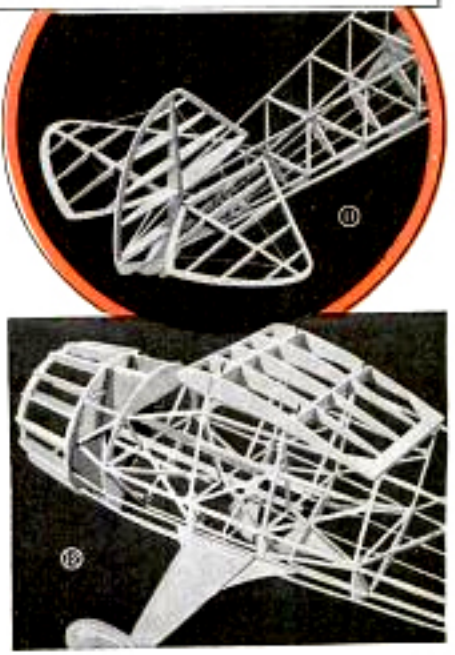
PART II

MODEL PLANE

Rudder—Wings—Covering Motor Installation

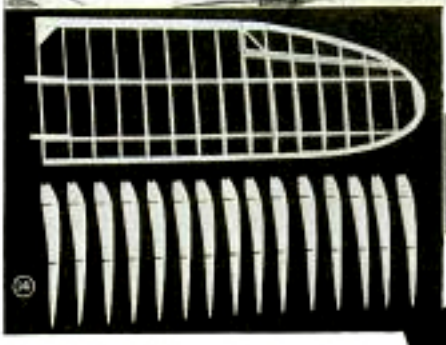
TAKING up the fin and rudder next, you sketch a full-size layout of the parts in Fig. 11, leaving a ⅛-in. space between the rudder and the bottom part of the tapered fuselage section. To do this, you can refer back to the plan view in Part I. Vertical members of the rudder and fin are tapered from the 1-in. width at the bottom to $\frac{5}{16}$ in. at the top. The leading and trailing edges are assembled first. Then the ribs are put in one at a time and fitted, starting at the bottom and working toward the top, small pins being used to hold the ribs in place until the cement sets. To keep the rudder square, a cross brace is placed from the upright of the second rib to the bottom rib near the trailing edge. After assembling, the parts are sanded to their proper streamlined shape. The rudder and fin are hinged at three points equally spaced with small strips of tin, $\frac{1}{64}$ in. thick and ¼ in. wide. These pieces are forced

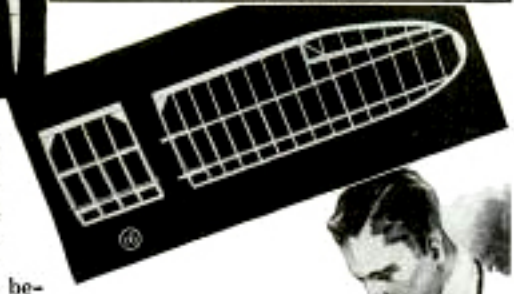


It's a good idea to make full-size layouts on heavy paper of the fin, rudder, ribs and wing panels before cutting the stock. Then you build the rudder and wing panels right over the layout

in. The center section, upon completion, is cemented in position against the top longeron on which a cross brace ½ in. high has been cemented to give the wing the correct angle of incidence.

Construction of the wing is similar to the center section and should be assembled over a full-size layout made from the plan view in Part I. Thirteen ribs are used in each panel, Figs. 14 and 16, and are spaced equally with the exception of the last one. The wing tips are cut from flat sheets and assembled in three sections. The front part is cut from ⅜-in. stock and the two rear parts from 1/16-in. stock. The two ribs near the wing tips are less in height and are tapered to fit when placed in position. Also, the last five ribs are a trifle shorter. When constructing the wing pan-



