PUFFIN II

BY JOHN D. WOODS

This model airplane is a complete departure from the others I have designed. It is relatively easy to build because of its very low parts count and its fairly conventional construction methods. There are only three departures from the ordinary and two of these have conventional alternatives. So, for those of you that read as far as the authors' name and no farther because you said to yourself "This is another one by that guy that can't do anything the way the rest of us do," take heart and read on!

In the beginning there was the Ryan ST and pilots, old and young alike, harkened unto the smooth lines and great capabilities of this "before its time" airplane. Then, as with most things man made, it passed into history. Since then it has been resurrected by Controline and R/C Scale modelers to win and place in many scale contests. Then, John Elliot Jr., decided that its basic design might be modified, somewhat, and be made into a fine Class III contest ship. So he toiled long and hard – more than 6 days and 6 nights because he rested a lot – and came up with the forerunner to the present design. This aircraft resembled the full scale aircraft in profile but had some concessions to practicality in order that the model could easily perform the pattern maneuvers. It had an inverted engine, flaps and DeBolt retract gear. So impressive was this design, both in appearance and in flight, that I elected to carry on with it and try to further extend its capabilities. Many extensive modifications, both in construction techniques and the basic airframe, were made. The result was Puffin II – a new model from every standpoint. The picture of Puffin I shows the engine upright, no retracts because of the additional unnecessary weight, a slightly re-designed fuselage and wing section, and the addition of wing fillets. The flaps were retained on this version, as on the first Puffin II, because of the very desirable low speed characteristics produced by them. They are not included on this version because an extensive lightening program was undertaken and a pound and a half was cut out of the design, making flaps unnecessary.

Some airfoil modifications also took place to improve low speed characteristics. This same basic airplane was flown at weights up to 8¼ pounds without struggling – the model as shown on the plan can be built as light as 6 pounds using the new miniaturized radio equipment. The flying characteristics don't seem to suffer on either end of this wide weight range. All Puffins built and flown to date have exhibited the same excellent flying characteristics. The model is capable of any maneuver the R/C pilot is able to perform. It does not exhibit any unusual or undesirable characteristics; for example, spin entry and exit are both easy and predictable, knife edge flight is excellent; it will snap on command, recovering immediately upon release of the controls to neutral, and it will perform all of the AMA/FAI maneuvers smoothly and easily. Begin construction of the model with the fuselage since all of the new techniques are used during its construction.

THE FUSELAGE: Cut 2 full length fuselage sides from 3/32" straight grained medium balsa. Make both sides identical and mark the positions of A, B, & C on the top and bottom edges of these sides. Next cut two 3/16" fuselage doublers according to the pattern on the plan. Using contact cement adhere these doublers to the inside of both of the fuselage sides. Be certain to make a right and a left side. Now, glue a 3/16" square stringer on the top and bottom of both sides from the doubler to the end of the fuselage sides. Cut a 1½" x 3/16" tail block and glue between these stringers in the position indicated. Taper these blocks the full 1½ inches so that when the tail is brought together in a later step the sides will contact each other along this whole distance and have a ¼" width at the end of the fuselage. Next, shave a 3/16" sheet of styrofoam off of a block and cut it to fit inside of the 3/16" square stringers, the fuselage doubler, and the tail block, and glue in place. Your sides should now look like picture #1.

Cut bulkheads "B" and "C" from 3/32" ply and the firewall "A" from ¼" ply. Also cut the plywood engine mount from ¼" ply. Glue B and C in place using Hobby Poxy I glue – note that these bulkheads key into the 3/16" balsa doubler on the top and bottom. Be sure the fuselage is square and allow to dry. When dry, epoxy the firewall in place in front of the 3/16" doubler. Clamp and tape it in until it has cured, being certain that the lower front edge of the fuselage sides contact the firewall all the way to the notch. Your fuselage should now look like picture #2. Glue the 1/8" fuselage alignment member "D" in place between "B" and "C" on the top of the

Two of the author's stable of Puffin's. The larger version is the one presented in this article. Designed to fly at weights varying from 6 to 8¼ lbs.

