
THE RCM BASIC BIPE MK II

BY DARREL C. STEBBINS

To us old-timers, a scale biplane is a beautiful sight to behold. However, after spending hundreds of hours carefully studying plans and photographs, cutting, sanding and trimming parts, fitting, smoothing, gluing dozens and dozens of little pieces to other little pieces, sanding, filling, covering, doping, priming, sanding, painting, sanding, rubbing, touching-up, trimming, applying decals, finish coats, rubbing, rubbing, and rubbing, do you honestly think I'm going to take my beautiful bird out to our sandy, motorcycle-rutted, tree-lined flying field for my first-ever biplane flight? No way!

If this strikes a responsive chord, take heart — the RCM Basic Biipe Mk II has arrived! You too can build a biplane in a week; a forgiving, docile, agile .40 powered rascal that will perform any maneuver that biplanes are capable of; is not squirrely on the ground, and will, when properly trimmed out, fly hands-off right-side-up or inverted.

Picture yourself at the field — nonchalant, rakish, devil-may-care — no shaking knees, no spots before your eyes, no soaring blood pressure, no slippery thumbs — what the heck, if you break this one, you can have another one flying next week. Sound good? Let's all fly biplanes!

The first step, for most modelers, is to undergo a complete attitude adjustment. Psychiatry may help. Use booze only as a last resort. Remember, you are setting out to deliberately build a plane "sans finesse." Hide all sandpaper finer than 180 grit. Place all filler, spackle, primer, putty, fillet material and polishing compound in a locked cabinet and give the key to a strong-willed friend. Convince yourself that the only appearance criteria will be, "how will it look on a low-level inverted pass from one hundred feet away?"

We named the bird "The RCM Basic Biipe" on purpose — there is nothing on

this plane that isn't there for a good reason. The only concession to grace and elegance is the rake-back on the leading edge of the fin. Makes the whole thing look pretty, doesn't it? You can add stuff to this basic structure to make it beautiful, or to make it resemble one of the real sport biplanes for the Sportsman Class event, but don't leave anything out that is shown on the plans — it's there for a reason. The dowels, for example, add considerable strength and stiffness to the trailing edges of the wings, and to the ailerons and tail surfaces — don't leave them out to save weight, or in order to use conventional hinges. Build your first Basic Biipe just like it is designed — you can pretty-up your second one, if you insist.

A .35, or a Wankel, will pull this bird around, but almost everybody eventually winds up installing a good .40 or a .45, just because it's more fun with a little extra power. I have a Supertigre .46 on one of mine, and it really does get it on!

When you are sure that you finally have the proper (for this project) mental attitude, start by making templates for the foam wing cores. Try to get them to resemble the airfoil shown on the plans, but don't be too fussy. When you have the cores cut, install the balsa leading edge strips and 1/8" dowel trailing edges — use strips of masking tape to hold them in place while the glue is curing. Cut the ailerons from 3/16" sheet balsa and glue the 1/8" dowel leading edges in place — note that the dowel stops short of the inboard ends to leave space for the aileron horns.

With a plane and a nice long sanding block, work the balsa leading edges of all four wing panels to shape. The leading edge sheeting for all panels is 3" x 1/16" balsa, top and bottom. If you start with three-foot-long pieces and cut them to 24" long for wing sheeting, you

will need about 13 sheets of 1/16" balsa for the whole plane. Split 3" wide pieces into 1 1/4" and 1 3/4" strips; use the narrower ones for trailing edge sheeting, top and bottom, for the lower wing and the wider ones for the upper wing.

The sheeting can be installed in any of the usual ways, but the fastest method is as follows:

(1) Lay the 24" long sheeting on a flat surface and run a strip of 3/4" masking tape full length along one edge, half on and half off the sheeting.

