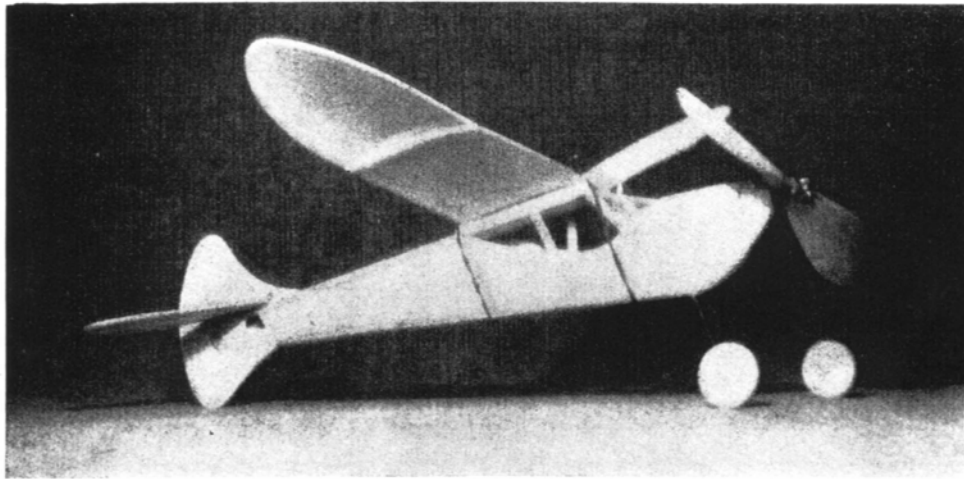


THE SWALLOW

An interesting, simple, all-balsa speedster of crashproof design.



Literally, this job can be made with just a razor blade, cement and pliers. This photograph gives excellent idea of its appearance.

by MALCOLM J. ABZUG

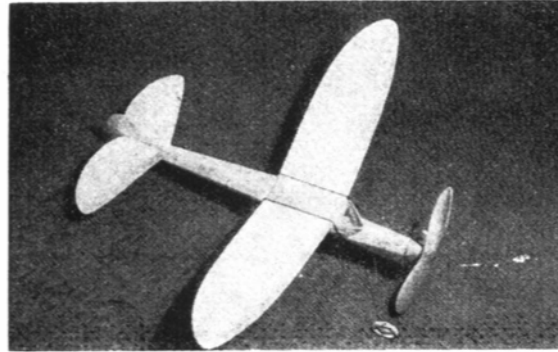
DESIGNED primarily for the purpose of testing a new type of monocoque fuselage design, the Swallow proved to be such an exceptionally fine performer that I decided to make the design available to everyone. The drawings will show you that the novel fuselage is unbelievably simple for all its good looks, and after weeks of flying, including breaking rubber motors, my Swallow still shows signs of a long future career.

Here is a chance to get out of the rut of weak frame-work paper-covered models and build a really advanced model!

FUSELAGE

The fuselage design is so radical that I had to work out a completely new construction procedure for it, so that even the most expert model builder will find it necessary to read the following instructions very carefully. In general, though, the most difficult part of building this fuselage can be summed up in the word "bevels." If you succeed in cutting the various bevels in the fuselage parts with a fair degree of

accuracy, the rest of the work is very simple. The best method of making these bevels is to use a sandpaper block in conjunction with a rough angle template. Hold the member so that the edge to be beveled projects slightly over the edge



The proportions and sizes of the flying surfaces are clearly indicated in this shot, although the sharp dihedral does not show.

of your work table, and tilting the block at the correct angle—as shown by the template —sand the edge slowly backward and forward, exerting an even pressure.

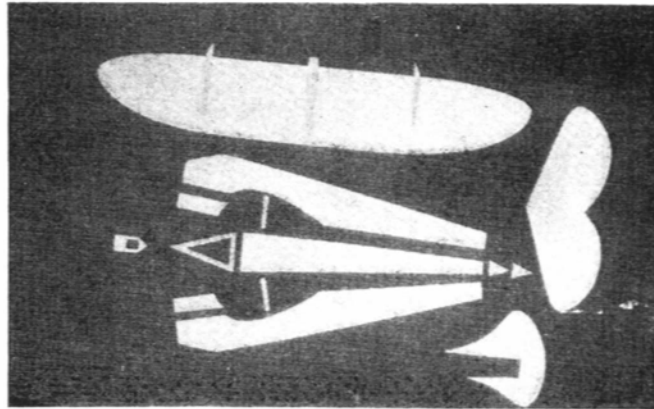
The sandpaper need not be very fine. If upon trial assembly the bevels are shown to be a little off, a correction can be made almost immediately by using the sanding block again. To assist us in talking about these bevels, I will set up the following convention. The right side of the fuselage will be understood to be on the right side of an imaginary pilot sitting in the plane. He faces forward, of course! Here are the steps to be followed:

1. Cut the two fuselage sides and the top out of $1/16 \times 3$ " medium balsa stock. To insure accuracy in this step, trace the outlines from the plans directly to the balsa, using carbon paper. Make the bulkhead "C" from three sections of $1/8 \times 3/16$ " medium balsa, using plenty of cement. Laminate the tail plug "B" from two $1/16$ " hard sheet blanks. Also cut out former "A," the nose former.

