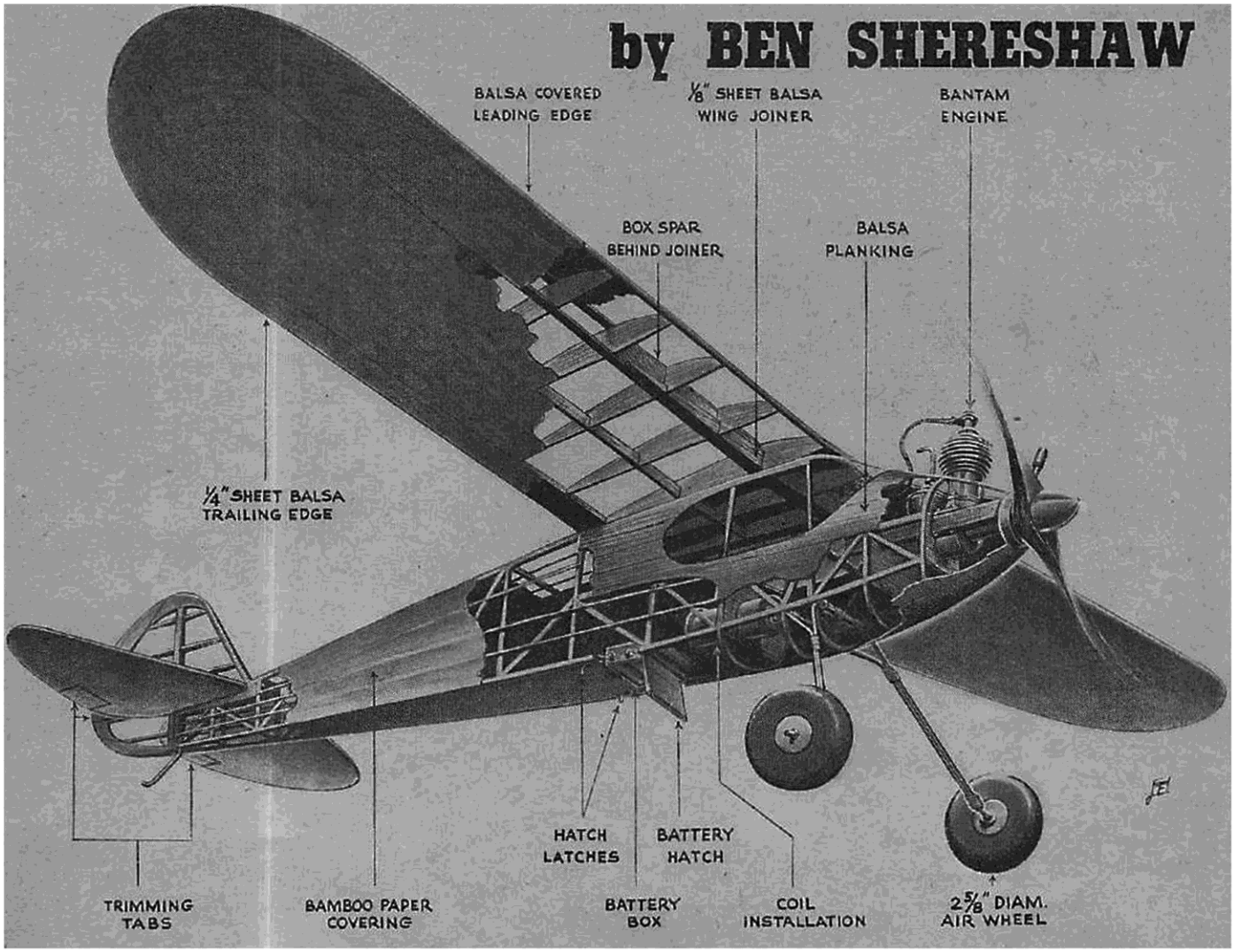


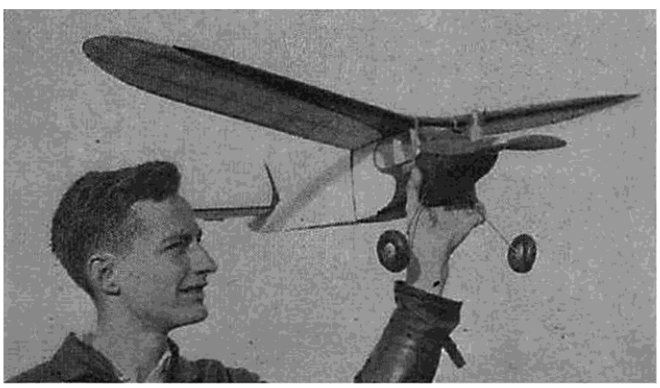
THE AIR TRAILS SPORTSTER

A fine-flying, efficient little ship combining appearance with performance, for small-bore engines.