(2) Position the sheet on the wing core exactly where it will be when glued down. Holding it in place with one hand, run your other thumb down across the sheeting and leading edge in several spots, adhering the masking tape to the front edge and bottom of the leading edge. When the sheeting is firmly located on the leading edge, press the rest of the tape down and around the leading edge to make a full length masking tape "hinge."

(3) Mark the location of the trailing edge of the sheeting on the foam core with a felt-tip pen. Open the sheeting and foam core, book-fashion, to expose the underside of the sheeting and the corresponding contact surface of the foam core. Mask off the remainder of the foam core by laying a piece of newspaper up to the felt-tip pen marks.

(4) With Scotch Brand 77 Contact Spray Adhesive, spray the underside of the sheeting, the exposed leading edge, and the foam core. Use sparingly, but make an extra pass down the middle where the "hinge" is, to make sure the leading edge will have sufficient adhesive to glue it down securely.

(5) Let dry for a minute or two, then, working from the leading edge, "close the book." Press into firm contact over the whole surface, then strip off the masking tape hinge and repeat the whole procedure with the leading edge cap sheeting on the bottom of the wing, and the trailing edge top and bottom.

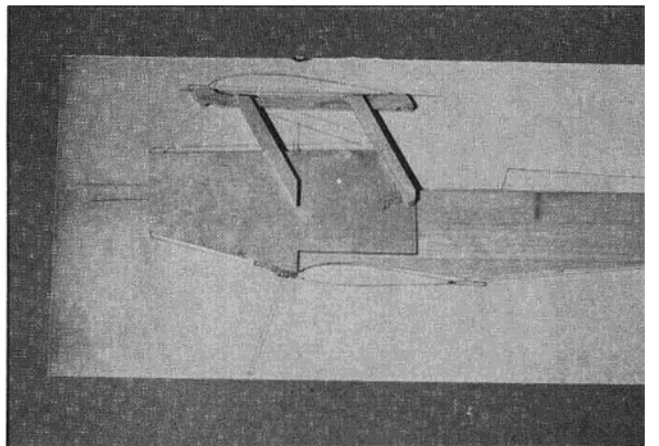
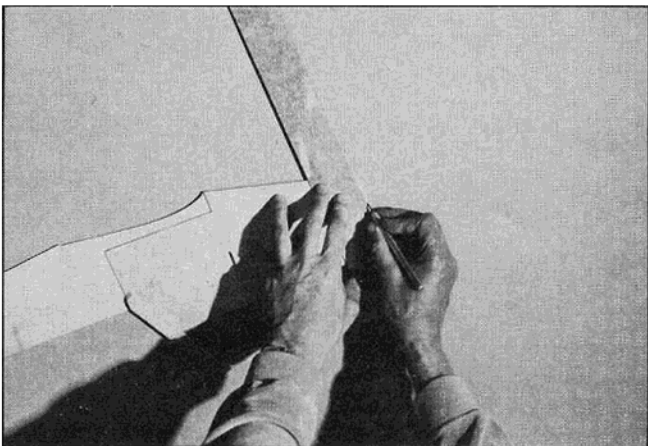
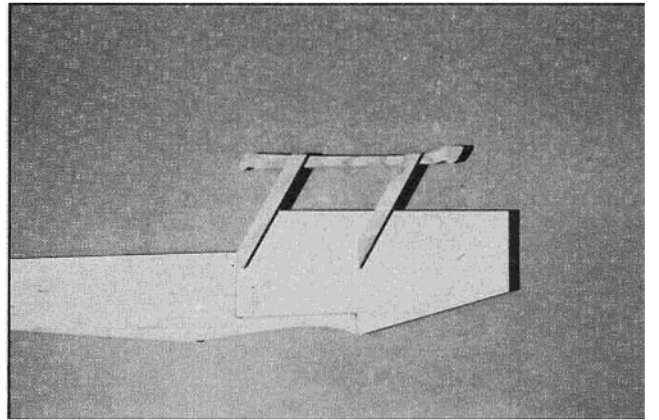
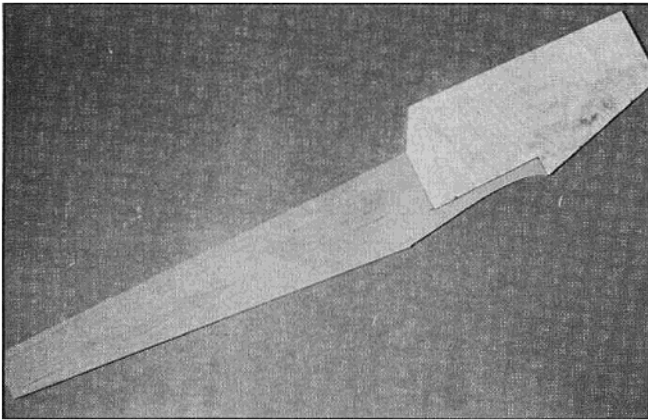
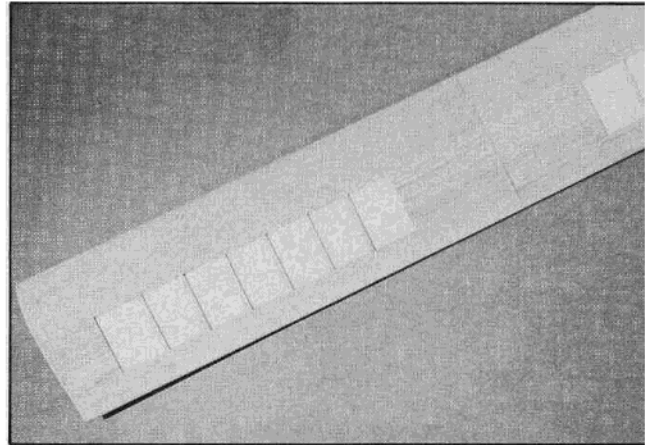
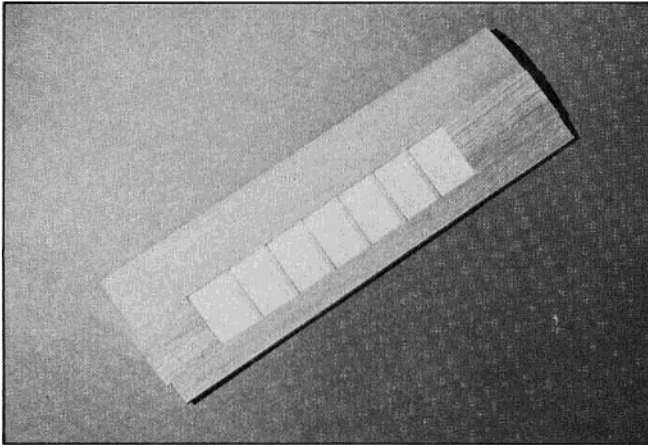
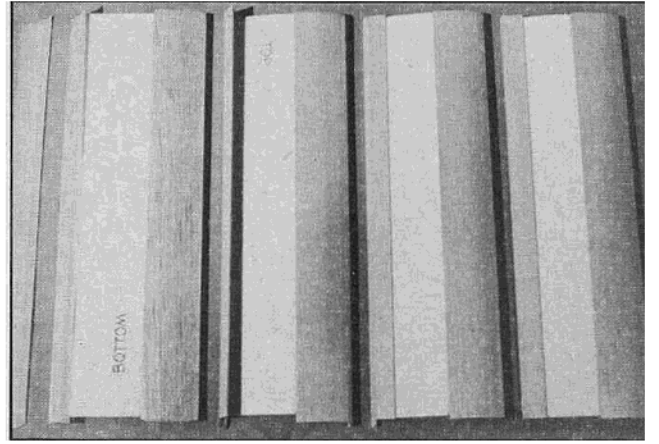
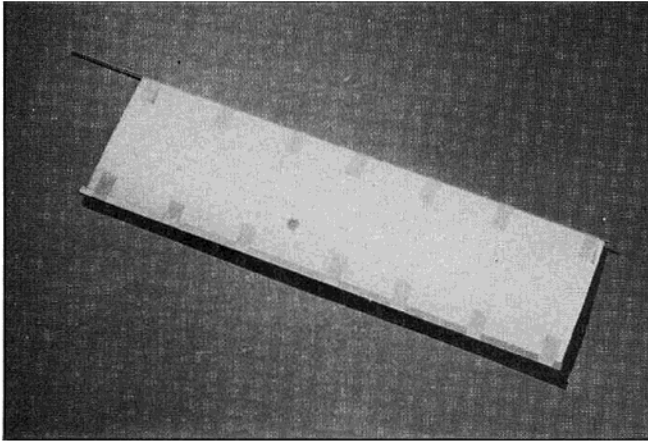
(6) When all leading edge and trailing edge cap sheets have been installed, trim the lower wing panels to the proper length. Cut the tips on both the upper and lower wings to a 30° bevel as shown on the plans. This is a straight flat cut — the rounded appearance from the top view is due to the curve of the airfoil. A power saw works best, but a sharp butcher knife used in a sawing fashion will do the job. Sand the inboard ends of the lower wing panels to the proper angle for 1 1/4" dihedral under each wingtip. Glue the center joints together on both wings with 5-minute epoxy, making sure that the leading and trailing edges are properly aligned.