3. Bevel left fuselage panel on the bottom from its lowest point, where it meets bulkhead "C," clear to the back, at an angle of about 45 degrees. Bevel right fuselage panel on the top from the end of the window to the rear of the fuselage at an angle of about 45.2 degrees. Bevel the top panel of the fuselage on its left side, the whole length, at an angle of about 45.2 degrees. Bevel bulkhead "C" on the top by measuring down $1/16$ " on the front side and cutting as shown in the plans. Also bevel each side slightly on the rear face.

3. Form the landing gear from .034 wire, and when bulkhead "C" is dry, bind the landing gear to it as shown, using fine thread and plenty of cement. Also insert tail hook in tail plug, spreading a liberal amount of glue around the joint.

4. The first step in the actual assembly is to apply cement to the bottom bevel on the left fuselage panel and to the lower portions of both sides of bulkhead "C." (The landing gear is, of course, already attached to this member.) Several pins going through the fuselage panels into bulkhead "C" will hold things together at this stage. Note that the fuselage is now connected at the bottom to the rear of bulkhead "C" only. The tail plug, with the affixed hook, should now be cemented into place, fitting behind the fuselage panels, as shown on the plans.



These are all the balsa parts. Merely cut out from sheet balsa and cement together. This should be an ideal model for beginners.

3. When the cement used in the preceding stage is thoroughly dry, you can go ahead and add the top panel. Notice that the top panel is glued over the right fuselage panel, but is butt-jointed to the left fuselage panel on the side on which it is beveled. Examination of the fuselage cut-away view will show you why this is necessary. The tail hook is hidden now, but you should have marked its position on either of the side panels, so that the access "window" could be cut to it. Note that the top panel fits snugly over the top bevel of bulkhead "C," where it is firmly glued. The fuselage is now finished behind bulkhead "C."

6. In this step we have to apply force to the fuselage balsa, the only place where we will have to do this. At bulkhead "C," the fuselage shape is triangular; at the nose it is rectangular. Result? We have to force the wood to go through this change. Do this by gentle coaxing at first, until

the danger of split-ting is past, then glue and pin the front edge of the side panels to the nose bulk-head. You will find that at the bottom of the front edge the side panels will have to be slightly widened, and at the top they will have to be considerably pinched in. Let this dry, then add an extra coat of glue for strength.

7. The rest of the work is fairly obvious. On the bottom of the fuselage in front of the landing gear we have a triangular gap with its apex at the landing gear. This gap is covered with a piece of 1/8" sheet balsa, "D," that is glued into place and then shaped. The cowling is made of two small pieces of 1/16" sheet balsa which are glued into place as blanks, mid then trimmed and shaped when dry. To secure a good joint, the tops of both fuselage panels forward of bulkhead "C" will have to be beveled at an angle of about 45 degrees. See detail cutaway. Notice that due to the method of beveling only one fuselage panel at the bottom, there is an unevenness in the height of the two sides at the front of roughly 1/16"(The left side is higher.) This can be ignored, as it does not affect the fundamental settings of the prop, wing and tail.

8. The fuselage is finished by adding the following details:

a. Two window braces of 1/16 x 1/8" stock. These are purely decorative and support no strain.

b. Add two 1/32" round strips of bamboo for the windshield. These go from the opposite sides of the top of bulkhead "C" and meet at the front of the windshield.

c. The nose plug, which is cut from the prop block, is fashioned in place; that is, while it is temporarily glued to the nose.

d. Slip 1 1/8" diameter hardwood wheels on the axles and bend the ends of the axles up to keep the wheels on.

e. Add a celluloid windshield. (Also windows if desired.)

f. Glue 3" wing channels of 1/16 x 5/32" balsa stock in place on top panel of fuselage. Be sure that these are parallel from a top view.

g. Brush a coat of dope over the fuselage, followed by a sanding with 10-0 sandpaper.

WING AND TAIL

The wing is of conventional design. The important points to remember are the following:

Make the wing blank in one piece— do not cut in two for dihedral. Merely make a shallow cut on the under side of the center line and slowly crack for a two-inch dihedral under each tip. When the dihedral has been formed, add a thick coat of glue to the joint, followed by the 1/16 x 3/16 x 3" dihedral brace, which had been beveled on its under side. Let this joint dry thoroughly, then add the two former ribs. Cut away part of these as shown for lightness after they have dried into place. The tail is cut to the given outline and sanded to a streamline section before being glued into place. The wing blank is also sanded around the edges for streamline effect.

