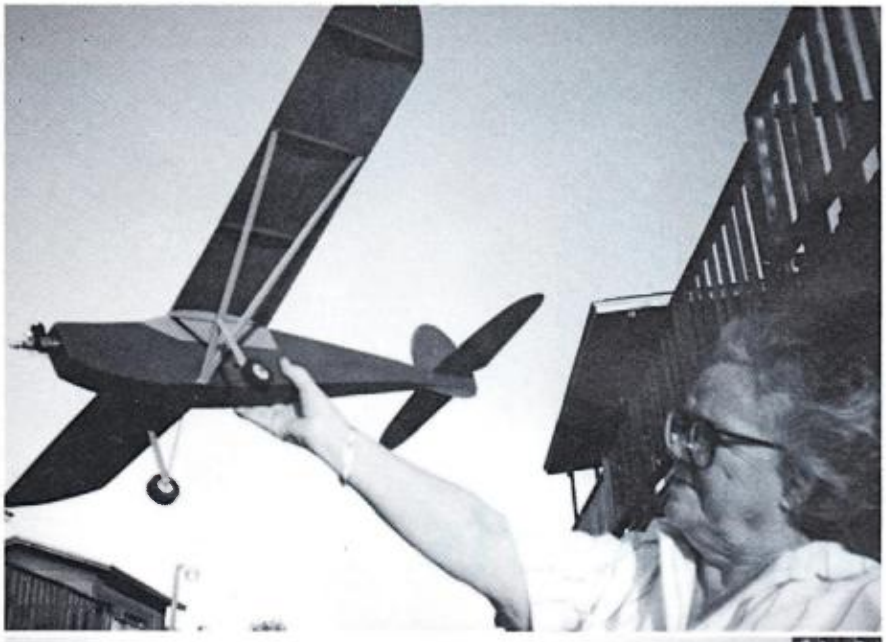
BALSA THE BUG

By John Valls

Need a break from that big project? Here's a simple, fast building .020 powered model that's just right for a relaxing weekend.



There is a strange wonderful feeling I get whenever I receive a shipment of balsa wood. This was a humdinger of a shipment. My Christmas present from my wife, almost two hundred bucks worth! I picked it out, she paid for it. Immediately, I start thinking of an all balsa model. After running several ideas through my mind, I remembered the Cardinal rule, **keep it simple**.

The objectives in The Balsa Bug design were to build an all balsa model that was small, light, simple, pleasing to the eye, to be powered by a Cox .020 engine, and for 2-channel control. I wanted the wing to be cut from one sheet of balsa, a 1/16" x 6" x 36" would do. The fuselage should also be cut from one sheet of balsa, a 1/16" x 4" x 48" sheet would get both fuselage sides. The stab and rudder would be cut from one sheet of 1/8" x 4" x 36" balsa. It should have a wing loading of less than 11 ozs. per sq. ft.; hopefully, much less!

Out comes the drafting paper, triangles, scale, and hard pencils. After my workbench is cleared, it takes me a solid hour to draw The Balsa Bug.

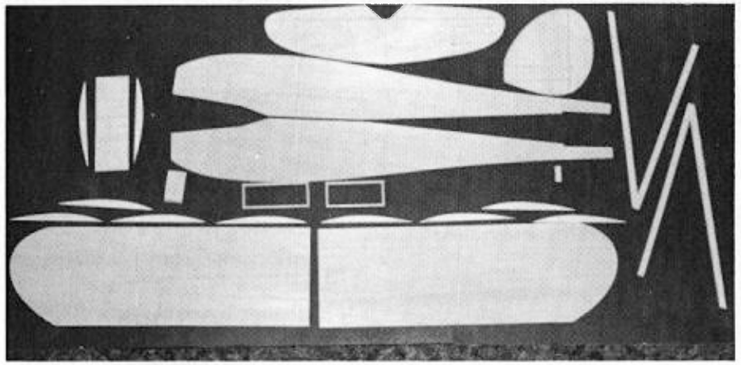
CONSTRUCTION

Fuselage:

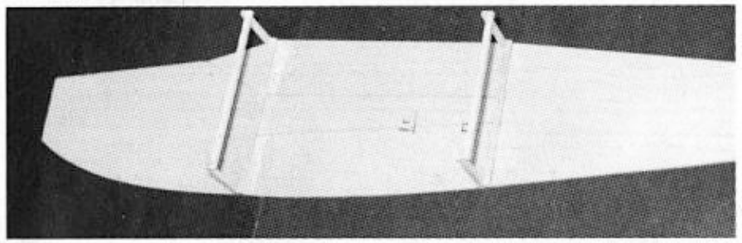
The fuselage sides are cut from one piece of 1/16" x 4" x 48" medium hard balsa. Everyone has their favorite way of tracing from a plan. I use a material called See Temp, which is a special soft mix of vinyl that's calendered on both sides.

You just put it over the pattern you want to copy, score it with a modeler's knife or razor blade and then break out your template following the score line and presto, you have an exact copy of your fuselage side. Place the pattern over your balsa on opposite sides, and opposite ends, and trace with a fine point pen. Cut out the sides, place both sides together, pin in several places, and sand lightly so both sides will be exactly the same. The two fuselage formers are made from 1/8" sq. hard balsa. Place over the plan and glue with thin CA. The engine mount front former is cut from 3/16" plywood. The rear fuselage former is cut from 1/16" sheet balsa.

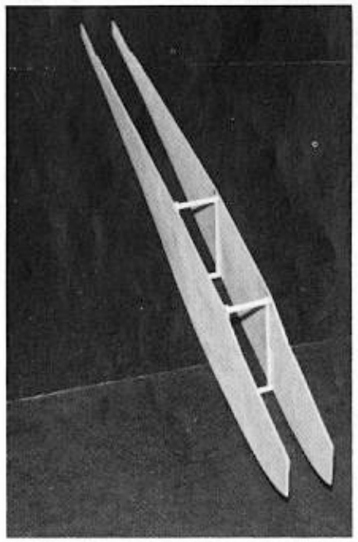
Lay the right fuselage side down on the plan and mark where formers #2 and #3 are to be installed. Be sure to mark the **inside** of each fuselage side. Position formers #2 and #3 in place. Use a triangle to ensure a 90° angle, and glue securely. Place the left

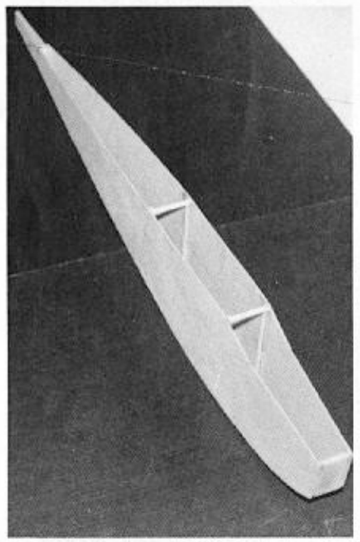


All the parts cut out and ready for assembly. This won't take long!

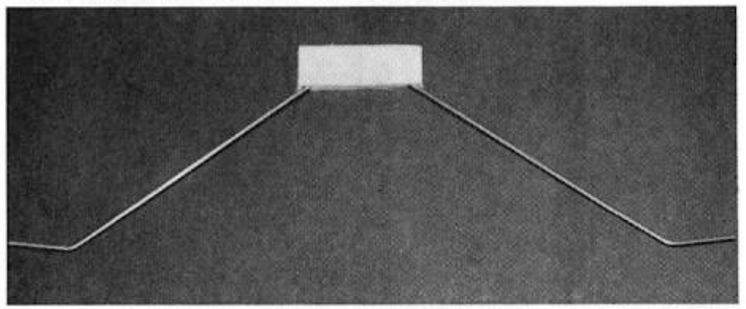


Make up the two fuselage formers and glue them in place, square to the fuselage side.





