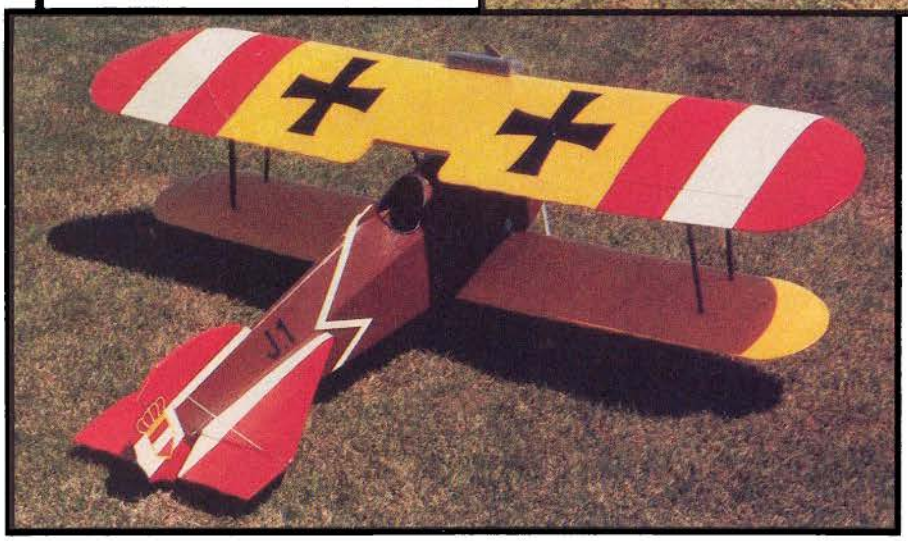
PHONIX



By Laddie Mikulasko

A BEAUTIFUL MODEL OF AN UNUSUAL WWI BIPLANE

About 25 years ago, I had the chance to purchase a Profile Publication booklet from England. Each book depicts one aircraft type in relative detail. What was great about them was the color documentation. One of the aircraft which caught my eye was this colorful biplane from WW I, called the Phonix.

The company which built this plane was situated in Vienna and was set up to be a supplier of aircraft to the Austro-Hungarian Empire. An interesting side note is that the designer of this plane was Ernest Heinkel, who later designed his own line of aircraft in Germany.

The plane saw limited action in WW I, over Italy. A number of them were sold to the Swedish Air Force. The scale model presented here is of a plane which was forced to land in Italy in 1919. The model is in 1:5.8 scale, with accurate scale outline throughout, using the Profile Publications 3-views as reference. This model is not for absolute beginners. It is not difficult to build, but there are just enough little things to discourage beginners. I will describe the more involved steps, only.

CONSTRUCTION

Wings:

Start by building the top wing first. Cut out all of the ribs. The top wing is built in two halves, to be joined on the centerline later. Build right on top of the plan, one panel at a time.

Pin the 1/16'' trailing edge sheeting and individual ribs to the building board. Slide the bottom 1/8'' x 1/4'' main spar and 1/4'' x 1/4'' rear spar into the ribs. Glue all of the ribs to them and to the trailing edge.

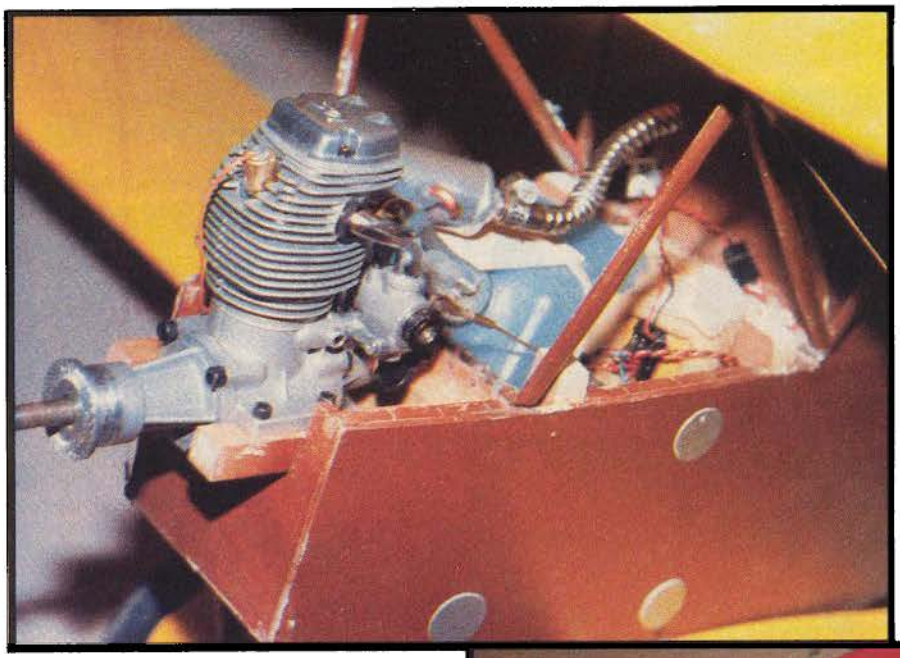
Glue the top 1/8'' x 1/4'' main spar, the 3/16'' x 3/8'' balsa leading edge, and the 1/8'' x 1/4'' spruce trailing edge all in place at this time.