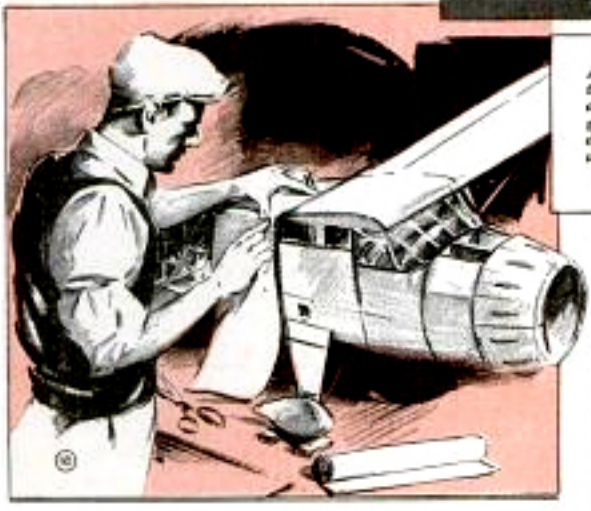


through the uprights, bent over on the inside and cemented. They are flexible enough to permit bending the rudder either way. The hinge construction of the stabilizer and elevators is the same. The fin, rudder, stabilizers and elevators are covered before they are attached to the body permanently with cement.

Wings and Center Section: A full-size layout of the wing rib should be sketched as in Fig. 13, and this pattern cemented to a block of balsa wood which in turn is sawed to shape, Fig. 15, including the notches for the leading edge, the spars and a part of the trailing edge. A block, 3½ to 5 in. high, will be sufficient. After the outline has been formed, the ribs are sliced off as in Fig. 17. Allow ten extra ribs to cover possible breakage. The center section, Fig. 12, should be constructed first, the end ribs being double thickness, or ⅛

els, be sure to make a left and a right-hand unit. Now, when the parts have all dried, you cut out a section for the aileron, adding a few extra parts to complete this unit. These consist of two additional end ribs and a spar for the front part of the aileron, also a small spar cemented to the wing. The ailerons are attached at three points with small bands of tin, 1/16 by 3/4 in.

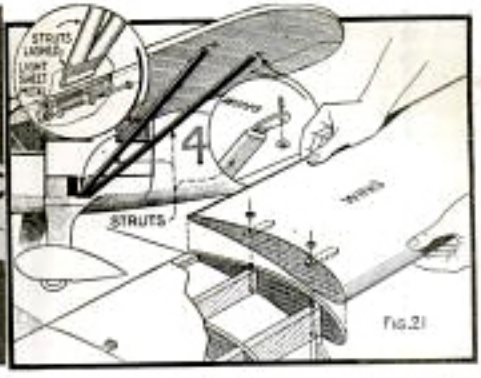
Wing Struts: The wing struts are made of pine. A 3° dihedral at the wing tips equals about 2-in. inclination for each tip. Although the length of the struts is given, it is advisable to cut and fit the parts with the model partly set up. The metal pieces that hold the wings to the center section are cut from



After covering fuselage and wings, the parts are sprayed with water, allowed to dry thoroughly, then given two coats of airplane wing dope. When dry this is followed with a coat of white lacquer applied with a camel's-hair brush

1/32-in. sheet metal, 1/4 in. wide and 1 1/2 in. long. Bolts are attached to the center section and are both cemented and tied, the threaded ends projecting upward 1/2 in. Two bolts in each wing project on the underside 1/2 in. below the wood parts. Triangular blocks of balsa forced against the spar and the rib hold them in place securely. Lugs for strut bolts on the body are attached first to a piece of balsa running across the inside of the fuselage at station 6. This piece is fitted in advance, the bolts attached with lugs which are wrapped with thread and cemented as in Fig. 21. The whole arrangement allows the wings to be detached from the fuselage when the model is being transported.