LEFT: Align and glue the other side of the fuselage in place. RIGHT: Add the 3/16" plywood fire wall, the rear former, and join the fuselage together at the rear.



The landing gear is made up using 1/16" music wire, which is sandwiched between two pieces of 1/16" balsa, with balsa filler pieces.

BALSA BUG
Designed By:
John Valls
TYPE AIRCRAFT
.020 Powered Sport
WINGSPAN
38 Inches
WING CHORD
6 Inches
TOTAL WING AREA
215 Sq. In. (Approx.)
WING LOCATION
Top of Fuselage
AIRFOIL
Undercamber, Sheet
WING PLANFORM
Constant Chord
DIHEDRAL, EACH TIP
3 Inches
OVERALL FUSELAGE LENGTH
27 Inches
RADIO COMPARTMENT SIZE
(L) 11" x (W) 1½" x (H) 3½"
STABILIZER SPAN
15 Inches
STABILIZER CHORD (incl. elev.)
3½ Inches (Avg.)
STABILIZER AREA
50 Sq. In. (Approx.)
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
5½ Inches (incl. Sub Fin)
VERTICAL FIN WIDTH (incl. rud.)
4 Inches (Avg.)
REC. ENGINE SIZE
.020 Cu. In.
FUEL TANK SIZE
Tank Mount
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
2 Micro
CONTROL FUNCTIONS
Rudder & Elevator
BASIC MATERIALS USED IN CONSTRUCTION

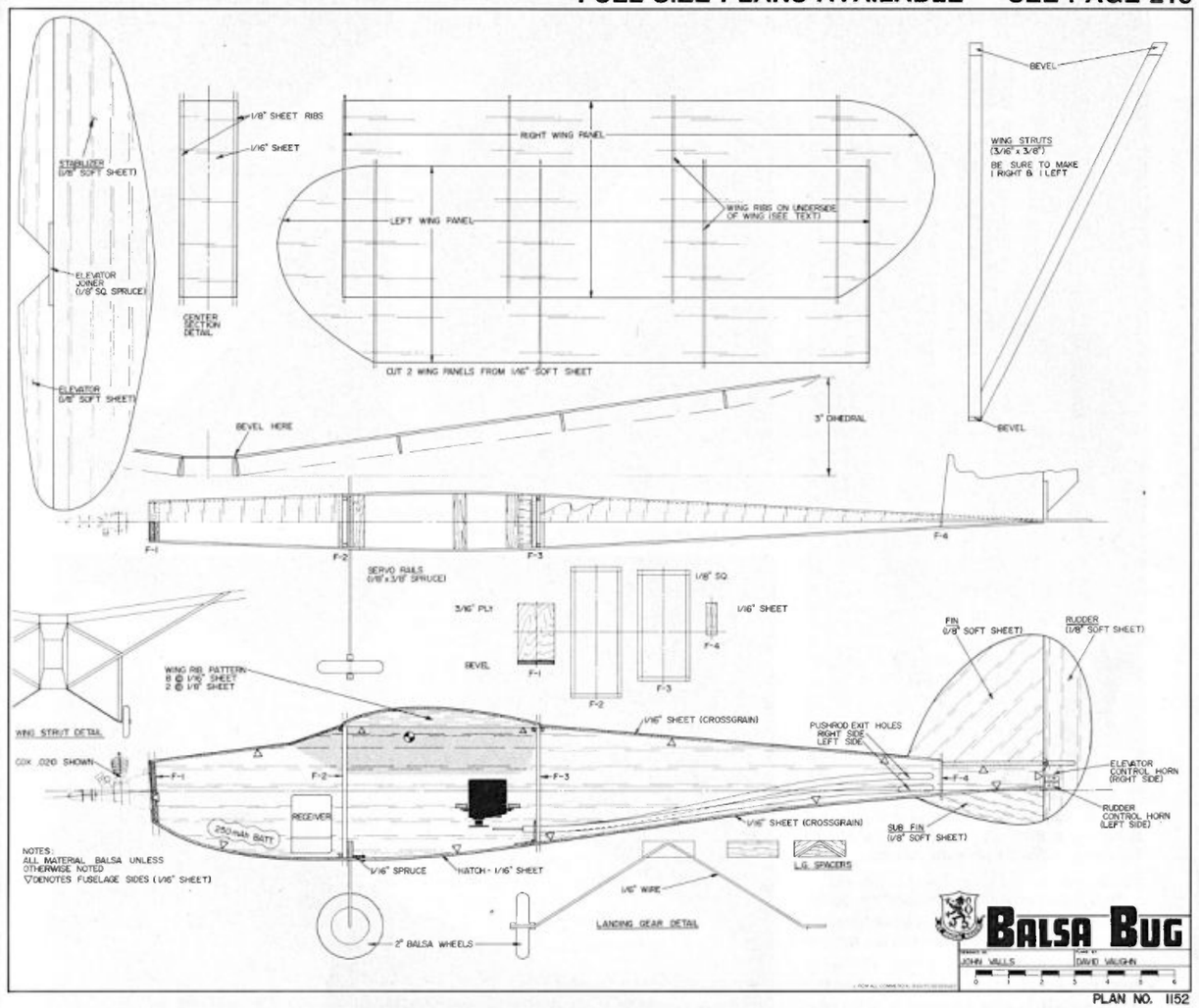
Fuselage	Balsa & Ply
Wing	Balsa
Empennage	Balsa
Wt. Ready To Fly	11 Ozs.
Wing Loading	7.3 Oz./Sq. Ft.