(7) Cut the center and tip planking to



Above, the RCM Basic Bipe Mk II. Below, The Basic Bipe, Baby Basic Bipe, and the Mini Bipe.





length, and trim to a reasonably snug fit between the leading and trailing cap sheets. Spray a liberal coat of contact cement on the contact side and immediately press into place to transfer some of the cement to the foam. Lift off and let dry for a minute or two while you run a light bead of white glue along the edges of the leading and trailing cap sheets where the planking occurs. Press the planking in place and scrape off the excess white glue squeezed out of the joint.

(8) When all center and tip planking is in place, mark the locations of the false rib cap strips on the foam with a felt tip pen. Pre-bend the cap strips by rolling a hexagonal pencil gently over the strip; cut to length, coat the contact surface with white glue and press in place. Pin the ends down if necessary — if the strips are properly pre-bent, they should stay in place without pins.

(9) Install the 1/8" balsa tip plates with white glue or epoxy, then sand the leading and trailing edges to the contour shown, round the edges of the tip plates, and gently sand the entire surface with a nice big sanding block to level all mismatched surfaces of cap sheets, planking, and cap strips.

(10) Epoxy a fiberglass tape bandage around the center joints of both wings. This whole process is much easier to do than to describe — you should be able to complete both wings in an evening and still have time to watch the 11:00 news on television. You can, of course, use a water-base contact cement and brush it on, in lieu of the spray adhesive — it just takes a little longer.

Fabricate the aileron horns from 3/32" welding rod or coat-hanger wire and 3/32" I.D. brass tubing as shown on the plans. Epoxy these to the trailing edge of the lower wing where shown, and epoxy a strip of fiberglass tape over them for extra strength. Sand off any big lumps of epoxy, and cover the wings with Solarfilm or MonoKote.

Sand the rough edges off the ailerons and drill holes for the aileron horns. Cover with Solarfilm or MonoKote, except at the leading edge where the aileron horns go. Slip a piece of Saran-Wrap, or the backing film from the Solarfilm, between the aileron horn extensions and the trailing edges of the wing, glob some epoxy on the wires, and push the ailerons into position. Fold the Saran-Wrap over the ailerons to force the epoxy to fill the space between the wire and the aileron, and tape in position until the epoxy cures.