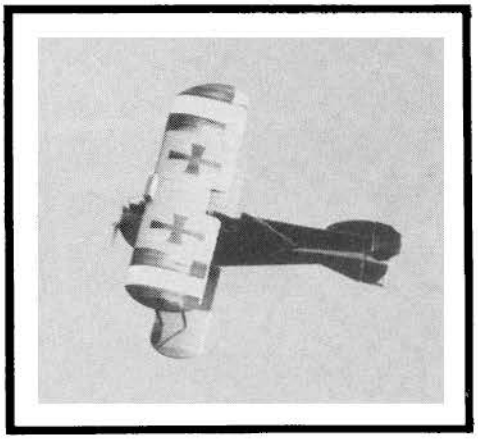
The wingtips are made by laminating 1/16'' x 3/8'' balsa strips around a corrugated cardboard template.

Glue the tips to the leading and trailing edge. Sheet the top of the leading edge with 3/32'' balsa. Separate the aileron from the wing and glue on its 1/4'' x 3/8'' balsa leading edge.

The aileron control can be done with NyRod or bellcrank.

Glue in 1/16'' plywood doublers to the ribs inside the bay where the wing struts are located, to hold the plywood strip. In each plywood strip, drill the hole, insert and glue in place the 2-56 blind nuts, so that the wing struts can be screwed in later on.





install the hardwood engine bearers.

Install the 1/4'' plywood piece at the tail, to hold the tail skid bracket. Next, glue in the two hardwood blocks, with the grooves in them to take the undercarriage, then sheet the bottom of the fuselage with 1/16'' balsa.

This half of the wing can be put aside, and the other half built the same way.

Both halves are joined at the center.

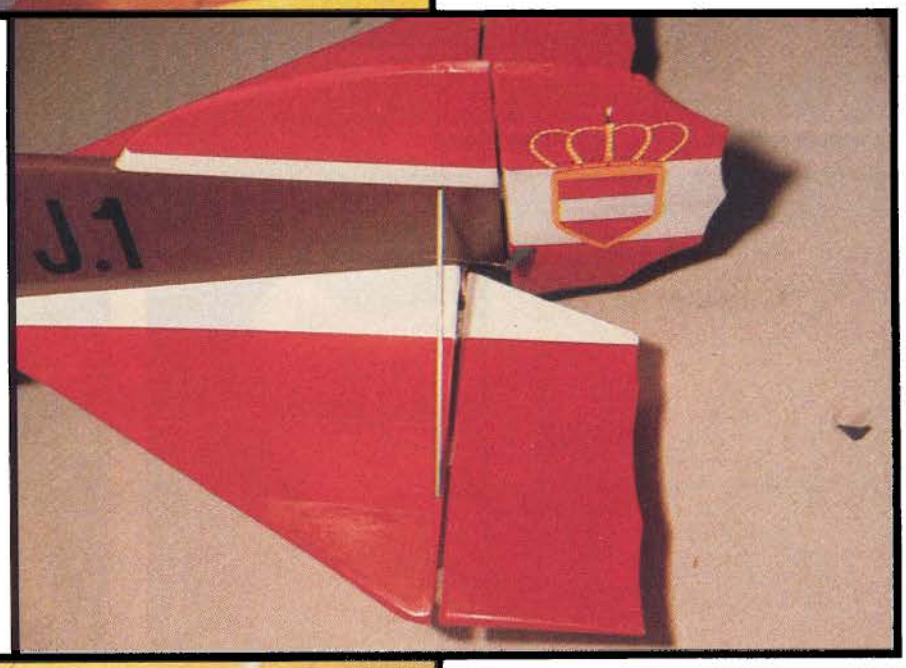
First, slide the 1/4'' plywood dihedral brace into one half of the wing. Then, slide the other wing half onto the brace and epoxy the two together. Before the glue sets, place a 3/8'' block under each wing rib W-6, to get the required dihedral.

