BEAGLE PUP

J. W. Headley's 36" span, 1/10th scale version of the aerobatic light aircraft Beagle B.121 'Pup.' Designed for single channel equipment, the 'Pup' is a natural for the sport scale enthusiast.

INTRODUCTION

The Beagle B.121 Pup is the latest attempt to break into the light aircraft market presently dominated by American trainers. A very attractive design, it's the latest in a line of light planes stretching back to a design by Taylorcraft. A refreshingly original shape, and the smallest of a general family of light single and twin engined aircraft, the Pup is an aerobatic two seater powered by a 100 H.P. Rolls-Royce Continental. We first found a complete writeup in a French magazine called "Aviation" so we had to use our schoolboy French to get the details. Naturally, as soon as we'd finished, a full description appeared in "Flight" in English! Our model is approximately 1/10th scale, the "approximate" being a sneaky way of making the wing span 36".

Now to the building board. We always begin by cleaning off the last half-built model, dusting a few of the shavings away, and pinning down the plan. A quick trip to the kitchen to steal a couple of yards of the wife's grease-proof paper, put a new blade in the knife, and away we go.

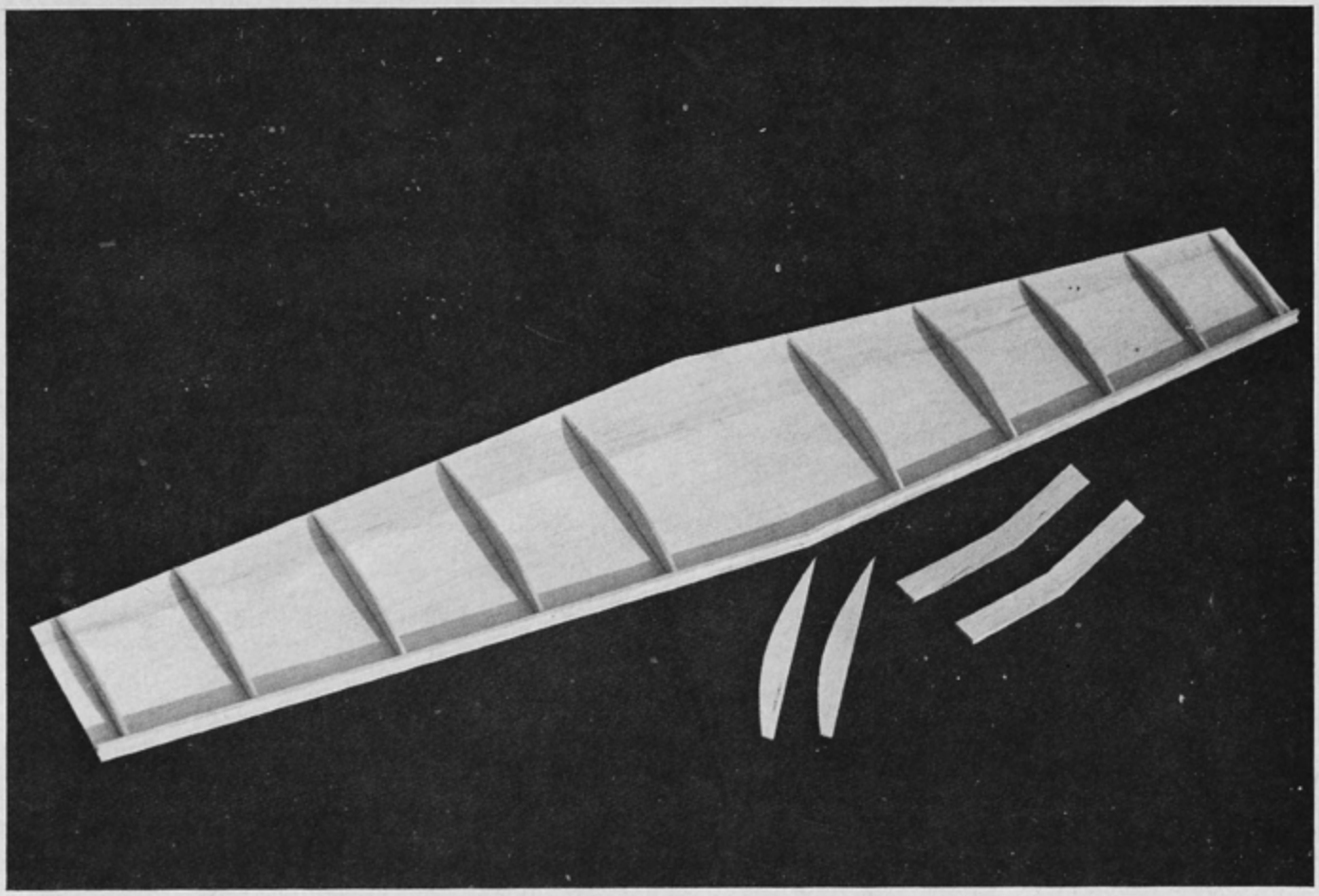
WING

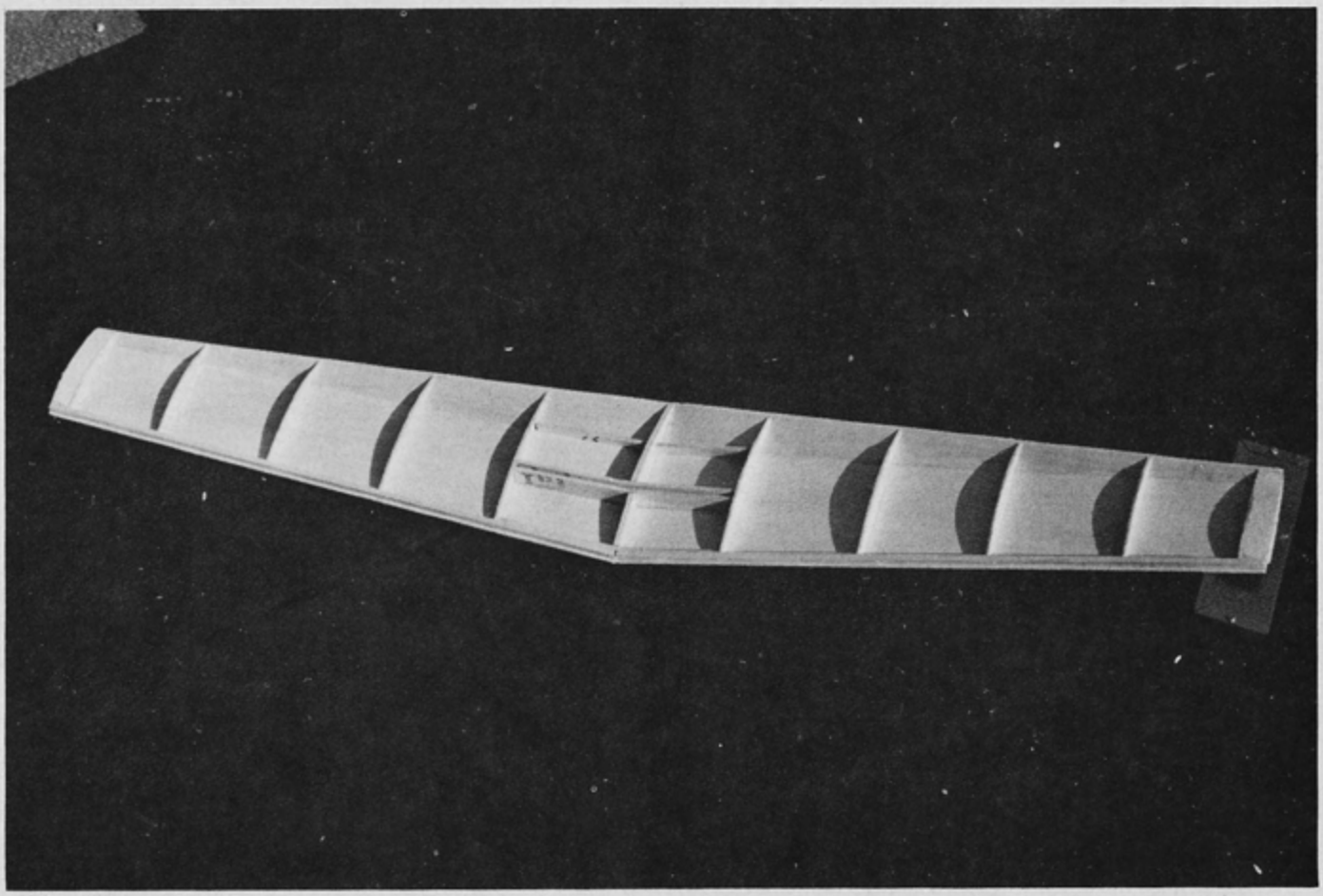
Begin the wing by first cutting the lower surface from medium hard 1/16" balsa sheet to the outline shape, and pinning this down flat to the building board. If you don't have 6" wide sheet, which isn't always available, cement together narrower stock. We used 4" wide sheets, and have indicated the join line for this size on the plan. Now add the hard balsa ⅛" x ¼" leading edge, which is glued ⅛" back from the edge of the sheet. Cut out the wing ribs from medium hard 3/32" sheet and cement onto the wing sheeting. Note that the two center ribs are not attached at this time.