PROP AND FLYING

Carve the prop out of a 7 x 1 1/8 x 3/4" hard balsa block in the usual manner, and finish it and balance it very carefully. Hard wood is specified so that the blades can be made quite thin, producing a more efficient prop.

Use a single loop of 1/8" flat rubber to hold the wing on.

By using different amounts of power you can actually make your Swallow many ships in one. Four strands of lubricated 1/8" flat brown rubber form the nominal power for this ship, and with this power the model will climb to a satisfying height and cruise for long distances for the average time of about forty-five seconds. However, when six strands of 1/8" flat are used, you have a little tornado in your hands, and the climb you get is almost unbelievable. With such power, however, adjustments are more delicate, and you will probably find it necessary to use small amounts of side and downthrust to prevent the model from looping. The possibilities of different types of performances are many, and the beginner can secure valuable adjustment practice with this model. To manipulate the rubber onto the rear hook in this relatively narrow fuselage, I strongly urge you to use a 15" length of music wire with a hook at one end. The way to use it is obvious.

In conclusion, I have no doubt but that this type of fuselage construction has no peer in any existing design for a small fuselage. That it can be advantageously applied to larger fuselages is another question, but with suitable

modifications I believe that this is a possibility. (Perhaps the addition of two or three more bulkheads like "C.")

With a little experimentation it should be possible to develop a fuselage along these lines with curving or bulging sides. This modification should be better streamlined and perhaps more pleasing to the eye.

An all-balsa model of this type takes very well to distinctive color designs executed in colored tissue that is doped directly to the wood.

1/16" sheet balsa is used throughout, but considering the model's excessive strength, it may be possible to use 1/32" sheet balsa throughout instead. For general utility work, however, I would stick to 1/16" stock. In its present form, the Swallow seems to be the most indestructible model that I ever built! Comments on the design will be greatly appreciated. Address your letters to me in care of Air Trails.

MATERIALS LIST

Balsa

2 sheets 1/16 x 3 x 36", fuselage panels, wing, tail, rear bulkhead, wing runners, window brace and dihedral brace

1 sheet 1/8 x 2 x 6", nose bulkhead, nose-block plug, wing ribs, stabilizer lift, fairing block "D"

1 strip 1/8 x 2 x 6", bulkhead "C"

1 block 8 1/2 x 1 1/8 x 3/4", prop and nose block

Miscellaneous

1 pair hardwood wheels, 1 1/8" diameter

1 small piece brass or tin for freewheeling

3 feet .034 diameter music wire for landing gear, prop shaft, rear hook, and rubber fastener

7 feet 1/8" flat brown rubber per 6-strand motor

4 2/3 feet 1/8" flat brown rubber per 4-strand motor

1 large bushing

3 1/4" diameter copper washers

Glue, dope, celluloid for windshield (and windows), strip of bamboo

Tools

Razor blades, rough and fine sandpaper, sanding block, pliers and carving knife



ENTIRE MODEL 1/16 SHEET

CUT OUT "WINDOW"
AFTER FUSELAGE
IS COMPLETED

ENLARGE "WINDOW"
IF NECESSARY

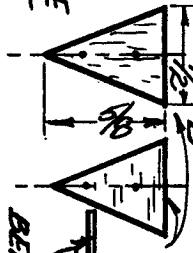
DIHEDRAL BRACE ~ 1/16 x 3/8 x 3

CUT OUT SHADED PORTION
WHEN WING IS COMPLETED

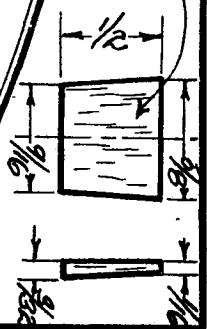
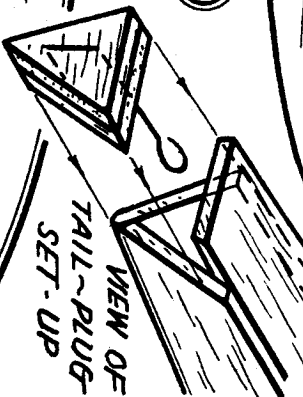
WING RIB

STAB.
& RUDDER
1/16 x 3 STOCK
STABILIZER
LIFT

STAB. LIFT



GLUE
TOGETHER
TAIL - HOOK



RAISE EACH TIP 3/4
FOR DIHEDRAL.

MAKE
ONE-PIECE
WING, STAB
& RUDDER!