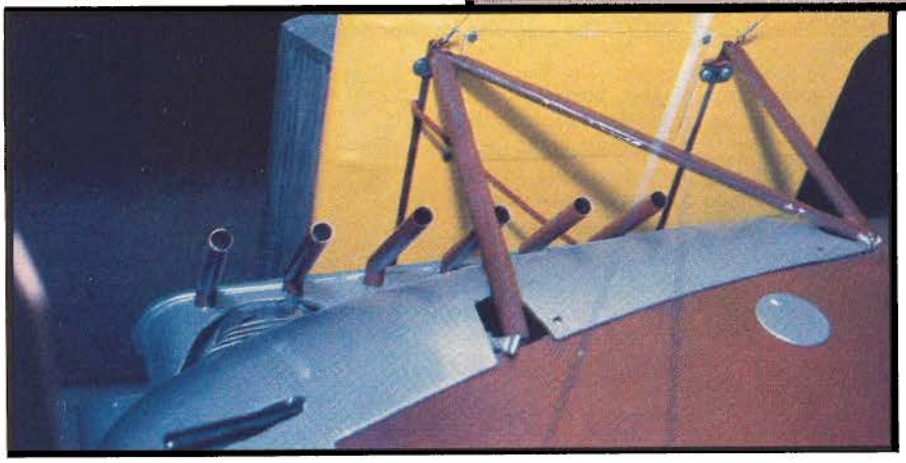
Remove the wing from the building board and glue in the front and rear plywood strips at the bottom of the center section, with grooves to accommodate the cabane wires.

Sand the whole wing to your satisfaction. If any filling is required, do it at this time.

The bottom wing halves are built the same as the top, except that each half has 1/8'' dia. piano wire attached to the main spar and rear spar (see the drawing for details).

The front piano wire will be plugged into the socket in the fuselage. The composition of this socket can be seen on the drawing.





Remove the fuselage from the building board and install the tail skid.

Glue the top formers, F-5, 6, 7, 8, and 9 to the cross braces. The fuselage top sheeting can be glued on now.

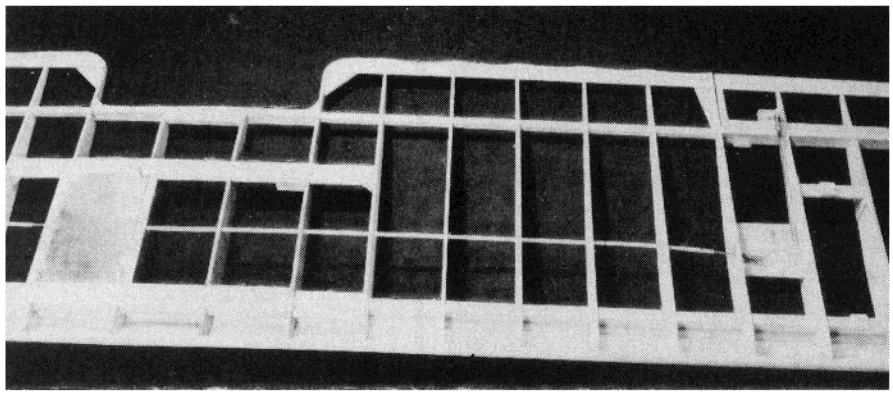
Cut out the cockpit opening.

The wheel collar and set screw will hold the wing to the fuselage.

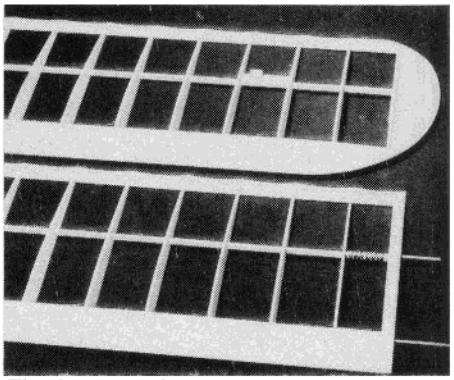
Fuselage:

Cut out the fuselage sides from 1/8'' balsa sheet, and the doublers from 1/32'' plywood. Glue 1/4'' sq. balsa longerons to each fuselage side, then glue the doublers in place.