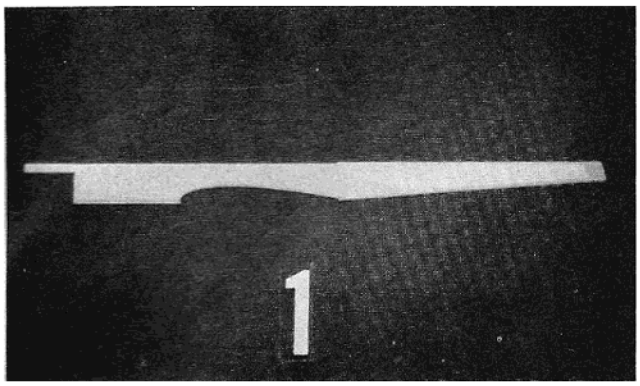
In the beginning, there was the RYAN ST . . . . Now the PUFFIN II, a fine pattern and sport ship which retains that vintage accent while providing all of the flight characteristics demanded by the contest flier.

fuselage. This part both aligns the fuselage and determines the curvature of the fuselage at the wing station. Notice that the fuselage is not straight between these bulkheads but follows a gentle curve. Notice, also, that the fuselage taper starts at "C" and that the fuselage width decreases in both directions from there. Next, epoxy the plywood engine mount in between the fuselage sides and on top of the 3/16" doublers and the firewall. Tape and clamp until dry. When dry, cut a 3/8" balsa block to the same outline as the engine mount and epoxy in place directly on top of it. Make sure the engine mounting blind nuts are in place on the ply mount before the balsa cap is glued on. Now bring the tail post together, being certain that both sides of the tail cone have the same curvature, then adhere with Hobby Poxy I cement. Your fuselage should now look like picture #3.

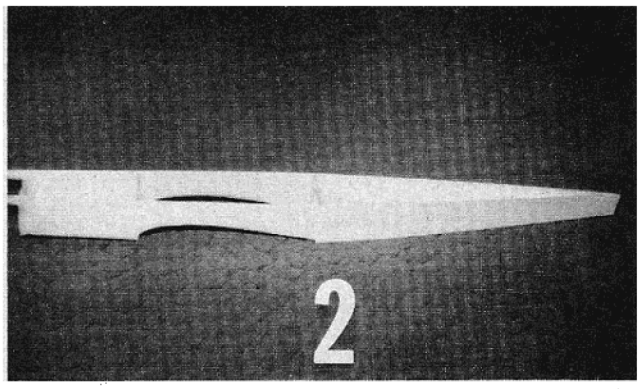
Very carefully cut the 3/32" filler sheets for the top and bottom of the tail cone, making sure that the curvature on both sides of both pieces are identical and glue in place inside of the 3/16" square stringers and flush with the top and bottom edges of the tail cone. Cut a 3/16" sheet filler for the bottom front of the fuselage and glue in place between the firewall "A" and bulkhead "B" and against the 3/16" fuselage doubler and between the fuselage sides. Your fuselage should now look like pictures 4 and 5. The square cut-out shown in "D" between "B" and "C" is necessary only if you use the large servos and have to relieve the top inside of the fuselage to accept their greater depth. If you use the miniaturized equipment this is not necessary. Cut a ½" block of balsa and glue in between A and C on the bottom side. Shape this block using the curvature of A and C as a guide. Cut a piece of 1/8" balsa and glue it on the bottom aft of "C". Shape this sheet using the fuselage sides and the bottom of "C" as a guide. Cut a piece of 1/8" ply and glue in place between the 3/16" doubler at the aft end of the wing saddle. This ply plate is the anchor plate for the blind nuts for the wing hold-down bolts. Glue a 1/16" sheet of balsa over this ply plate the same length but wide enough to extend to the outside of the fuselage sides. Block sand a taper in this 1/16" balsa plate so it contacts the wing along the aft top side when it is bolted in place. The fuselage should now look like picture #6.