Hinges are made from 12 lb. test limp nylon fishing leader material, sewn in a figure-eight pattern around the trailing edge dowel of the wing and the leading edge dowel of the aileron. Drill six 1/32" holes, 1/8" apart, directly behind the dowels, and lace the nylon through in the pattern shown. Place a drop of white glue or epoxy in each of the holes after

RCM BASIC BIPE MK II

Designed By: Darrel C. Stebbins

TYPE AIRCRAFT

Sport Biplane

WINGSPAN

48" Top — 44" Bottom

WING CHORD

8½ Inches

TOTAL WING AREA

772 Square Inches

WING LOCATION

Biplane

AIRFOIL

Semi-Symmetrical

WING PLANFORM

Constant Chord

DIHEDRAL, EACH TIP

1¼" (Lower Wing Only)

O.A. FUSELAGE LENGTH

40" (Including Engine)

RADIO COMPARTMENT AREA

(L) 7½" X (W) 3" X (H) 5"

STABILIZER SPAN

18 Inches

STABILIZER CHORD (incl. elev.)

6 Inches

STABILIZER AREA

104 Square Inches

STAB AIRFOIL SECTION

Flat

STABILIZER LOCATION

Top of Fuselage

VERTICAL FIN HEIGHT

6 Inches

VERTICAL FIN WIDTH (incl. rudder)

6 Inches

REC. ENGINE SIZE

.35-.46 Cu. In.

FUEL TANK SIZE

8-12 Ounce

LANDING GEAR

Conventional

REC. NO. OF CHANNELS

4

CONTROL FUNCTIONS

Rud., Elev., Ail., Throt.

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa and Ply
Wing	Foam and Balsa
Empennage	Balsa & Hardwood
Weight Ready-To-Fly	80 Oz.
Wing Loading	14.9 Oz/Sq. Ft.

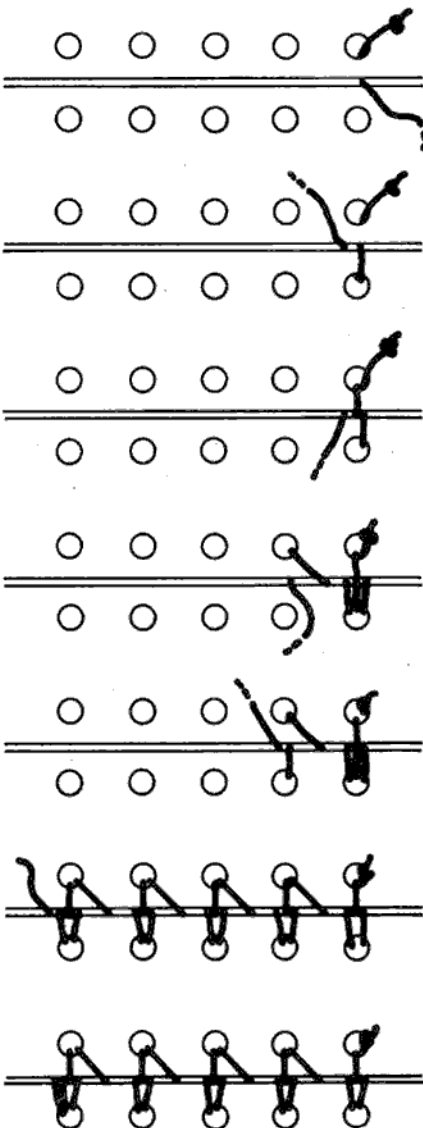
Cut monofilament fishing line into 18" lengths — make cuts at an angle with a razor blade or X-Acto knife to provide a pointed end on the monofilament.