Mounting the Motor: Now, before continuing, it's best to mount the motor and test it. With the motor in place, the tiny gasoline tank and spark coil are mounted on the body bulkhead as in Fig. 23. Because of the probability of breaking wire connections, make small pig tails leading from the spark plug to the high-tension side of the coil. As three volts are required for operation, two small 1 1/2-volt flashlight cells are soldered together in series with long wire leads soldered on. The leads go through the body and to the outside between stations 4 and 5 where a midget radio jack is used to break the circuit. The dry cells are located to the rear of station 8 in a balsa-wood box, made sufficiently large to permit wedging the batteries firmly in place. A trap door allows entry to the battery box as in Fig. 20. Positive and negative leads should be marked on the fuselage for connecting



large dry cells, which are used for starting. The dry cells are connected to the leads with clips and the circuit to the small flashlight cells is so arranged that after the motor has been started, the small cells are cut in the circuit. Then the clips to the large cells are removed and the motor will continue to run. The exhaust pipe is lengthened with thin sheet metal so that it reaches through to the outside of the motor cowl. The motor should be thoroughly checked, using both the external dry cells and the small ones. All of these small motors are of the two-cycle variety.

Material List

STABILIZER AND RUDDER

4 Spars, balsa, ⅛ x ¾ x 24 in.
4 Ribs, balsa, 1/16 x 2 x 24 in.
2 Leading Edge Spars, balsa, ⅜ x ⅜ x 24 in.
2 Trailing Edge Cut to Curve, balsa, 3/16 x ⅜ in.

WING MATERIAL

3 Leading Edge Spars, balsa, ⅜ x ⅜ x 24 in.
3 Front Spar, balsa, ⅛ x ¾ x 24 in.
3 Rear Spar, balsa, ⅛ x ½ x 24 in.
3 Trailing Edge, balsa, 3/16 x ⅝ x 24 in.
2 Wing Tips, Front, balsa, ⅜ x ¾ in., cut to curve
2 Wing Tips, Rear, balsa, 3/16 x ⅝ in., cut to curve
30 Ribs, balsa, 1/16 x 1½ x 11 in.
10 Sets Bolts and Nuts, iron, 1 x 2/56 in.
10 Lugs, iron, 1/32 x ⅝ x ⅝ in.
4 Struts, pine or basswood, ¼ x ½ x 24 in.

MISCELLANEOUS

1 Windshield, heavy celluloid, 12 x 12 in.
1 Battery Box, balsa, 1/16 x 3 x 12 in.
½ pt. White Lacquer
½ pt. Quick-Drying Model Airplane Cement
½ pt. Dope
12 Sheets heavy bamboo fiber paper, 15 x 20 in.
Black Tissue for numbers and control outlines, cut to size
1 Motor and 15 in. Propeller, small bore, less than 1 in.
1 Ignition Coil, 3 volt, 3 oz.
½ oz. 400-volt Condenser

Covering: Heavy bamboo-fiber paper is used for covering. Between five and ten sheets are required, the number depending on the size of the sheets. The paper is fastened in place as in Fig. 18, with model airplane cement. All the separate units are

covered and sprayed with water, allowed to dry and then given two light coats of standard airplane "dope," followed with a coat of white lacquer as in Fig. 19. Handholes are arranged on each side of the hot-air vent behind the motor cowling on the top side of the fuselage or directly in front of the celluloid windshield. This is the best place to hold the model while starting. The rudder and stabilizers are braced with heavy thread. Decorations such as No. "40" placed on the fuselage sides and "NR-273Y" placed one underneath the left wing and another on top of the right wing as in Fig. 19, help to complete the job. Black tissue paper, ⅛ in. wide, is used to outline the controls. This is also carried around the windows and windshield and a ¼-in. strip is cemented around the body at stations 4, 5 and 7.

Preparing the Model for Flight: After checking all the parts and having the motor in running condition, a suitable field is selected for the first trial flights. The weather should be perfectly calm, early morning or late evening being the best time. Fill the tank with ½ oz. of gasoline as in Fig. 23, attach the external dry cells, crank the motor, and select a hard runway. It is advisable to have an assistant on hand so that when the model is started, the two persons can follow along with the model near the wing tips to see that it is in perfect balance before allowing it to continue on its first flight. Gas models are not as a rule launched by hand. They are permitted to run along a runway just as the large ships. If the balance does not appear to be correct, adjustments can be made before the model gets out of hand.