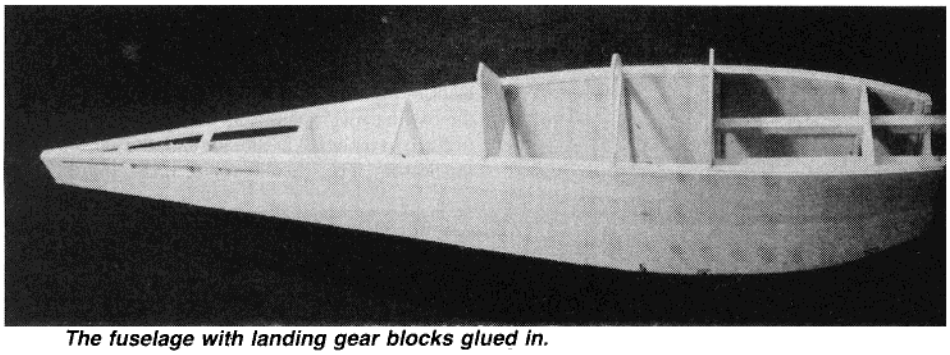
Place the fuselage upside-down and glue in the bottom half of former F-5 and all the cross braces using 5-minute epoxy; glue in formers F-3, F-2, and F-1 in that order, then



The top wing ready for covering. Notice location of hatch plate hiding the aileron servo.



The bottom wings ready for covering. Notice the thread wrapped around the wire and rear spar.



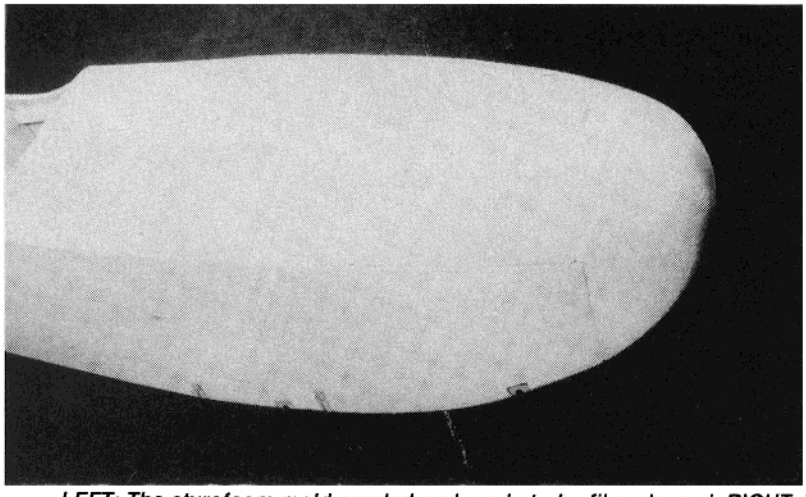
The fuselage with landing gear blocks glued in.

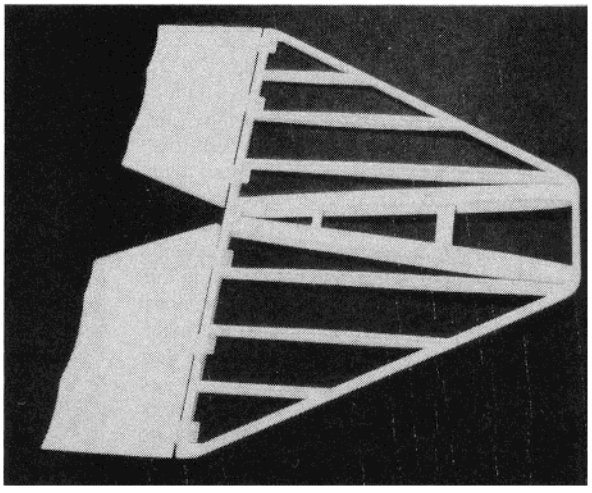
finish. Dig out all of the foam from the inside and cut out the openings where needed.

The cabane is next.