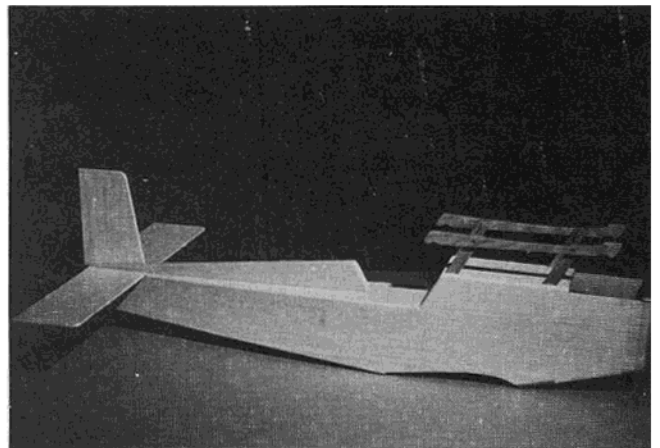
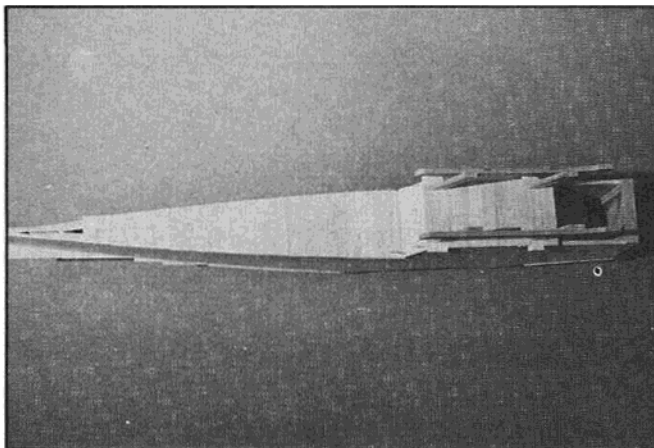
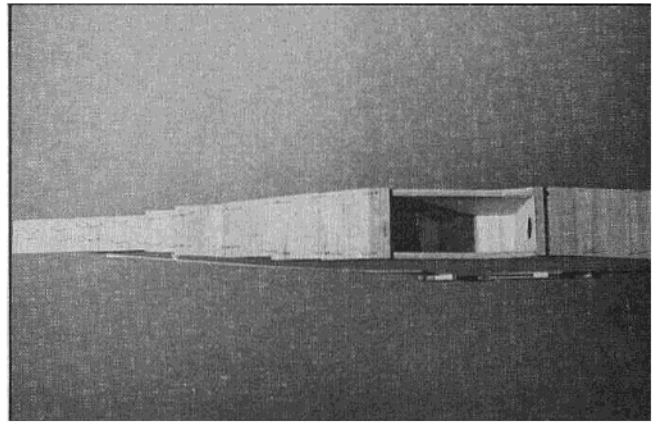
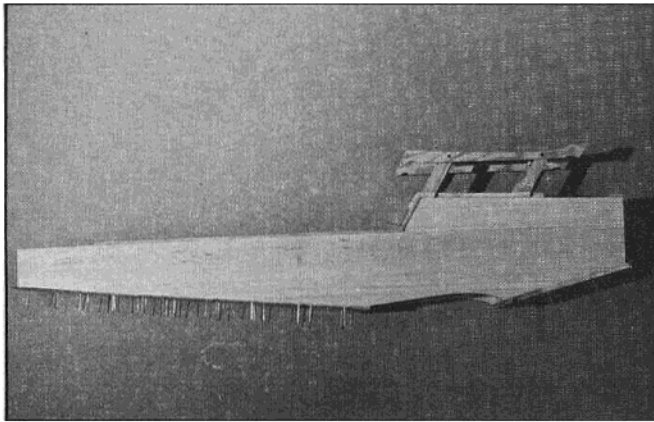