fuselage side on the formers, making sure the formers line up with the lines you marked on the inside of the fuselage side. Again, use triangles to ensure both fuselage sides are lined up true. Pin the left fuselage side to the formers and glue in place.

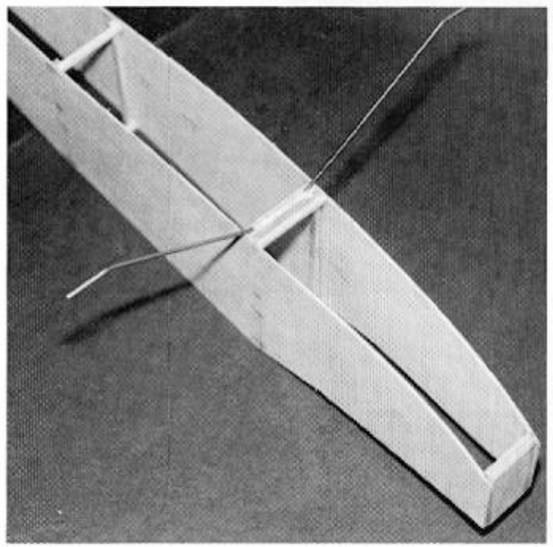
Next, install the 3/16" plywood motor mount, former #1. Pin the rear end of the fuselage together and install former #4. Check for true alignment by placing the fuselage over the top view on the plan. Glue in former #4.

Cut the servo rails from pine or spruce. Make sure the rails fit snugly on the sides of the fuselage. Glue in the rear servo rail first. Now fit the servo in place, position the front servo rail and glue in place. Next, you need to install the servos in order to position the Gold-N-Rods. Cut the rod exit holes in the back of the fuselage and position the rods in place. You can now glue the Gold-N-Rods in place.

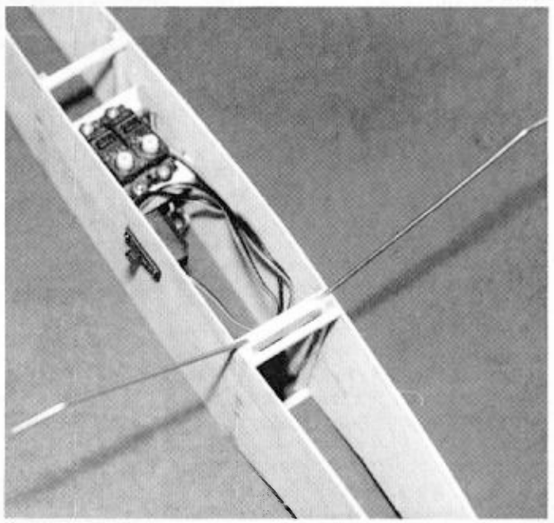
FULL SIZE PLANS AVAILABLE — SEE PAGE 215