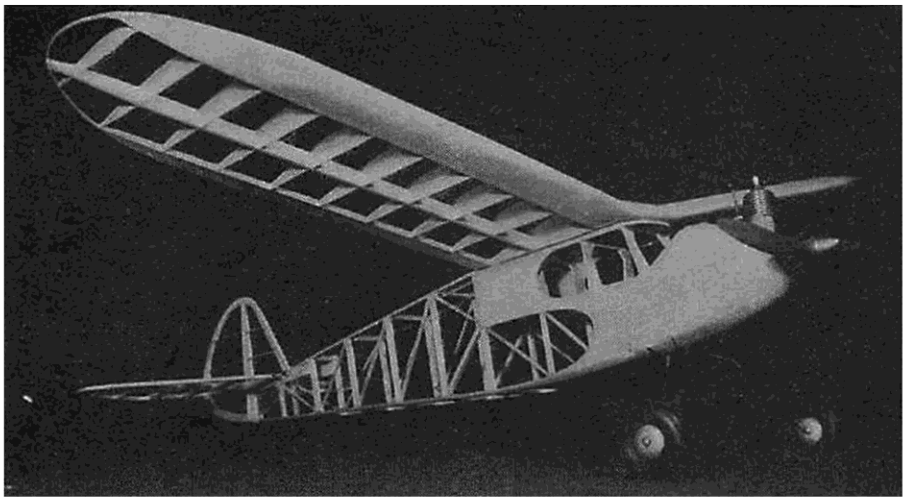
THE AIR TRAILS SPORTSTER is an efficient little gas job for small-bore engines. Although it is said that small gas models suffer losses in glides and other important performance characteristics, the difference in the performance of the Sportster to that of its big brothers cannot be denoted. Having ample wing area to take care of the larger of the small-bore engines, it is yet light and efficient enough to fly well with a ½"-bore motor.

This little ship is simple to build, and with a bit of painstaking care in its construction you will be well rewarded with a model that possesses a smart appearance and contest performance. Read the text and study the plans minutely before any of the actual construction work is attempted.

First select a flat seasoned workboard upon which to build the fuselage and wing. The next step is to scale all of the drawings which are quarter scale to full size. Do your utmost in doing an accurate job of this, and by all means use a set of draftsman's instruments in doing it. After the fuselage layout drawing has been completed, it



This is how the model looks completed and ready to fly. Duplicate this ship faithfully and you will have a job to be proud of.



Half the trick of building a successful gas job lies in the proper structural design. Standard and proven practices are evident in this photograph of the completed frame.

Designed expressly for Air Trails, this outstanding job embodies that certain something in appearance which is so characteristic of its designer's work in the field.

can be fastened down to the workboard. Above the entire drawing tack a sheet of wax paper.

Small ½" brads are used to construct a jig which holds the longerons and diagonal members in place over the drawing while the cement is drying. The brads should be affixed in such a way that when they are tacked in place on either side of the longerons, they will hold the members absolutely in line. Lay the longerons in place and proceed by cutting all the diagonal and vertical cross-members. Cut two like members at a time, as this will help to insure identical sides. When fitting the cross-members in place be sure that they fit in firmly between the longerons, yet not too tightly as to cause distortion when the sides are lifted from the jig. Also, be certain that the diagonal and vertical members butt both against the longerons and its adjacent member. After all of the braces have been inserted, a coat of good cement is applied. It's a good idea to build the other side of the fuselage over the half just completed, but before doing this, apply three more coats of cement and allow the side to dry at least two hours. (Four to five hours if weather is wet.)

Our next step after completing both sides is to assemble the sides to form the fuselage understructure. The fuselage is assembled over a full-size top view in an inverted position. As in the construction of the sides, it is best to cut all like cross-members simultaneously. The stern post should be joined first, the portion around the greatest cross-section next, and then the nose end. After allowing the assembly thus far to dry, you may join together the portions not previously joined. Allow every joint to dry thoroughly before proceeding to the next step. Keep a constant check on the alignment of the fuselage with a set of draftsman's angles.