I made mine out of 1/8'' o.d. welding rods, which I cleaned and bent to the exact shape. I silver soldered the diagonal braces to the front and back of the cabane, using a cardboard template to get the proper angles.

Attach the cabane to formers F-2 and F-3 with tie-wraps or strong thread. Place the top wing on the cabane, so that the cabane

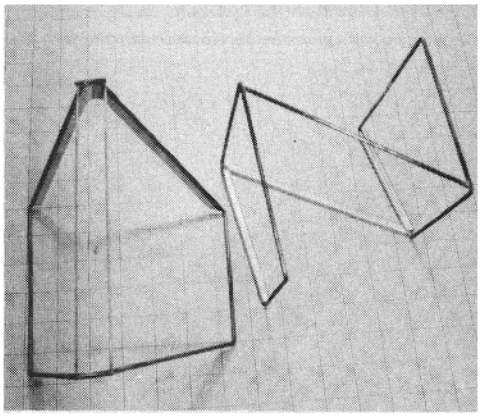




LEFT: The styrofoam mold sanded and ready to be fiberglassed. RIGHT: The stab and elevator ready for installation.

Next comes the fiberglass cowl.

To make the male plug, cut the half formers A, B, and C, out of 1/16'' balsa

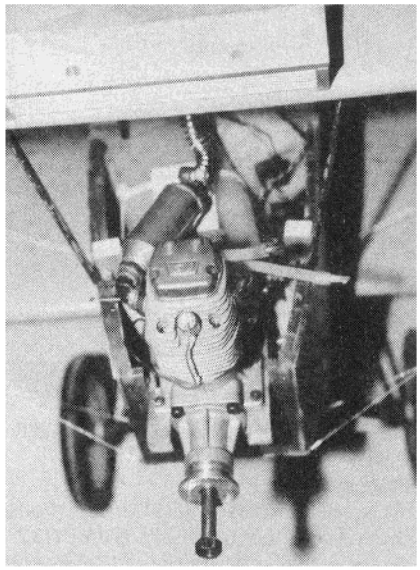


The landing gear and cabane.

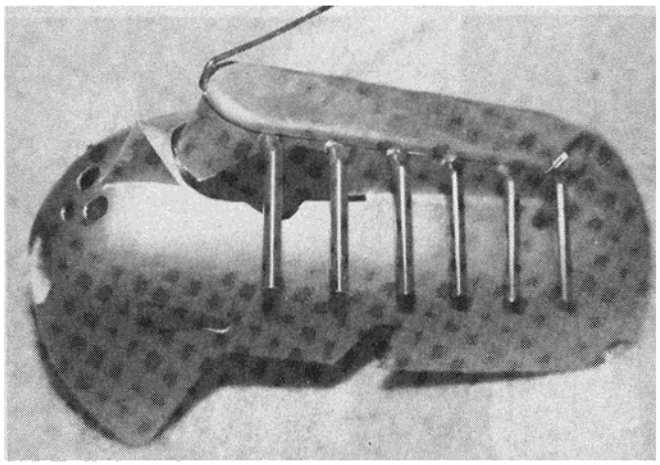
and, with a drop of glue, attach them to formers F1, 2, and 3. Fill the space between them with styrofoam SM (blue) and glue it to the fuselage. Sand the foam to the contours of those formers and the mating fuselage sides. If there are any gaps, fill them with drywall filler or similar material and sand to as smooth a finish as possible. Cover the balsa fuselage sheeting at the perimeter of the cowl with silver duct tape.

Lay four layers of approximately 2½ oz. per sq. yd. glass cloth over the mold, using epoxy resin to wet the cloth. **Do not use polyester resin as it will dissolve the foam**. Once the resin is cured, pry it away from the duct tape and from the fuselage.