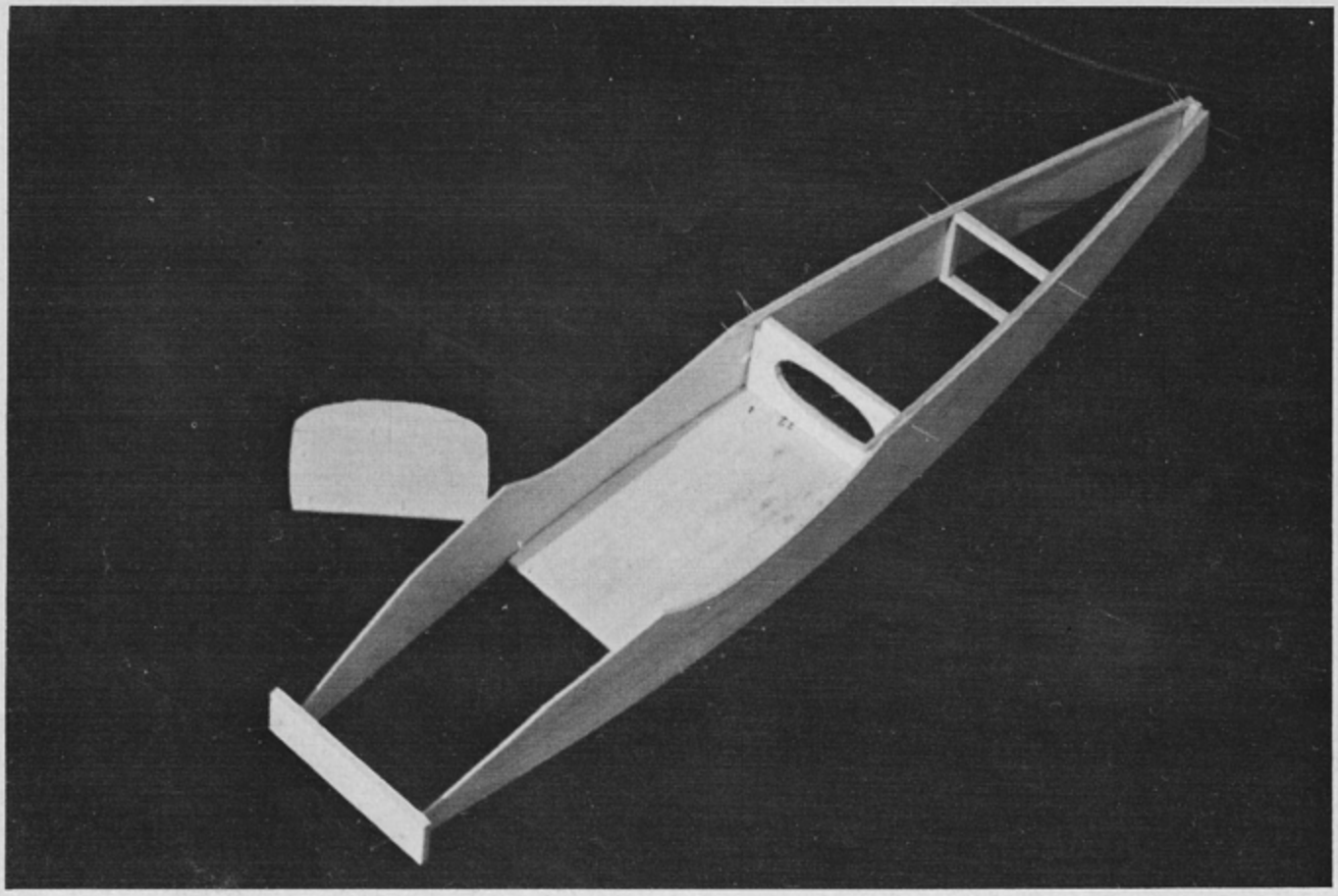
The wing tip blocks can now be glued in place, after first shaping the upper side to the contour of the end rib. These tips can be made from scrap soft balsa block, and are glued on top of the lower wing skin as well as to the tip rib. When all the cement is thoroughly dry, remove from the building board. Score along the center line of the sheeting, crack gently, glue, and replace back onto the plan, propping up one wing tip to the total dihedral angle, which is equivalent to 4½" under the tip. Make the wing spars next, using hard ⅛" sheet balsa, and also the leading edge brace. Cement these in place leaving a gap of ⅛" between the main spars. (This slot forms the undercarriage attachment.) The leading edge brace needs to be slightly bent to conform to the sweepback before cementing it in place. The center wing ribs can now be segmented and glued between the spars. Use lots of glue on this operation as these are the main load carrying members.