Turn the fuselage over and start building up the top side by gluing on "E" in place along the center line of the fuselage. Notice that this member extends from the ply spinner ring in the front to the vertical fin at the rear. Next cut the 1" balsa blocks that fit against "E", front and rear, and epoxy these in the positions indicated on the plan. These blocks are necessary to provide strength to the engine mount and the empennage, so do not attempt to extend the foam blocks along the whole fuselage length. Block sand these to shape – gently rounding the edges to give a pleasing appearance to the aft end and tapering it down in front to blend into the spinner ring. Build the stab from ¼" sheet balsa and epoxy in place with Hobby Poxy I. Your fuselage should now look like picture #7.

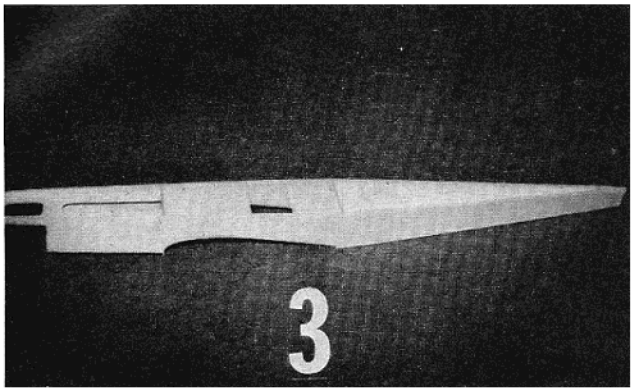
Cut two styrofoam blocks slightly oversized, and with 90 degree angles to fit between these balsa blocks you just shaped, and against "E" and the top of the fuselage. Glue in place. Very carefully block sand this foam using the shaped balsa blocks and "E" as guides until you have gently rounded fuselage



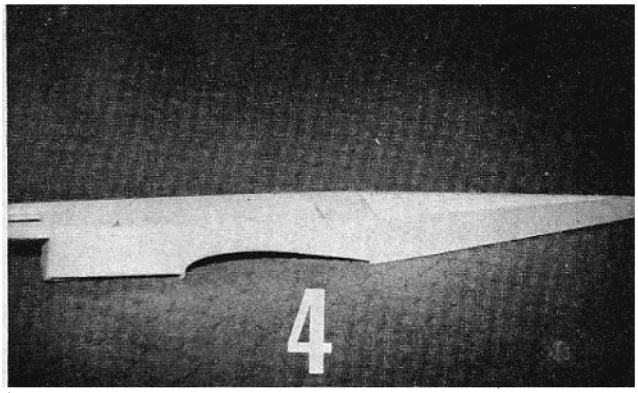
Step #1 3/16" balsa and styrofoam doubler in place.



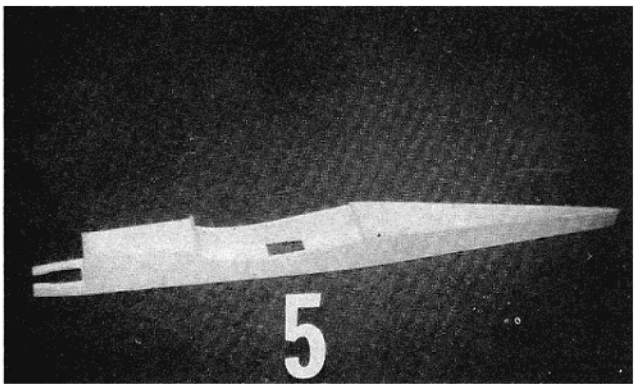
Step #2 Fuselage with bulkheads glued in and tail post joined.



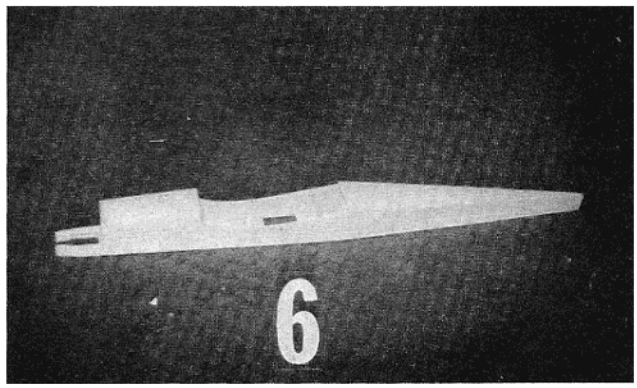
Step #3 Fuselage showing top sub sheeting and ¼" plywood motor mount glued in.