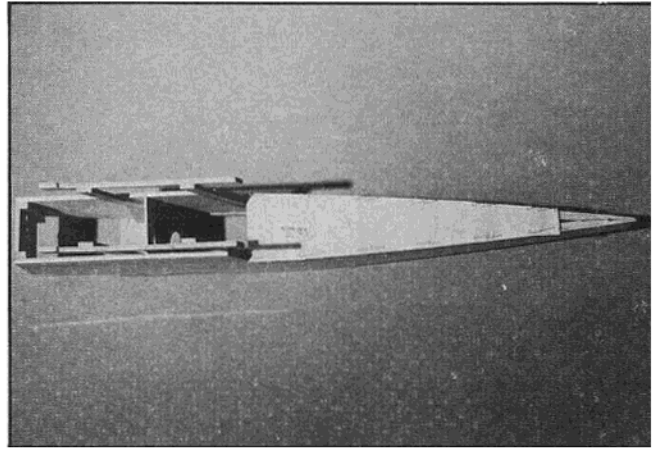
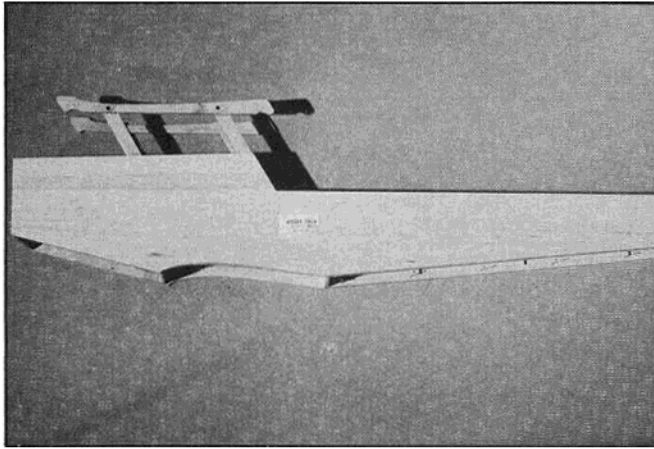
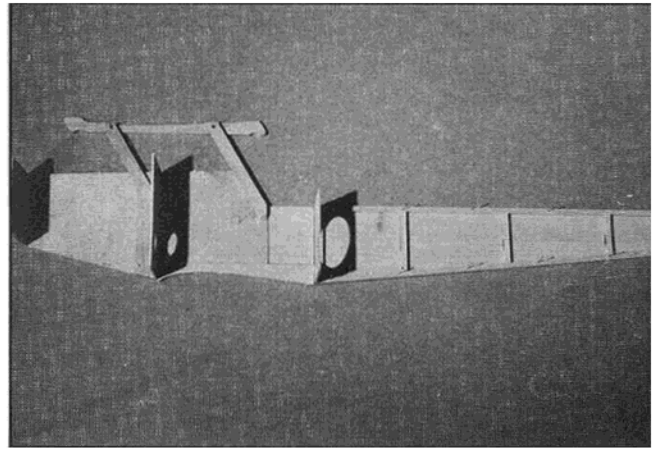
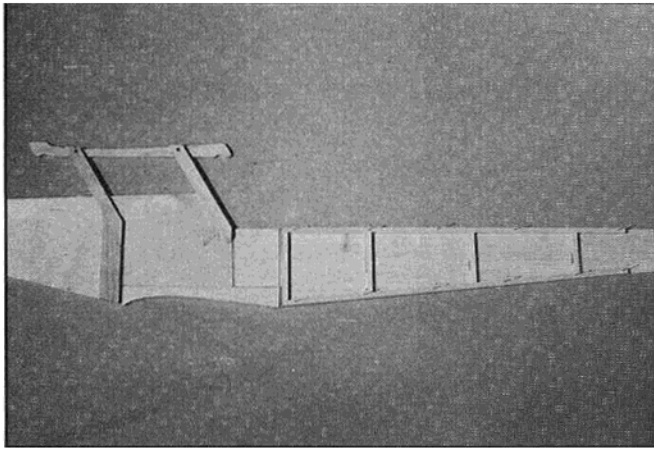


