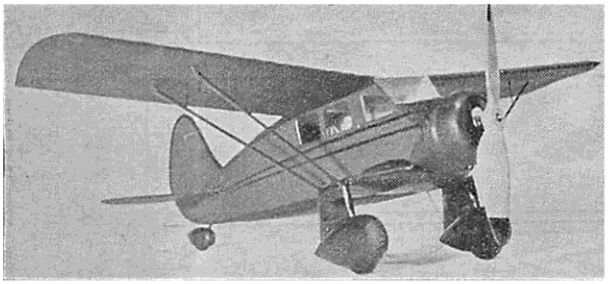
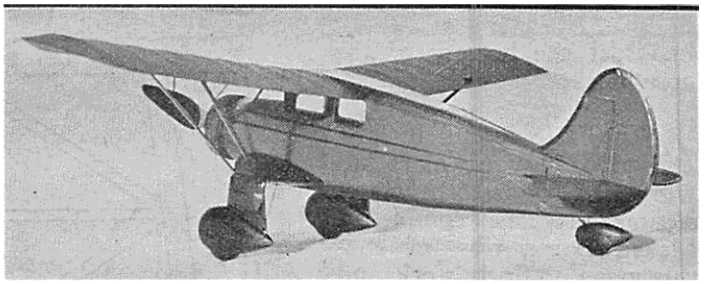


The completed model ready to fly is realistic.



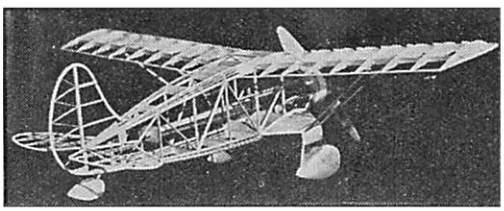
Details are carried out accurately.

Building A Flying Stinson "R"

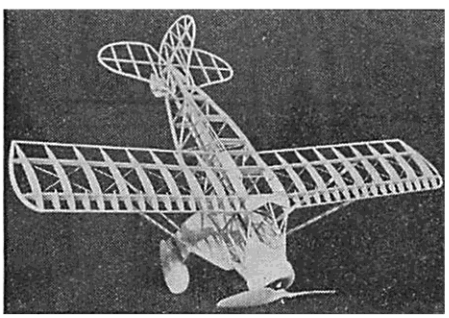
Complete Plans and Instructions to Build a Clever Flying Scale Model of One of the Most Popular Cabin Planes

By C. L. BRISTOL

THE Stinson "R" is without question a step forward in airplane design and its structural and aerodynamic advantages can be readily applied to make a truly fine flying model. Noticeable among these is the exceptional balance of the plane, the centralizing and distribution of the various stresses through a cradle-like landing gear and the low center of gravity maintained. Three point shock absorbers, good streamlining and dihedral wings also combine to make your model a dependable one.



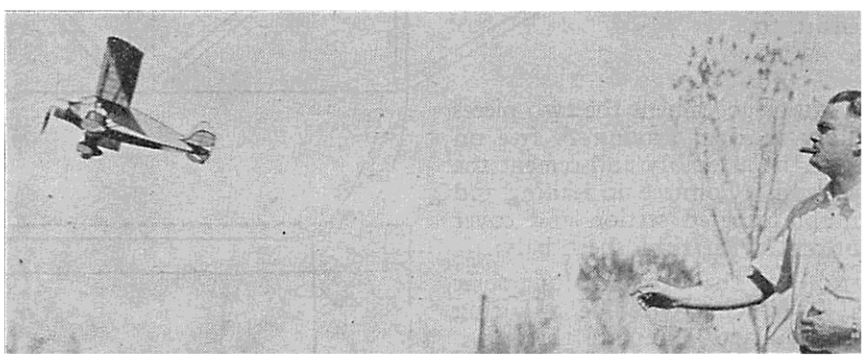
The framework has been carefully designed and is exceedingly sturdy.



Details of the wing construction show this to be a real job.

The model described herewith is designed primarily for use with the controllable stabilizer, drawings and directions for which have appeared in UNIVERSAL MODEL AIRPLANE NEWS. The drawings presented herewith may be used as a guide for making your own layouts, or cut out and joined together themselves for the same purpose. All are full size except the angular descriptive views of various parts. Bear in mind at all times that the different parts must fit each other and that the thickness of balsa stock often varies enough to affect the length of another piece as in the landing gear spar shown. Remember also that the width of your pencil line in tracing around a cut out pattern may decidedly alter the shape and size of the part under construction.