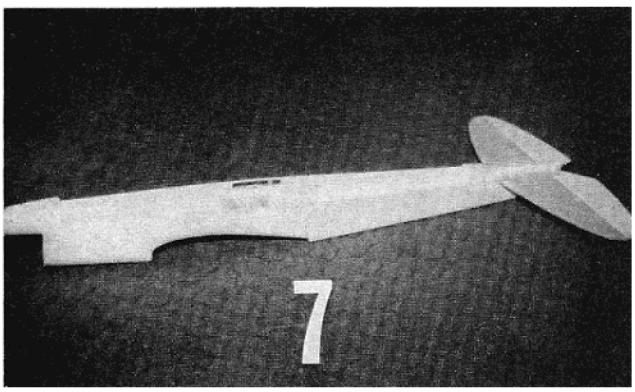
Step #4 Shows a ½" balsa block fill in over plywood mount making a straight line across the entire fuselage top.



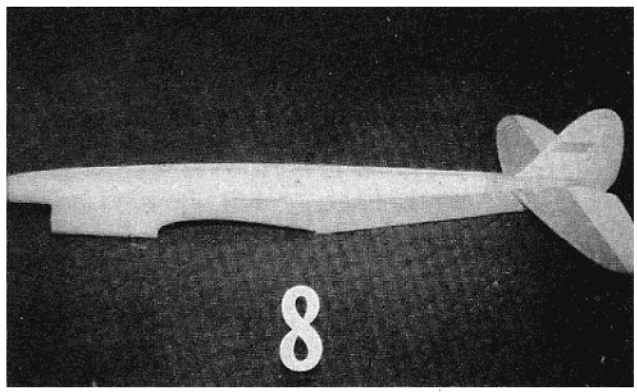
Step #5 Fuselage bottom with sheet balsa fill ins forward and aft of the wing saddle.



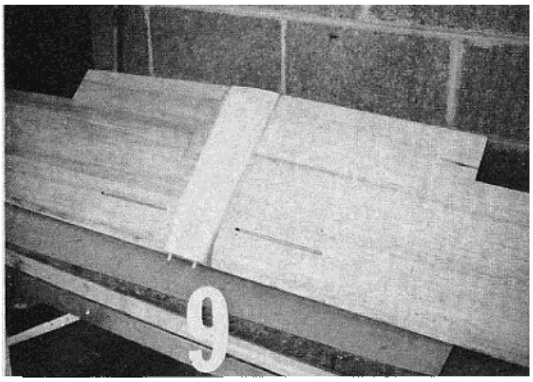
Step #6 Fuselage bottom complete with balsa block under chin and shaped 1/8" balsa sheet on bottom of tail cone.



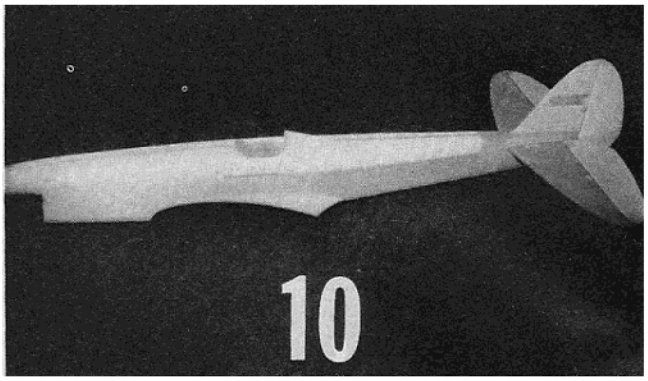
Step #7 Shows stab, front and rear balsa blocks and fuselage spine in place.