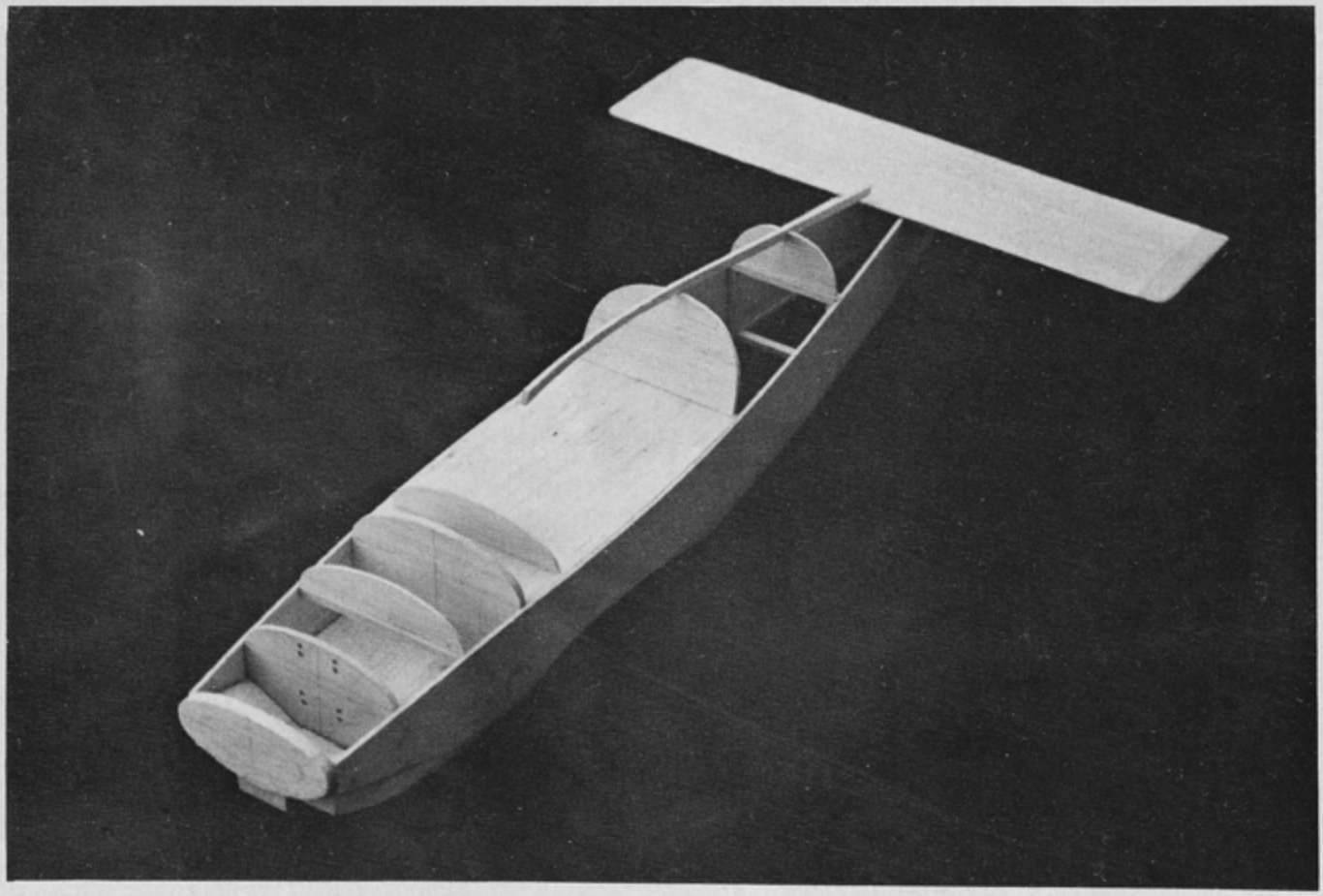
When dry sand the leading edge and bevel the sheet at the trailing edge to the correct rib contour. Cut out the area between the main spars now, and make sure that ⅛" sheet will slip into the resulting slot.