In drawings 1 and 2 the longerons are indicated by the letter X and are of one-eighth inch square stock. With the two forward diagonals, (0) and the tail upright, the drawings outline as much of the fuselage as can be built in the flat plane. V marks the wedge-shaped piece that goes under the top longeron at the center section. All pieces shown here are one-eighth inch deep and as wide as shown. Make two of these sides, using the same layout for both to insure their being exactly alike. Cut four cross members of one-eighth inch balsa, half an inch wide and two and one-half inches long. These are cemented in place between the fuselage sides at the location of the two heavy forward uprights. A little care in cutting the ends of these cross pieces exactly square will save a lot of annoyance in obtaining a true fuselage. After they have dried in place you can join the sides at the rear, cutting away a portion of each side so as to form a tail post just an eighth inch wide. All other cross members are of one-eighth by one-sixteenth inch stock and are located directly under the formers shown in the top view. The slotted segment that carries the forward stabilizer spar may be omitted at this time. The two piece nose block and cowl shown may be hand carved, built up or lathe turned, the latter being in most cases a little more satisfactory. Aluminum or celluloid cowlings of the 2¼ inch size may also be used. The nose block is first cemented to the projecting side points of the fuselage, after which the vee shaped and off-set extension of the window frame is installed at the top center point on the block. The top view, drawing 3, shows this clearly, as well as the construction of the windshield or front window frames of sixteenth inch square stock. Place a similar heavier pair of



Mr. Bristol lets one go. It is off for a flight of 250 to 300 feet. Good stability makes crashes rare.

braces at the bottom of the nose block.

AT THIS point it is a good idea to make all wing ribs so that the center section may be completed. Make sixteen ribs of one-thirty-second inch stock and four of one-sixteenth, cutting two of the latter away to form the pieces V in drawing 1, and cementing them in place on the top longeron of each side. You are then ready to install top and bottom formers and stringers. These formers should be rectangular with quarter-round shoulders, at which point three stringers are spaced around them on each corner. Cover the top of the center section at the leading edge with a piece of thin sheet balsa cut as indicated in plate No. 3. Cover the rear portion just forward of the front former in the same manner, cutting the center away again after the fairing blocks are in place. These must be carved and sanded to fill the gap at this point as shown in drawings 1 and 3.

Refer to plates 3 and 4 for detail of the landing gear parts. Make two of each of the parts A, B, C and D, A being of one-eighth inch stock and D of three-eighths inch. The spar, also on one-eighth inch balsa is shown in full size on plate 4, with the positions and thickness of the other pieces indicated by the dotted lines. Do not be confused by the leading edge block also shown here and be sure that the spar is notched so that it fits your model when the other pieces are in place. Sand the pieces D to a streamline section below the point indicated by the small arrows, making no effort to shape the top portion. With the spar and the pieces A and BB held in place on the fuselage, cement the two pieces B to the spar and allow to dry, leaving A free on each side. Then remove the assembly and cement the small sections C on each end. Connect up leading and trailing edges of a suitable tapered section and cover each side, top and bottom, with thin sheet balsa.

You are then ready to sand the pieces A along their top edges as indicated by dots to provide a fairing between wing stub and fuselage. Replace these two sections and the wing stub on the fuselage and cement the fairing plates A in their place on the wing stub only, as the landing gear must be completed and placed on the fuselage only after the latter has been covered. Next cover the center of the wing stub on the bottom only and you are ready to proceed with the shock absorbing legs D. Make two wheel pants of the shape and size shown in drawing 4, using the conventional method of two sides and core section. The latter should be half an inch thick and the sides one-fourth inch, to accommodate a balloon type celluloid wheel of suitable size.

NEXT saw the pieces D in two along dotted line and glue a strip of celluloid completely around the section, placing the cement around the bottom portion below the saw cut only. The celluloid should extend halfway up each leg. After these have dried you can trim the bottom away to the same section as D, slipping the top half of D out of the celluloid collar thus formed and cutting another half inch off each leg to make room for the small pieces of rubber sponge shown in the angular view on drawing 6.

It will be helpful to refer to this view as you progress with the shock absorbers, as they are of a new style and probably unfamiliar to many readers. The trimming of these sections of sponge to the desired shape is no small task. They should be half an inch long, as was the portion cut off at top D. Cement them in place in the celluloid collar, placing the cement on the bottom only and using a wax paper guard shoe-horn-wise while setting them. The remaining portions of D can then be cemented in place at the top, being careful not to get any of the cement on the collar as this will render the shock absorber completely useless. Cement the "oleo-struts" thus formed on to the wheel pants so that the front edge of each leg is directly over the center of the wheel.