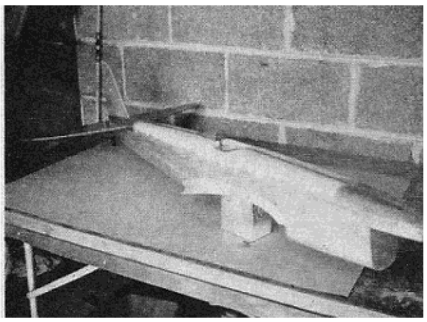
Step #8 Fuselage top complete with styrofoam blocks in place.



Step #9 Shows wing with fuselage fairing completed. Wing must be completed before fillets can be fitted ón the fuselage.

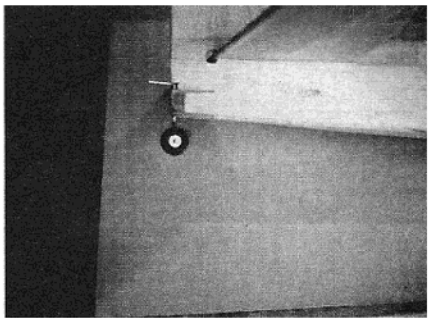


Step #10 Fillets are complete, fin in place and cockpit cut out and floored.



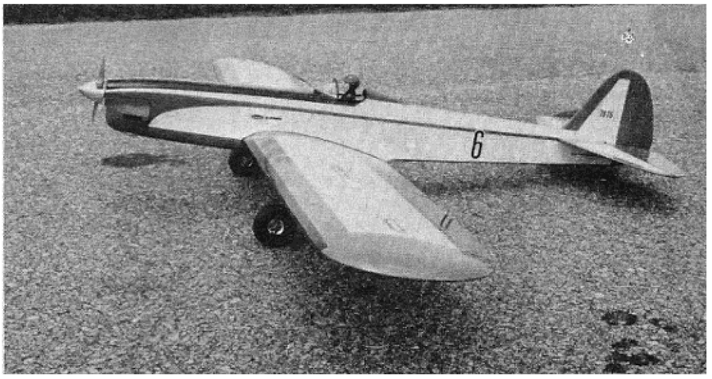
This picture shows the fuselage section with fiberglass over the sytrofoam and two coats of Hobby Poxy II glue ready for final sprating.

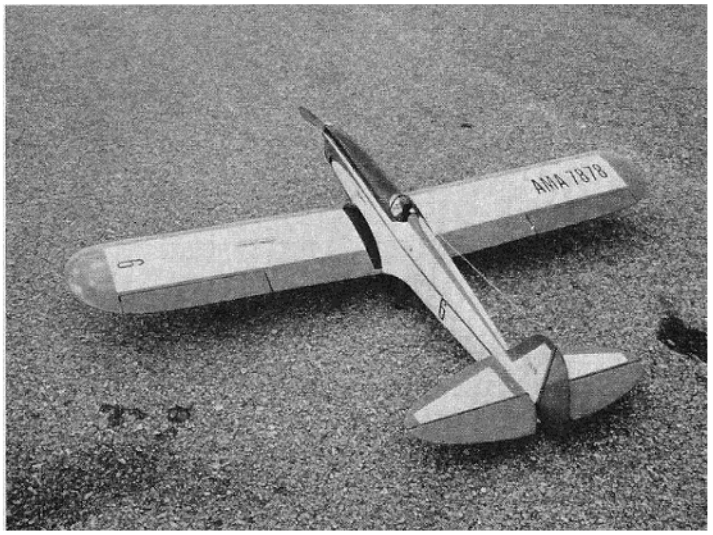
A closeup of the cockpit showing detail of flooring, instrument panel and headrest.



Tail wheel detail – note the flush nyrod push rod exit forward of tail wheel and under stab.

Above: author with his third Puffin – color scheme is orange and white. Upper, rt: Side profile shows off the long (51") fuselage to its' best advantage. Rt: rear quarter view shows the long tapering nose and fillets very well.





top. Be careful not to over sand, particularly in the vicinity of the balsa blocks. Build the fin and rudder and glue in place. The results of all this should look like picture #8. Cut out the cockpit using the template on the plan. Cut the styrofoam to the depth indicated by the slot in "E" and at that location. Floor the cockpit with 3/32" blasa. Cut an instrument panel and glue it in place. Carve a headrest from block balsa and glue it in place aft of the cockpit area. Cut out the 1/32" ply fillet base and bevel the front so it easily conforms to the curvature of the leading edge of the wing saddle. Put the fuselage aside and build the wing.