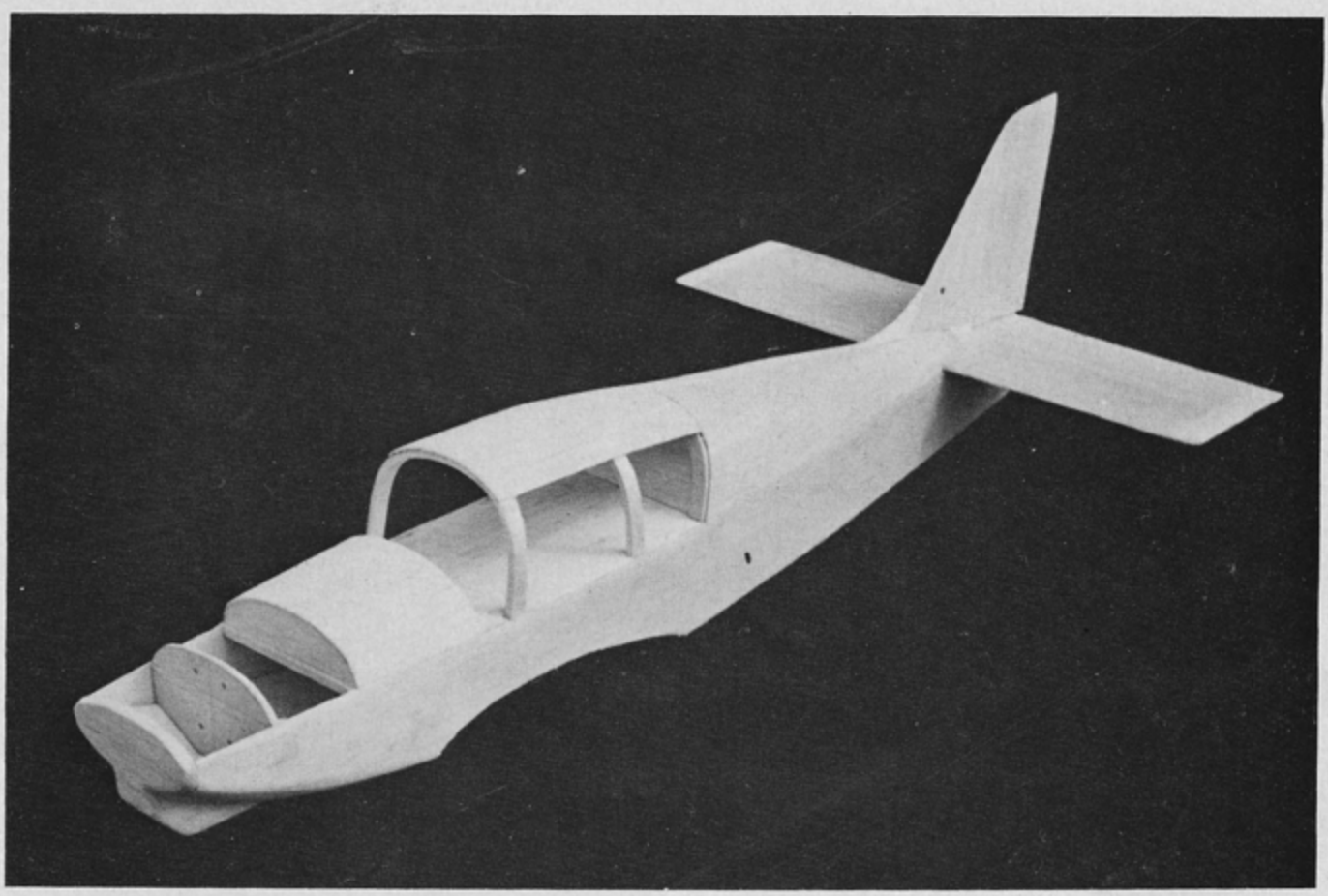
The upper wing surfaces can now be

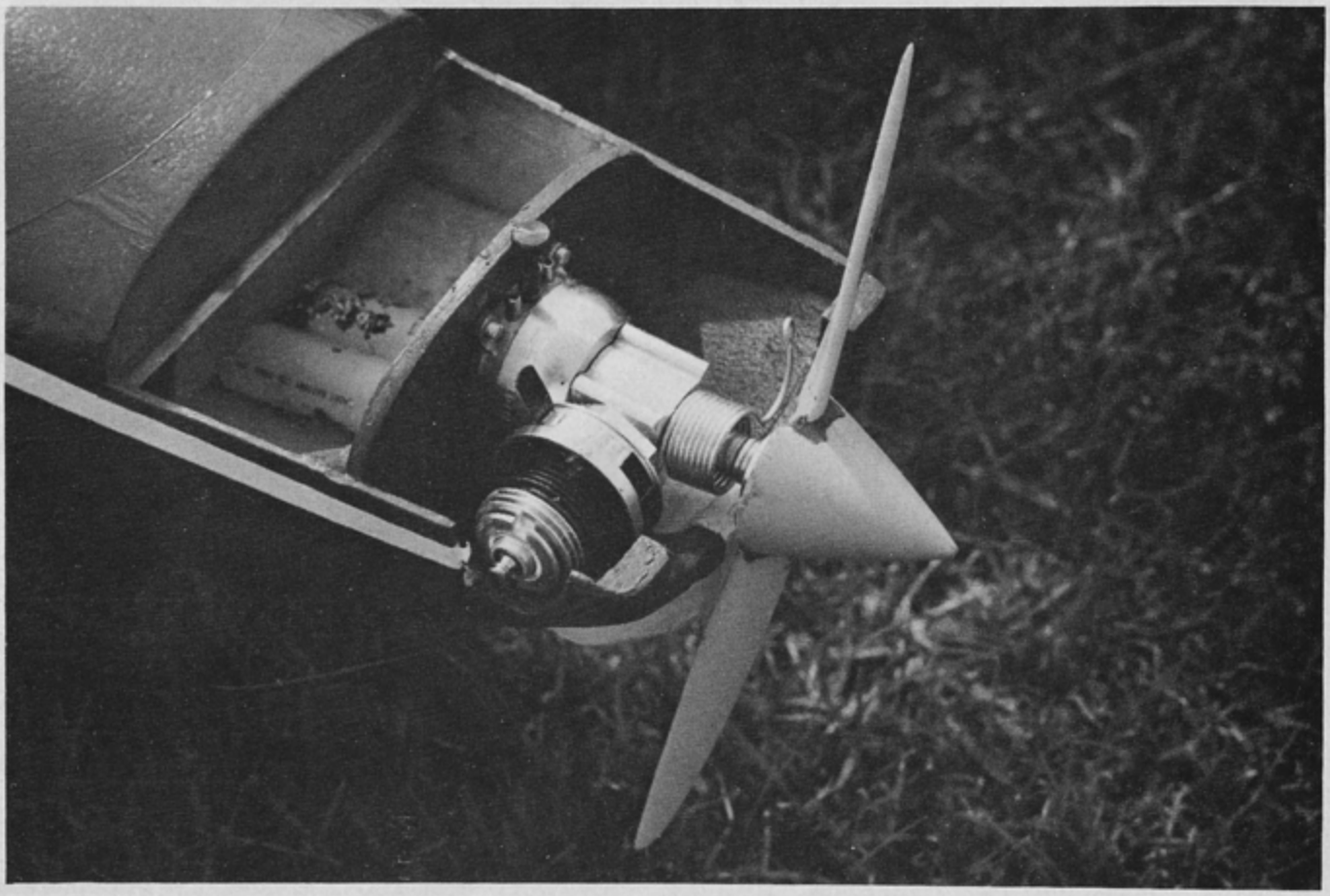










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constructed in a similar manner to the lower one, but cut slightly oversize. Contour the root to the correct profile, and then cement to the wing structure. Use plenty of ordinary pins and also clothespins to get good joints at this stage. Now attach the leading edge strip, using 1/8" x 5/16" hard balsa.

This completes the wing structure. Sand overall, and shape the leading and trailing edges to the correct airfoil, and cut and contour the wing tip blocks. Give the whole structure a coat of clear dope, another pass with the sanding block, and the wing is ready for covering. Our model was covered with white jap tissue, and then given another coat of clear dope, before attaching the undercarriage, and painting.