You are now ready to cement each side to the wing stub section at C on each end sanding the top of each D to conform to the intersecting streamlines and rounding off the top portion. Run a brace of No. 8 music wire on each side as shown in plate 6, from the inside rear portion of each leg to the spar at the center. It will be seen that this particular theory may be applied to any model that calls for an oleo strut shock absorber. Correctly made, it will be found to be very light, strong and efficient.

Building A Flying Stinson "R."

(*Continued from page* 12)

THE correct size and shape of the tail wheel pant and its attachment to the rear bottom fairing block is shown on drawing 2. Do not install the wheel itself until you have completed the assembly. Cement a round balsa plug on the wheel pant as shown and bend a square hook in one end of a four inch piece of number 8 music wire. The plug should fit a hole in the pant so that its end can be seen from the inside. Run the wire piece through the plug from the inside, sinking and cementing the hooked end in place on the core of the wheel pant. Saw a slot in the fairing block and bend the wire to the desired shape so that the shock absorbing loop projects well above the block. Then make your T bend in the wire and cement in place on the block, cutting away surplus wire. Install the wheel and cement the fairing block on the fuselage.

The fin and rudder layout appears in drawing 2. These should be made in one piece, using two strips of one-sixteenth by one-eighth inch balsa cemented together at the top for the rudder post. The front outline piece should be cut from one-eighth inch sheet balsa and the two rear pieces of slightly thinner material. Install the various cross members as shown and sand the edges to shape only after they have dried thoroughly, giving the front edge a half-round shape and the rear part the regular trailing edge taper. The front top should gradually taper from the half-round to the flat tapered section. A small triangular block reinforces the joint in the trailing edge, and another provides a place to mount the control horns at the bottom.

It will be readily seen how the rudder is cut away from the fin after completion and the method of hinging these together is shown in the angular views. After cementing wire pins on the fine post as shown, make a hole for the top pin in the rudder post. Bend a tiny loop in one end of a short piece of fine music wire and curve the wire to conform to the shape of the rudder at the bottom, bending an L shaped hook at the other end. With fin and rudder fitted together, place your small loop over the bottom pin and cement the wire to the edge of the rudder, forcing the hook into the balsa and cementing only at the extreme end. Then cut the bottom pin away flush with the wire loop, and you have a detachable rudder that solves the mounting problem and will turn through about forty degrees if the edges are slightly beveled. Notice the notch cut in the top rear fairing block to receive fin, drawing 4. It is purposely offset as shown, thus giving your fin a slight left hand pull that assists the wing dihedral in resisting propeller torque.

ONE-HALF of the stabilizer layout is given in plate 4. A convenient cross section shows the employment of bows instead of ribs. The short front spar shown is of round bamboo and slides freely in holes drilled in the leading edge and inside outline pieces, passing through the lift block of the control referred to previously. It is wise to inlay a short piece of bamboo in the rear or main stabilizer spar at the center and cut the balsa away at this point, as the stabilizer is required to tilt back and forth in the small notch shown in drawing 2. No hinge is necessary as the fin and rudder hold it in place when the model is assembled.

A layout for the right wing is given in drawings 5 and 6, which of course can be reversed for the other. Spars should be of a size to fit the holes shown in the wing rib pattern. Use the two remaining heavy ribs for the inside ends next the center section. Nose ribs are omitted to lend clarity to the layout and may be installed after the rest of the wing is completed. A front view shows the method of providing a solid anchor for the wing struts, the pieces M and N being shown in full size and made of any small gauge of music wire. After covering the bottom surface of each wing, cement the pieces N to each wing spar at the point shown so that the small loop extends through the cover. The hooks M go through these eyelets and into the ends of the struts, with the longer end cemented to the front of each strut. The struts are secured on the landing gear with short wire hooks running through the shoulders of the wing stub. These spars are made of balsa strips one-eighth by three-eighths inches and sanded to a suitable streamline section. Their length is determined by the amount of dihedral you give the model and also by the amount of shaping done on the wing stub.

Wing tips should be at least an inch higher than the center section. Lace the wing with number 20 cotton thread as shown, so that it will resist various longitudinal shocks that might otherwise crack the wing covering. It will be seen that the spars do not touch the cover at any point, thus insuring a true airfoil section throughout the entire length of the wing and increasing its efficiency as such. An end view of the right wing is shown in drawing six. The small holes fit bamboo strips that extend entirely through the center section at these points, and the four hooks K which are shown in full size are employed as shown to secure the wings, one end being cemented to the spars.