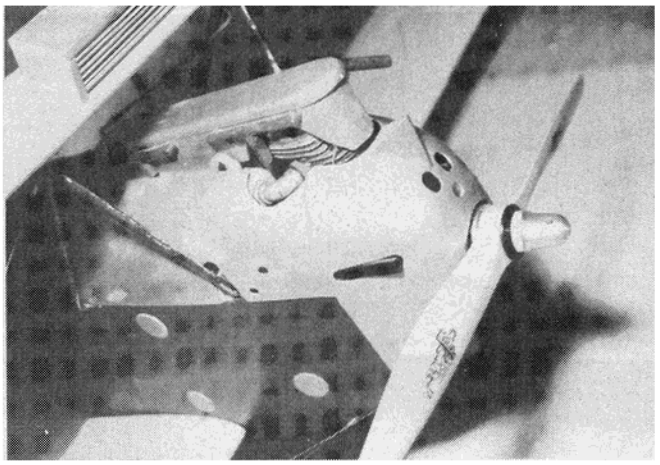
Sand the outside of the cowl to a smooth



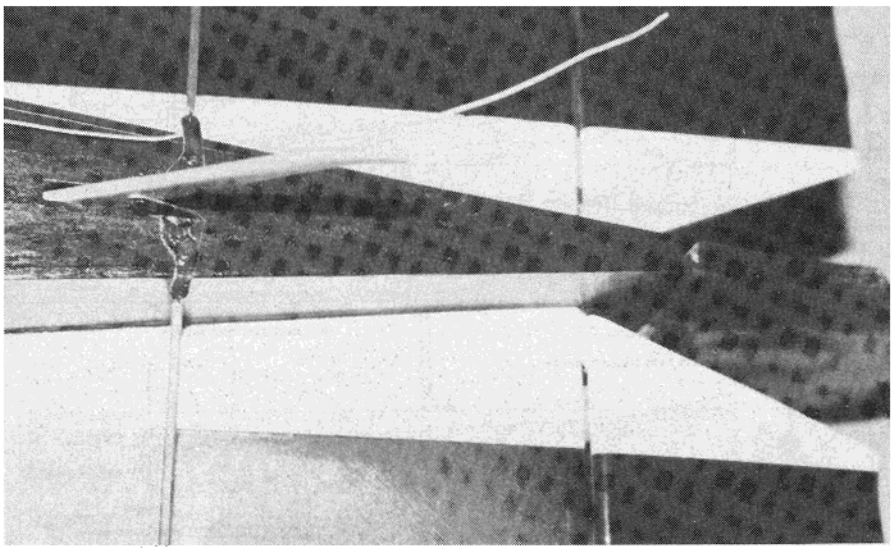
The engine installation. Notice new elbow connecting the muffler to the engine. At the same time notice prebent flexible copper tubing clamped to the muffler.



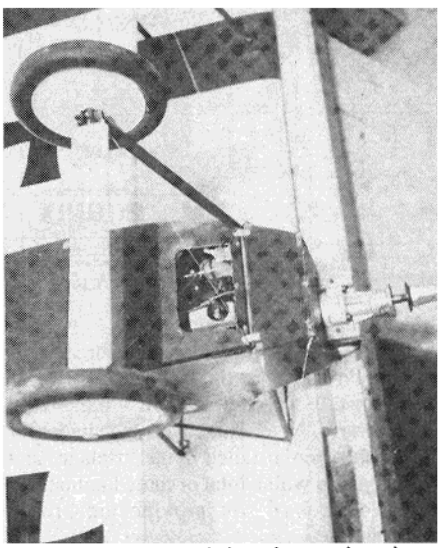
The fiberglass cover and dummy engine.



The engine is well hidden.



The tail skid and strut attachment.



The underside of fuselage showing location of elevator and rudder servos. The glow plug remote connector is mounted there as well. The "O" ring is used in place of bungee cord.

fits inside the grooves in the top wing. Check the alignment of the wings against the fuselage. If needed, realign the cabane. The balsa fairing must be glued onto each cabane strut now.

Because I wanted to hide the aileron extension cable, I glued it into one of the front fairings.