In the next step the landing gear requires our attention. The wire members are bent relative to a layout, giving the true length of each member. The rear strut is formed only after it has been bound to the fuselage cross-members. It is then brought to its designated position where it contacts the front landing gear member, bent parallel to it, and is bound and soldered. Take care not to bend sharp corners in the bending of the piano wire, as this is apt to encourage fatigue in a hard landing. The axle is incorporated with the front strut and a small brass washer should be soldered in place at the root of the axle to keep the wheel from rolling against the gear. A small washer of the same diameter should be soldered at the end of the axle to keep the wheel permanently on.

We return again to the fuselage, and cut all internal motor bearer bulkheads to their correct sizes. The motor bearer size is large enough to accommodate the larger of the small-bore engines. Therefore do not alter their dimensions. You will note on Plate 3 that the vertical brace at Station A is chamfered away to make room for the motor mounts. It is obvious that the dimensions between the bearers will vary, relative to the type of motor used.

The internal bulkheads should be laminated of two-ply $^3/_{32}$" medium sheet balsa. After they have been cut and notched, they can be inserted at their proper stations. The motor bearer can then be slipped into place and cemented securely with several coats of cement.

The fairing bulkheads at the nose should then be cut and cemented at their proper locations. They contain no provisions for stringers, as the planking holds them in place. Bulkheads 3-4-6 constitute our superstructure and the wing mount of the fuselage. They are cut from a medium grade of $^3/_{32}$" sheet balsa. The superstructure of $^3/_{16}$" square longerons should be cut from a medium grade of sheet balsa possessing good bending characteristics. Cross-members C. R. of ⅛ x $^3/_{16}$" hard balsa are then cemented to the bulkheads as indicated on Plate 4. After all of the bulkheads and wing mount members have been attached to the fuselage frame, we can proceed to plank the fuselage with *(Turn to page 87)*

$^3/_{32}$x½" soft balsa. Where sharp radius occurs, the width should be decreased to $^3/_{16}$".

Our next step is to sand the entire planked surface smooth with a fine grade of sandpaper to approximately $^1/_{16}$" thickness. Our nose block, which is laminated of soft ½" plank, is now cemented to the lower portions of bulkheads B-7L, B-7R, and B-7. Allow it to dry before attempting any of the carving. The sides and portions of the cowl, ahead and around Bulkhead 1, are also of ½" soft balsa plank and should be carved to shape after the planks have been cemented.

Our battery box is next constructed and cemented at its specified location. Insert the aluminum tube latch before attachment to the linen hinge. Study closely the latch cover; its location, materials, and especially the spring arrangement. The spring is sweat-soldered over an aluminum tube and fastened at the lever end with solder. Lastly, the tail skid, coil and ignition installation should be cemented in place. This procedure just about completes our fuselage, with the exception of the $^1/_{16}$" square bamboo stringers, which are affixed in place as illustrated on Plate 1. Check for alignment on all parts.

TAIL AND RUDDER

The rudder and horizontal tail should be constructed over a full-sized layout. Select the wood for its even-grain qualities. Our lower spar is laid down first, over its designated position above the drawing, or in the case of the rudder, it may be our right or left spar. The ribs are then cut and cemented in place over the spars. While doing this, keep an eye on their proper alignment. After the assembling thus far has been allowed to dry, the ⅛" balsa outline should be cemented in place. The outline should be roughly carved to the airfoil contour before attachment to the ribs. After the outline has been allowed to permanently adhere to the ribs, it can be finished off with fine sandpaper. The center section of the horizontal tail is covered on both sides with $^1/_{20}$" sheet balsa. The leading edge E, at the center portion of the horizontal tail, is left square for reasons illustrated by the isometric sketch in the lower right-hand corner on Plate 1. Study carefully the construction of the tab spars. You will note that they are "T" section beams to prevent dope distortion of the tab spars.

For added rigidity the spars on the horizontal tail can be boxed with $^1/_{20}$" sheet balsa between each rib. The tail should be covered with a light grade of bamboo tissue before affixing it to the fuselage. If the tail assembly shows any signs of distortion it can be steamed out easily.

The tabs are cut from a medium grade of $^3/_{16}$" sheet balsa, and they should be carved and sanded to their correct cross-section before attachment to the tail assembly.

It is a good idea to cover the tabs with a layer of silk to prevent splitting. Either annealed wire or .030 spring brass can be used as hinges. Note that the hinges pass completely through the tabs. A minute drop of solder should be applied at the end of each hinge to keep the tab from pulling out. When cementing the tail assembly in place on the fuselage, be sure to check for alignment, both before and after the cement has dried.