A MODEL behaves differently according to the altitude of the place where it is flown and in most cases a different propeller is required in the high altitudes where a greater flying speed is essential. You are advised to stick to accepted formulas combined with your own experience in this matter, although a very good prop of the helix type is shown in drawing 6. Draw a center line on your prop block and locate the pattern on same with a small pin at the center, marking a point on the pattern at the tip just over the line. Trace the blade on the block and rotate the pattern to the other end, being very sure to get the same tip point on the center line. Center drill the block and saw out the blank, using the side view pattern after the planform of the prop has been cut. Employ the conventional carving methods to the blank thus formed, giving your prop a slight camber on the front blade surface and flattening the back.

Three loops of one-eighth inch flat rubber on a fifteen inch motor stick will give nice results. Method of mounting the motor stick to the nose block on a piece of hardwood dowell is also shown in drawing 6. The rear mounting should be placed between the uprights Q, drawing 2, and should be made of one-sixteenth inch balsa with a hole cut in same for the end of the stick.

The covering and assembling of this model is a little involved and should be done in the following manner. First cover the triangular rounded corners of the fuselage next the nose block with thin sheet balsa. Then cover the sides with black tissue and apply the red Stinson striping to fuselage, nose block and cowel as well as wheel pants. Paint all exposed wood parts with black dope or lacquer, well thinned. At this point it is wise to install the motor stick and hook up the automatic control, after which you may cover the top and bottom of the fuselage using plenty of separate sections of tissue to insure a smooth job at the shoulders.

Cement the landing gear in place and fit a suitable curved leading edge block to same, painting with lacquer. The exact shape of this piece can only be determined after the landing gear is in place. It is largely a cut-and-try process, unless the builder cares to go into a lot of involved descriptive geometry. The wing cover is of the triangular black and red design, with the red section tapering backward from the wing tips. Determine the angle of this line so that it runs just beyond the end rib of the wing, and cut two rectangles of black tissue and two of red. Then take one of each and lay them on a flat surface, cutting both together with a sharp razor blade.

In joining these pieces, overlap about an eighth of an inch and make the seam with banana oil, using a small soft brush. By placing the dark paper underneath you can see what you are doing at all times, and a weighted straight edge of some sort will be found very helpful in holding the paper. Work on a flat surface with a piece of waxed paper under the seam. The black paper should be outside the seam for a neat-looking job. This involves making two right and two left hand wing covers. In covering the wing, cover the bottom of each one first and secure the wire strut anchors afterward. Then cover the top, using separate pieces of tissue for the tips in each case. The covering should be cemented to leading and trailing edge and each rib, top and bottom, for their entire length. Unless this procedure is followed the ribs, which are very light, may tend to collapse or buckle when the cover is drawn tight with a water spray. Thin cement or heavy banana oil is equally good for this job of applying the wing covers, and a little cement should be spread around the entire edge of the wing afterward to lend strength and smoothness to the job.

WINDSHIELD and windows are next installed, being made of clear sheet celluloid. Using the pattern in drawing 1, make two outline masks of black tissue. Secure them on the celluloid and cut out around the outer edge, which will fit the window frames. The finished wings, with the hooks K installed, are next attached

to the center section. Force the wire pieces through knife cuts in the center section and press the hooked ends into the cross members of the fuselage, cementing well. Hook up the wing struts and cement in place, set the covered stabilizer in place and run the bamboo front spar through the lift block of the control. It is understood that the stabilizer is first to be covered with red tissue and a black stripe painted around its edge.

Cover the fin and rudder with black tissue, painting a red stripe around the edge of this piece. Cement the top rear fairing block in place after making sure that the control is right, and secure the fin in its place in the same way. Put a small pair of horns on the rudder near the bottom, and run a thread through the fuselage just ahead of the last pair of uprights, glueing the ends to the rudder horns. The rudder can then be set in any desired position. The stabilizer is braced with a single thread running through its sides at the rear spar and just outside the middle bows on each half, over the middle cross member of the fin and attached at the bottom of the tail post. This holds the stabilizer in line without interfering with its action.

Directions for the installation and adjustment of the automatic control need not be repeated here. (See February 1933 issue.) This model is correctly proportioned so that it will fly without this feature in case the builder does not desire to install it, but he will have to make his model decidedly nose-heavy and attach the stabilizer at a negative angle, best determined by trial flights. In any event this will be a worthwhile model and one that will keep its builder busy for several days. The fineness of any model depends entirely upon the amount of time and energy its builder is willing to expend in its making, and satisfactory short-cuts are few and far between.