STABILIZER

The stabilizer is cut from a piece of flat, medium soft 3/16" balsa sheet, and the two tip pieces from medium hard sheet. Glue the tips in place, then when dry carve the rough airfoil section. Sand to the final section, as shown on the plan. Now give one coat of clear dope, re-sand and then cover with white tissue. The trip tab should now be carefully cut out, and then re-attached after lightly sanding the edges, using B.B.C. hinges (bits of beer can). This can now be put on one side until the final assembly.

FIN AND RUDDER

The fin is cut from medium 3/16" balsa sheet. Sand to a symmetrical shape, and cut the lower edge to conform to the stabilizer airfoil. The rudder is made in a similar way but is not attached until all the structure is completed. Make sure that the hinges used allow the rudder to move freely.

FUSELAGE

Select two similar sheets of 3/32" medium hard balsa sheet, and cut out the basic fuselage sides to the outline shown on the plan. At this stage leave the wing cut-out oversize, this will later be trimmed to final shape when the fuselage is completed. Cut out the cabin floor from medium soft 1/8" sheet, and frame F8 from 1/4" sheet. The tail post F11 is also made at this stage from scrap 1/4" sheet. Glue the 3/32" square re-enforcing strips to the fuselage sides, and when dry, the basic fuselage construction can begin. The fuselage is initially built upside down on the plan. Begin by pinning down the cabin floor, and attaching F8 into place. Now glue down the fuselage sides, and join at the rear with frame F-11.