WING: No detailed building instructions will be attempted for the wing since it is a conventional styrofoam wing. The wing is sheeted with 1/16" balsa and the cutting templates for the styrofoam are included full size on the plan. The tips do warrant some explanation. These are built from two 2" x 2" soft balsa blocks. After the wing is sheeted, cut both of these blocks to conform to the tip rib shape. Hollow the block closest to the wing completely out leaving a ¼" balsa shell top and bottom. Leave 1" front and rear to allow for sanding the curvature of the tip without sanding too thin. Next, partially hollow the outer block to lighten and cut it to the shape of the wing tip. Glue one of these to each of the tip blocks previously glued on. Block sand these tips to the shape shown on the plan. Also, notice on the aft part of the center section of the wing that there is a 1/16" ply plate inlaid into the foam before the top sheeting is put on. This is the plate that the wing hold-down bolts screw down against. Now, build the fuselage fairing from soft block balsa and cap the front and rear with "B" and "C" respectively. This fairing is clearly shown in picture #9 as are the dowels that secure the front of the wing to the fuselage.

Mix some Hobby Poxy I and glue the 1/32" ply fillet base to the wing saddle cut out. Tape securely in place along its entire length so it conforms exactly to the wing cut out. Lay a large piece of plastic wrap on the center section of the wing to keep it from being glued to the fillet base and bolt it in place. Now, using masking tape, secure the outside edge of the 1/32" fillet base to the wing surface so it will fit the wing exactly when the glue cures. Set aside to dry. Cut two blocks of styrofoam 4" high and 15" long by 2" wide and saw the top and bottom outlines according to the fillet shape shown on the plan. When the fillet base dries, remove the wing and glue one of these blocks on each side of the fuselage and against the top side of the fillet base. Allow to dry. Cut the aft fillet base member from 3/32" ply and glue to the bottom of the foam aft of the 1/32" ply fillet base. Shape the foam using sandpaper until you achieve the shape indicated by pictures #10 and#11. Apply medium weight fiberglass deck cloth using Hobby Poxy II glue over all foam areas. When cured, brush on another layer of glue using a Flux brush. Sand gently using 80A Garnet paper. Do not sand into the fiberglass cloth.

Construct the cowl with fiberglass using the Hobby Poxy E-Z-Duz-It method and attach as shown on the plan. The conventional alternatives to the foam construction I promised are as follows: First the 3/16" foam sheets inlaid in the back of the fuselage sides can be eliminated and 3/16" square Wassen truss bracing can be substituted. Second, the foam-balsa-fiberglass fuselage top can be replaced by a single full length soft balsa block sanded to shape, hollowed and finished the same way as the rest of the balsa parts. If you are handy with balsa carving, the fillets can also be made from soft balsa blocks or any other method you are familiar with. Do not just eliminate them, however, because they contribute substantially to the strength and appearance of the airplane.

FINISHING Finish the entire model with two coats of Hobby Poxy II glue according to Pettit's Ez-Duz-It method. Apply these coats over the fiberglass parts so that all wood parts will have two coats and all fiberglass-foam parts will end up with four coats. Do not scrape the foam-fiberglass parts with a blade but sand these parts until smooth with 80A Garnet paper. Spray on your favorite Hobby Poxy color, add a vintage trim accent and there you have it . . . A Puffin II.

FLYING: No special warnings or notes are necessary when test hopping this bird. It handles extremely well on the ground and, when it gets rolling it tracks very well with no large rudder correction needed for the takeoff roll. Just a very slight back stick pressure will get the bird into the air for a very graceful and smooth lift off and climb-out. You will find the airplane very easy to get used to; it's very smooth on the controls and an able acrobatic performer. ●

From RCModeler Aug. 1970