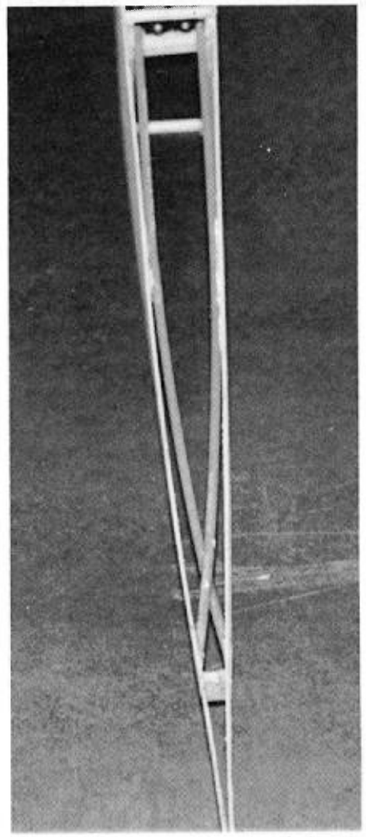
PLAN NO. 1152



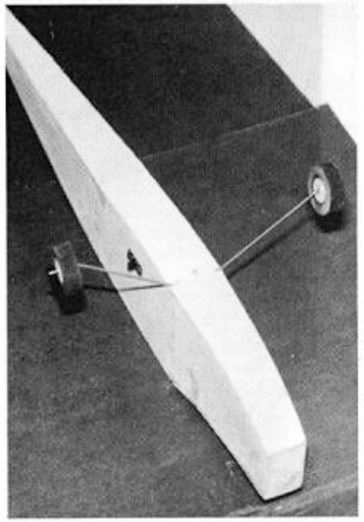
Landing gear assembly is glued in place at former #2.

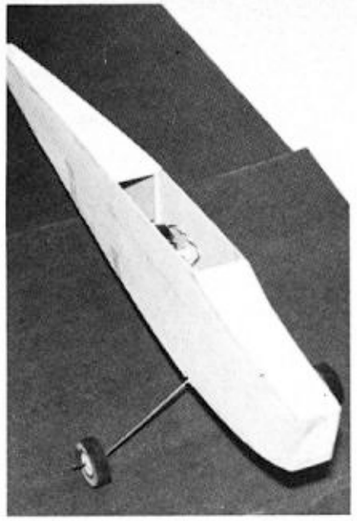


Servos and switch harness are positioned prior to adding bottom sheeting.

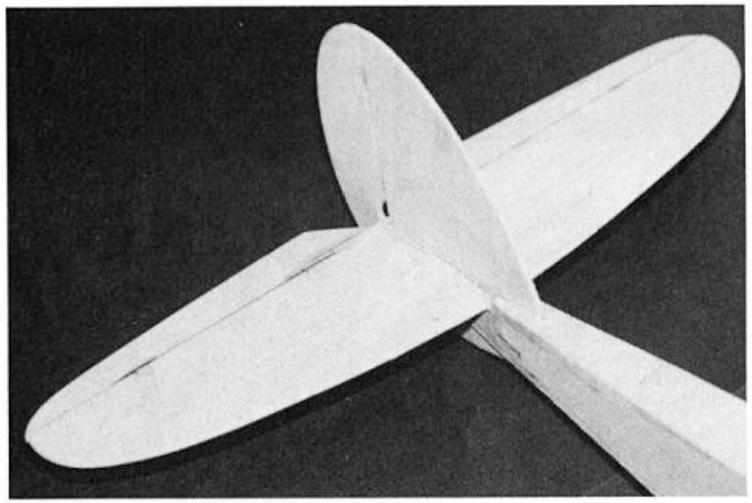


Gold-N-Rods are positioned and glued in place. Be sure to attach securely to fuselage sides to prevent flexing.