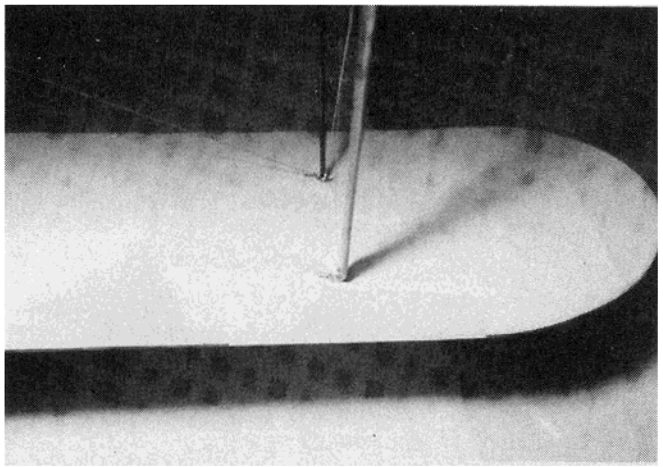
Mount the engine without the muffler and do the final cowl fit. The dummy engine is made out of balsa sheeting and aluminum tubing. To hide the muffler on my O.S. 90 inside the cowl, I modified the original elbow going to the muffler. I took 3/8" dia. copper tubing approximately 6" long, and in a vise, I squeezed one end shut. With a propane torch, I melted lead to fill this tube full. After it cooled, I bent the tubing around a 3/8" bolt. I cut out a 90 degree section from it. Then, I heated the original elbow until the silver solder was soft enough to remove the threaded ends. At the same time, I heated up my new 90 degree elbow and poured out the lead. Then I soldered the threaded ends to the new elbow.

To get the hot exhaust gases out of the cowl, I cut a length of flexible copper faucet tubing and bent it to the shape required to come out just behind the dummy engine. The engine is well hidden inside the cowl. By running the engine rich it has never suffered from overheating.

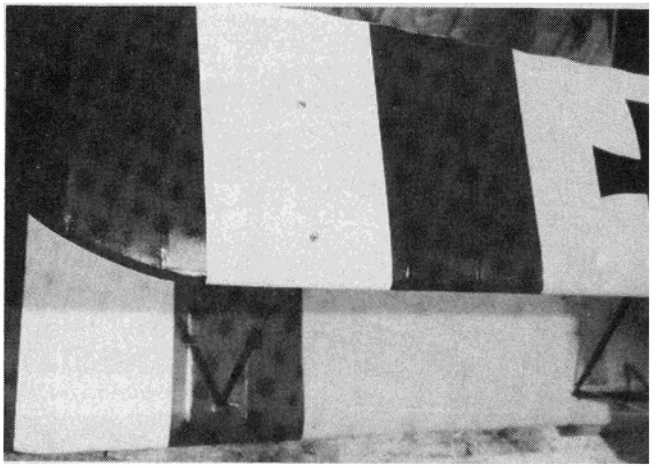
Make the landing gear in similar fashion to the cabane construction. Do not forget to wrap each leg with fiberglass cloth.

PHONIX D.I.

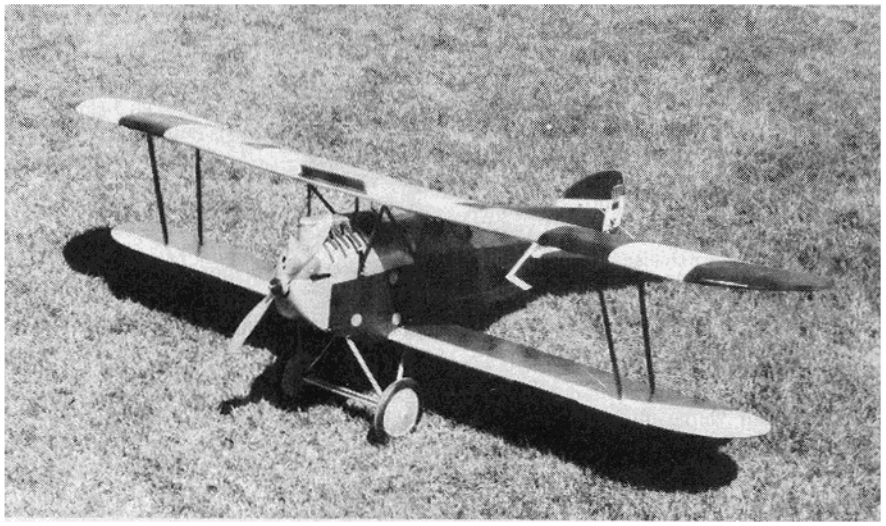
Designed By:
Laddie Mikulasko
TYPE AIRCRAFT
Sport Scale Biplane
WINGSPAN
Top 66½", Bottom 60½"
WING CHORD
Top 11¾", Bottom 8"
TOTAL WING AREA
1219 Sq. In.
Top 781 Sq. In., Bottom 438 Sq. In.
WING LOCATION
Biplane
AIRFOIL
Flat Bottom
WING PLANFORM
Constant Chord
DIHEDRAL EACH TIP
3/8" (both wings)
OVERALL FUSELAGE LENGTH
43¼ Inches
RADIO COMPARTMENT SIZE
(L)11" x (W)5" x (H)5"
STABILIZER SPAN
16 Inches
STABILIZER CHORD (incl. elev.)
11 Inches (Avg.)
STABILIZER AREA
176 Sq. In. (approx.)
STAB AIRFOIL SECTION
Symmetrical
STABILIZER LOCATION
Middle of Fuselage
VERTICAL FIN HEIGHT
6 Inches
VERTICAL FIN WIDTH (incl. rud.)
12 Inches
REC. ENGINE RANGE
.80-.90 4-stroke, .60 2-stroke
FUEL TANK SIZE
10 Oz.
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
Rud., Elev., Throt., Ail.
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage .... Balsa, Ply, Spruce, & Fiberglass
Wing ..... Balsa, Ply, Spruce
Empennage ..... Balsa
Wt. Ready To Fly ..... 112 Ozs. (7 Lbs.)
Wing Loading ..... 13.2 Oz./Sq. Ft.