Frame F10 is now constructed from 3/16" square and glued in place. Bend the nose to the correct shape and locate by lightly gluing a temporary F1 across the nose. This can be a scrap piece of 1/8" sheet. While this assembly is drying, the remaining fuselage frames can be made. F1 and F4 are cut from medium hard 1/4" sheet, F2 is from 1/8" plywood, and F3, F5, F9 and F10 from 1/16" hard sheet. Cut two F3 frames, one of which is required for the engine hatch. When dry, the basic fuselage is removed from the plan, and frames F4, F5, F9, F10 are glued in place.

The nose blocks are now required. Cut three blocks of medium soft balsa to the basic shapes shown. Glue these together, and when dry, sand to the external profile shown, and also remove excess balsa from the inside. This can then be glued into place, followed by F2, F1, and F3. Don't forget to drill F2 for the engine bolts before finally fixing it in place. Sheet over between F3 and F5 with 1/16" balsa, and using 3/32" sheet cover the lower rear fuselage, noting that the sheets are laid crossways. The tail-plane and its attachment can now be glued in place, followed by the fin, and the backbone F12. Cover the rear fuselage now with 1/16" sheet up to F9. Frames F6 and F7 are made next. These are wound around card formers cut to the inside line of the frame, after first being soaked in hot water for a few minutes. Sand and trim to length before attaching to the fuselage. Now fill in the cabin roof as shown on the plans. The basic fuselage is now completed.

Make the engine-battery compartment hatch by first lightly gluing the extra F3 to the fuselage. Sheet between F1 and F3 with medium hard 3/32" x 1/4" strips. When dry, sand to the correct fuselage contour, cut F1 in half horizontally, and remove the hatch. Cut out the slot for the engine cooling air as shown.

Now shape the wing cut-out to suit the wing exactly, and add the doublers as shown. Sand all over, shaping the nose block to the correct contours. Add the sub-fin, and give the complete fuselage a coat of clear dope. Install the nosewheel, and cut out the drain holes in the engine bay.

Before adding the cabin windows be sure to finish completely the cabin details. We added a set of instruments to the control panel, then painted the rest black. Add a pilot's head **now** if required. The windows are celluloid, the front window being first heated and formed over a block before being attached.

ENGINE INSTALLATION

The engine used in our prototype is a Cox QZ, mounted sideways, and the pictures show this installation. Make sure that sufficient clearance is available for the engine at this stage, and cut out all the necessary holes for glow plugs, fuel lines and the needle valve.

The fuselage can now be finished. Cover with tissue, and dope again with clear dope, and coat the insides of the engine with resin. Install the wing dowels and it's all done.

UNDER CARRIAGE MAIN WHEELS

Bend two pieces of 1/16" wire to the shape shown on the plans. Note that the undercarriage legs are slightly swept backwards, and this bend should be put in at this stage. The undercarriage-main spar attachment should be cut next, from 1/8" plywood. Bind and glue the wire legs to this spar now, using strong cotton thread. Solder the wheels to the axles, using the smallest possible washers to restrain the wheels. Glue the complete assembly into the slot provided in the wing. Add the undercarriage leg fairings next, sand and finish ready for the final painting.

NOSE WHEEL

Bend a piece of 1/16" wire to the shape illustrated on the plan and solder the nose-wheel in place, then attach as shown.

RADIO

The plans do not show any particular installation, the actual fitting depending on the favorite system of the builder. The prototype was fitted with our old reliable Honey Bee, and Citizen-Ship SE-2 escapement. The fuselage is broad enough to have both of these mounted on a single removable 1/16" ply bulkhead.

The battery pack is located in the compartment behind the engine, securely packed with foam rubber. A small hole has to be cut in F4 to pass the leads through.

FINISHING

The original Pup was colored red and white as shown in our pictures, with white wings and tail, and red fuselage with white trim.

Fuselage registration and the word PUP on the fin are also white. The word BEAGLE is written in red on a white strip across the top of the fin. Recent copies of "Air Progress" and "Pilot" have had color shots of the Pup, so if you are interested in more details refer to these magazines.