LEFT: Bottom sheeting is attached cross-grain to help stiffen fuselage sides. RIGHT: Top sheeting is also installed cross-grain.

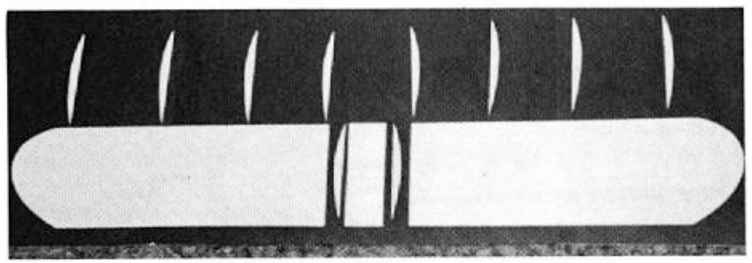


Tail feathers are all cut from lightweight 1/8" balsa.

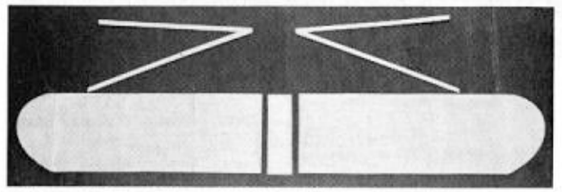
Install the top and bottom sheeting on the fuselage using 1/16" soft sheet balsa. Notice that neither the cabin top nor the top rear of the fuselage are covered. The wing will be glued to the top of the cabin and the stabilizer will be glued to the rear. Also note that the bottom of the cabin area is not covered, this will be the access hatch cover. Next, form the landing gear from 1/16" piano wire. Sandwich the landing gear wire and spacers between two pieces of 1/16" sheet balsa. Install the landing gear flush with the bottom of the former #2. The hatch cover is built from 1/16" sheet balsa. Glue a piece of 1/16" balsa cross-grained at the rear end of the hatch cover to overlap 1/16". Glue a 1/16" x 3/8" piece of spruce to the inside of the bottom of the fuselage as shown on the plan. This will serve as the anchor for the front of the hatch cover. Secure the front with a small screw.

Wing:

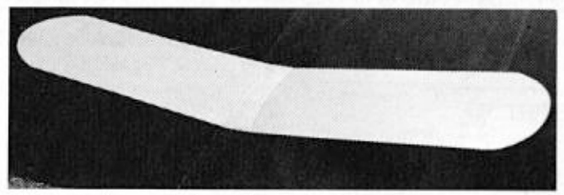
The wing is made from one piece of 1/16" x 6" x 36" light contest balsa. This has to be the simplest wing I have ever made. Cut the sheet of balsa in half. Each half should be 18" in length. Trace the rounded tips from the plan and cut the tips out for both ends. Trace the rib pattern from the plan and cut out 10 ribs. Starting with a middle rib, tack the front end of the rib to the leading edge of the wing, then simply roll the rib back towards the trailing edge, applying thin CA as you go along. Install the other middle rib the same way, then the root rib, and finally the tip rib. Follow the same procedure with the other wing panel. Now install the two 1/8" sheet ribs to the center section of the wing. The next step will be to glue the left and right wing panels to the center section. Sand the center section to form the right angle for the 3" dihedral at each tip. Pin the center section down on your workbench. Cut two pieces of balsa to 3" length to prop up the wingtip while you glue the outer wing panels to the center section. After the glue has dried, sand the leading edge, trailing edge, and tips. That is all there is to the wing. Easy, isn't it?



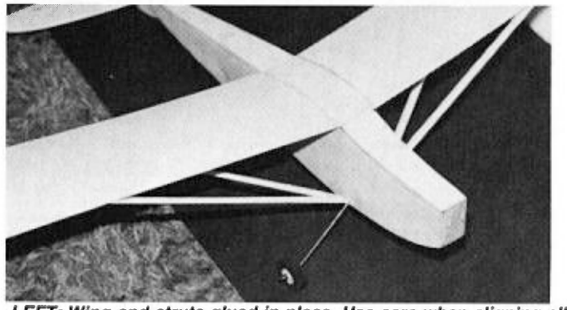
The wing pieces are cut from 1/16" balsa sheet.

