade. Two needle-nose pliers are best suited for this task. This step is probably the most difficult part of building your folding propeller, so don't get discouraged. After you bend both wires to lie as flat as possible on both blades, bind tightly with thread or use gauze and epoxy the wires to the blades. Step No. 5 shows how to bend the propeller shaft with a pair of needle-nose pliers.

After completing 5-F, slide through the propeller hole and into the other hole on the front of propeller hub. Now bind the shaft to the propeller hub and glue well. When dry, slide on the spring, ball bearing washer (or small washers if a ball bearing washer won't fit the nose block) and bend as shown in sketch No. 6-A. Complete other bends to Step E. Step E shows the extra wire cut off.

This little stub end of the wire should not scrape against the inside of the fuselage when the propeller is turned. Slip a piece of neoprene tubing or 1/8" gas line tubing over this hook area to protect the rubber motor when wound tightly. Now it is time to cut the blades so they will fold back. Use an X-acto saw or a fine hacksaw blade and cut through the hub directly opposite the hinge tubes. The blades should fold back with no binding. If there is a sticking or stiffness when they fold, put a drop of oil in the little tube and work the blade back and forth until they fold easily along side the fuselage. Insert the nose block and fold one blade on one side of the fuselage and the other on the opposite side, as flush with the sides as possible. The spring at this point should not be compressed but in its normal position.

When you have the blades where you would like them to fold, extract the propeller and nose block without changing its position. Mark a pencil dot directly to the right of the stub end of the hook on the back of the nose block. This is where a 5/8" wood screw will be inserted. This screw should be close enough to hit the stub end of the propeller shaft and prevent it from turning. When the rubber motor is fully wound the spring allows the prop shaft to clear the stop screw allowing the motor to unwind. As the motor runs down, the spring gradually pushes the prop forward where the stub end engages the wood screw and stops the prop exactly where you want it to fold. This may take some adjustment, but the rubber motor should have a few winds left in it when the propeller shaft hits the stop screw. The partially wound motor ac-

complishes three important tasks: it keeps the balance of the Curlew constant, prevents the nose block from dropping out, and stops the propeller just where you want it to fold. Give prop and nose block three coats of dope.

**Covering:** Put a thin coat of clear butyrate dope on the sheeted part of the fuselage using your favorite Japanese tissue color combination. Dope the tissue directly to the sheeted area and shrink the tissue on the open structure. Give the whole body one more clear coat of butyrate.

Attach clear acetate windows after the body is covered and doped. The 1/16" dowels which guide the braided nylon and the wooden bead at the back can be glued in place. Predope the wing on the leading edge, trailing edge and each rib on the undercambered side only. Cover the bottom first in sections, securing the tissue to each cambered rib. Remember, the grain of the tissue should run spanwise or wrinkles will occur. Cover the top in sections also, but don't glue the tissue to the ribs. Spray the wing with water and hold while it dries to prevent warping. When drum tight, give the wing two thin coats of clear dope. Cover the stabilizer as you did the wing, but don't put dope on the ribs. The tissue on the rudder will be tightened and doped once. Keep the tail surfaces light.

### Flying

The test model flew nicely on six strands of 1/8" Pirelli rubber. Four strands of 1/4" brown rubber also work fine. Add two strands at a time if more power is definitely needed.

Balance the model as shown on the plans. If the Curlew is slightly tail heavy, slide the wing back just a little. If model is still tail heavy, add coats of dope to the propeller until proper balance is achieved. Bend the small tab on the rudder for a gentle right turn.

Test fly the model on a quiet day over a tall grassy area. Launch the Curlew parallel to the ground with a slight nose-down attitude. The glide should be a flat descent turning gently to the right. Don't bend the rudder tab too far or a spiral dive may occur while the model is under power. If the Curlew continually stalls in the glide, it still isn't balanced properly or the stabilizer trailing edge isn't down tightly against the fuselage. Be sure the fuse rubber band is strong enough to hold the trailing edge firmly against the fuselage. If the model dives in the glide with the wing set according to the plans, shim the wing up under the leading edge. Test glide the Curlew several times to make sure the proper glide angle is achieved.

To wind the model, use a little inexpensive hand drill with a screw hook in the chuck. Put the threaded end in the chuck as tightly as you can! Make sure the square knot in the rubber motor is tight and the motor well lubricated. Have your partner hold the Curlew firmly while you hook the propeller assembly and stretch out the rubber motor four to six ft. Now wind clockwise about 30 turns on the drill while moving toward the nose of the Curlew. Slip the nose block back into the Curlew while holding the hub of the propeller.

Gently launch the model parallel to the ground, releasing the propeller first then the model. The model should climb steadily and in a right turn. Under no circumstances should you let the Curlew climb to the left during the power run. If the model climbs and stalls, insert downthrust by peeling thin layers from paper safety matches and gluing them to the top of the nose block.

If the model climbs successfully but too straight, bend the rudder tab to the right a little more. The best combination is a nice climbing right spiral. If the model glides in a nice right circle, but still climbs straight out under power, add a bit of righthrust. Shim the nose block the same as you did for downthrust by gluing a sliver of paper on the left side of the nose block. Don't put in too much righthrust because you already have a right circle adjustment. There should be just enough to turn the Curlew to the right during its climb. Too much righthrust causes a spiral dive which could end up damaging your new model. The Curlew should climb nicely to the right, neither stalling nor spiraling too steeply. Gradually increase the number of turns on the winder to around 80. Check to make sure the hook in the winder will not slip out! Make necessary thrust adjustments as you increase the winds. Don't exceed 350 turns on the motor, as the motor will break if wound too tightly. *Keep motor clean!*

Although the Curlew is a sport model, flights of over two min. have been made. If you're flying on a nice warm day be sure to light the fuse or be prepared to run a cross country chase after your Curlew. I hope building and flying your Curlew will be an enjoyable adventure.