The attachment of rigging wires to the bottom wing is shown.



The struts are held to the bottom wing with bicycle nuts.



From RCModeler Dec. 1991

Horizontal Stabilizer:

The stabilizer is built up in three basic steps. First, glue up the 1/4'' sq. balsa frame and install the 1/4'' x 9/16'' balsa root support rib. Note: This rib is much wider for support when installed in the fuselage, and will end up with a total of three laminations of 1/4'' x 9/16'' to provide the proper airfoil.

The second step is to cut the four additional pieces of 1/4'' x 9/16'' balsa to the airfoil shape shown on the plans and glue the two top pieces in place on the center section. At this time, you may also glue the 1/8'' x 1/4'' balsa strips in place on the 1/4'' sq. ribs, as shown on the plans. Now turn the assembly over and do the same on the other side. Add the 3/8'' x 3/4'' and 1/4'' x 1/2'' cross pieces. The third step is to sand all of the ribs to the shape of the center using a long sanding block. When doing this, be careful not to remove excess material from the center section pieces.

Follow the contour of the root rib and work out to the tip so the shape is progressive out to the tip of the stabilizer.

Vertical Fin:

The vertical fin is made up using 1/4'' balsa sheet cut to the shape shown on the plans, along with 1/8'' x 1/4'' and 1/4'' sq. as shown. The entire framework is then sheeted with 1/16'' balsa skin.

Rudder and Elevators:

The rudder and elevators are built up by first cutting 1/16'' balsa sheet to the shape shown. Next, glue 3/32'' x 1/4'' balsa strips to the leading edge and tips, then glue the 3/32'' x 1/8'' half ribs in place. Flip each surface over and do the same on the other side. Glue the 1/8'' x 1/4'' trailing edge material in place and then sand the surfaces so that they taper from the leading edge to the trailing edge as shown on the plan.

To make the struts I used bicycle spokes as my connecting medium. Silver solder two of them together so they are the right length, with both ends threaded. From 1/16'' plywood, cut out strut fairings and groove them to accommodate the spokes. Sand the struts to round them off and wrap with fiberglass cloth.

The model is ready for covering. Fill any dents or gaps now. I covered my model with lightweight silk. Brush on three or four coats of clear nitrate dope. Paint the model. Install all the clips which hold the flying and landing wires. Mount the wings and screw in the struts into the top wing, feeding the other end into the hole in the bottom wing, and screw on a spoke nut at the bottom. Install the rigging wires (see the drawing for details). Install the radio and balance the model at the point shown on the plans.

Flying:

Check the operation of the engine. Despite the engine being cowled in with a relatively small opening for cooling, I had no problems with the engine overheating. Usually I run the engine slightly rich.

Re-check the C.G. again one last time.

The model being a tail dragger with a short fuselage may appear to be difficult to handle on take-off. However, this is not the case with the Phonix. As soon as the power is applied, the tail comes up and the rudder is capable of holding the heading.

In the air, the model is easy to fly and responds well to control inputs allowing all standard maneuvers. The landings are no problem as long as the grass is short. On the longer grass, the model has a tendency to nose over just before it comes to a complete stop. This is minor aggravation for me in comparison to seeing this colorful model in the air. Well, that's about it for the full size aircraft and the model.

Good luck and happy flying. □