WING ASSEMBLY

The wing layout must be laid out to full size very accurately before any plan of attack is considered. All of the profiles on Plate 3 should then be traced and templates made for all the R-1 ribs. Note that the overall depth of the center-section ribs are decreased equal to the thickness of the $^1/_{20}$" sheet covering. Note, too, that the leading-edge covering on all ribs is recessed.

As can easily be seen, the wing is constructed in three sections—the center section and the two panels. The best procedure to follow in the construction of the panels is to lay the lower front and the rear spar over the scaled-up drawing. In our next step, cement and insert all of the ribs at their proper stations. Be certain that the ribs are properly aligned both fore and aft, and are perpendicular to the workboard. The butt ribs, which are laminated of two R-1 ribs, should then be cemented at the roots of each panel, at an angle which will result in the proper dihedral of each panel. The wing tips, which are of bamboo, should next be stripped to $^1/_{16}$ x $^3/_{32}$" with the $^3/_{32}$" dimension perpendicular. Be certain that the glossy surface of the bamboo is always on the outside of the tip. The bamboo can be easily bent to shape over a lighted gas stove or Bunsen burner.

The leading and trailing edges should then be cemented to the ribs and carved to shape. Keep checking for panel alignment during this operation. The tips can now be cemented to the leading and trailing edges. A light sanding should be given to the tips of the bamboo to break all the sharp corners. The same procedure is followed in the construction of the center section as in the building of the outer panels.

Box the front of all spars at "A," as indicated on Plate 2, between each rib with $^1/_{20}$" sheet balsa. The boxing forms a greater glue surface for our wing joiner, and also adds to the rigidity of the wing. The panels and center section can now be joined together. Cut the joiner notches adjacent to the front spar, and cement the butt ribs of the center section to the butt ribs of the panel. The panels should be blocked up at the tips to correct amount of dihedral. Be absolutely sure that both panels possess the same amount of dihedral. After this has been checked, the joiner of hard ⅛" sheet balsa can be inserted onto the ribs and cemented in place against the boxing. The sheet leading edge and the sheet center section covering can next be applied. The sheeting should be finished with a light sanding with ten zero sandpaper. We complete the sanding of the entire structure of the ship with the rounding off of the longerons.

The entire ship is covered with a light grade of bamboo tissue, and three coats of dope are applied throughout.

TEST HOPPING

The model should balance at thirty percent from the leading edge after assembly. If the deviation is slight, a correction can be made with the tabs. If the model shows a great deviation from the thirty-percent point, a redistribution of weight will be required. Glide the model over tall weeds. The model should show no signs of any stall tendencies. The flight altitudes, while gliding, should not vary from the time it leaves your hand to the time it touches the ground. Progressive power increases with short motor runs are recommended. Gradually increase the power after making adjustments on each succeeding hop. Be sure to engage the timer before letting the ship hop.

BILL OF MATERIALS

(All lengths 36")

Fuselage

4 pcs. $^3/_{16}$ x $^3/_{16}$", longerons
2 pcs. $^3/_{16}$ x $^3/_{16}$", front diagonal bracing
2 pcs. ⅛ x $^3/_{16}$", rear diagonal bracing
2 pcs. $^3/_{16}$ x $^3/_{16}$", cross members
2 sheets $^3/_{32}$ x 3", bulkheads
1 pc. $^3/_{16}$ x 1" med., tail support and wing-mount longerons
1 pc. $^5/_{16}$ x ½ x 12", motor bearers
1 pc. .0625 piano wire (36" long). landing gear
1 pc. ½ x 2" soft balsa, nose block

Tail Assembly

1 sheet $^1/_{16}$ x 3" med., ribs
1 sheet ⅛ x 2" med., outline
4 pcs. ¼ x $^3/_{32}$" hard, spars

Wing

1 sheet ⅛" hard, spars
4 pcs. ⅛ x ¼" hard, spars
3 sheets $^1/_{16}$ x 3" med., ribs
2 pcs. ¼ x ¾" med., trailing edge
2 pcs. ⅛ x ⅛" hard, leading edge
4 sheets $^1/_{20}$ x 3", sheet covering
1 pc. ⅛ x 1" hard, joiner
2 strips of $^1/_{16}$ x ¼ x 15" bamboo, tips

Miscellaneous

1 pc. $^3/_{32}$ x 1" hard, battery box
1 pr. 2⅝" airwheels
1 pint dope
4 ozs. cement
4 sheets 10 zero sandpaper
4 sheets light bamboo paper, 18 x 24"

Editor's Note—Cut-away drawing for this article was made by Frank Tinsley; model plans by the author.