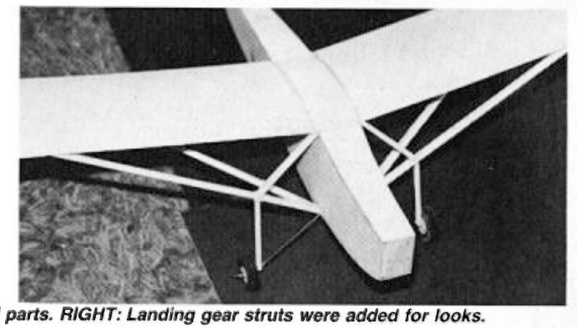


Left and right panels ready for joining to the center section.



Finished wing ready for gluing to fuselage.





LEFT: Wing and struts glued in place. Use care when aligning all parts. RIGHT: Landing gear struts were added for looks.

List of Materials

1 — 3/8" x 3/16" x 36", hard balsa
1 — 1/16" x 6" x 36", contest balsa
1 — 1/16" x 4" x 48", medium balsa
1 — 1/8" x 3" x 36", contest balsa
1 — 1/8" x 1/8" x 36", medium balsa
1 — 1/16" x 3" x 36", contest balsa
1 — 1/16" x 36", steel wire
1 — pr., 2" balsa wheels
6 — pcs. hinge material
2 — small control horns
1 — 3/16" plywood, 3" x 3"
1 — Gold-N-Rod (red)
1 — 1 oz. color dope
1 — 4 oz. clear dope
1 — 4 oz. thinner

Product Addresses

See Temp, P.O. Box 105, Sussex, Wisconsin 53089.
Sullivan Products, 1 N. Haven St., Baltimore, Maryland 21224.
Sig Mfg. Co., Montezuma, Iowa 50171.
Cox Hobbies, 350 W. Rincon St., Corona, California 91720.

Tail Group:

The fin and stabilizer are both cut from 1/8" x 3" x 36" contest balsa or soft balsa. Trace the stabilizer pattern from the plan and cut from the sheet of 1/8" balsa. Trace the pattern for the elevator and cut to shape. The elevator halves are joined with a piece of 1/8" spruce. Sand the leading and trailing edges. Trace the pattern for the fin and rudder and cut from the sheet of 1/8" balsa. Remember to cut out the part of the rudder where the elevator halves are joined. Hinge the elevator to the stabilizer, and the rudder to the fin.

Assembling The Model:

Glue the stabilizer to the fuselage platform at the rear. Position the fin and rudder and glue in place. Remember you have a sub fin that goes on the bottom of the fuselage.

Position the center section of the wing on top of the fuselage and pin in place, but don't glue yet. You will now cut the wing struts to size from the plan, sand to shape and pin them in position to the fuselage and wing as indicated on the plan. It is very important that you check, and double check the alignment to ensure you have the same incidence at the root and tip of the wing. Do not build in any washout on the wing, it is not needed on this model. Glue the wing and wing struts in place. Now you can add the bracing from the wing root and fuselage to the wing strut, and down to the landing gear. It should be mentioned that the bracing is not needed for strength, and can be left off without any ill effects. I've always liked the Spirit of St. Louis and Curtiss Robin, so I added the bracing for looks.

Finishing:

Install the Cox .020 engine, install your radio gear, balance the model as shown on the plans by moving the radio gear forward or back in the model. When the model balances correctly, you are ready to fly. The Balsa Bug will fly with a standard Cox .020; the Cox TD .020, however, will get you a lot more altitude. I had a flight of 15 minutes on one tank of fuel with the TD .020.

The Balsa Bug is a very stable model and will surprise you with its ability to thermal. Good luck with your "Bug," and have fun. □