Tie a knot in one end and thread through first hole — don't pull it tight yet. Push the end up through the slot between the surfaces — then back down through opposite hole and up again through slot between surfaces — then down through first hole and up through the slot again — now pull it snug to seat knot down to surface of the first hole.

Continue — going DOWN through the holes (twice for each hole) and UP through the slot between the surfaces. Pull line reasonably snug as you go. Finish end by looping through the last hole one extra time — pull snug and place a small drop of white glue in each hole to secure the whole mess. Trim off excess at ends.

(Note — holes are shown much larger than they really are for clarity. Drill holes with 1/32" drill, enlarge slightly with round toothpick, if necessary.)





the lacing is completed. This hinge system is a hold-over from early radio control days, and still provides the most friction-free, reliable, and misalignment-proof hinge known. Cheap, quick and strong, especially when you have dowels to prevent the thread from tearing out of the soft balsa.

Cut the lower part of the fuselage sides from 3/16" x 4" x 36" balsa sheets. (Save the parts cut off from the bottom — these will become the "headrest fairing" later on.) Cut the upper fuselage sides to shape from 3/16" balsa sheets and glue to the lower parts. Use Zap or Hot-Stuff if you're in a hurry.

Cut the 1/16" plywood doublers to shape from 6" x 12" sheets. Using contact cement, install the doublers to the fuselage sides — be sure and make one left side and one right side. Cut the 3/16" balsa lower wing saddles to shape and contact cement them in place.

While you're in the cutting business, you might as well cut out all the 1/4" plywood parts — upper wing saddles, cabane struts, landing gear retainers, firewall, and firewall cap. If you don't have the proper power tools to do this the easy way, introduce some lucky high-school boy to our hobby (read "obsession") by having him cut these parts out for you in his manual arts class.

Carefully position one of the upper wing saddles and the right fuselage side on the plans and glue a pair of cabane struts to both the wing saddle and the fuselage side in the exact position shown. Use epoxy or white glue. Get this step right! When the glue has cured, flop the fuselage side over and assemble the left fuselage side, wing saddle and cabane struts over the right side — to insure correct alignment of the upper wing. While the sides are still stacked, drill 3/16" diameter holes at the center of the junctures of the cabane struts and wing saddles for the 3/16" dowel stiffeners.

Trim 3/32" from the front end of the *right* fuselage side to provide right thrust at the firewall. Using epoxy or white glue, install the vertical landing gear wire retainers in place — be sure and leave a 1/8" gap between the landing gear retainers and lower wing saddles for bulkhead "A". Glue the 3/16" square balsa stringers and stiffeners to the fuselage sides where shown on the plans.

Lay one of the fuselage sides on a flat surface and glue bulkheads "A" and "B" in place — check to make sure that the bulkheads are at right angles to the fuselage side. When the glue has cured, glue the other fuselage side in place. Mark and drill the firewall for your motor mounts, and sand a slight bevel on the sides of the firewall for a closer fit to the fuselage sides (right thrust, remember?). Glue the firewall in place with epoxy or white glue, and glue in the triangular balsa fillets to provide additional strength at this critical joint.

BASIC BIPE MATERIALS LIST

- 1/4" plywood — 1 sheet 12" x 6"***
- 1/8" plywood — 1 sheet 12" x 6"
- 1/16" plywood — 2 sheets 12" x 6"
- 1/16" balsa — 13 sheets 3" x 36"
- 1/8" balsa — 1 sheet 3" x 36"
- 3/16" balsa — 2 sheets 3" x 36",
2 sheets 4" x 36"
- 1/4" balsa — 1 sheet 3" x 36"
- 3/8" balsa — 1 3/8" x 1" x 12"
- 1/8" dowels — 3 @ 48"
- 3/16" dowels — 3 @ 36" (1 for 2 pushrods)
- 1/4" dowels — 1 @ 9"
- 3/16" square balsa — 3 @ 36"
- 3/8" square balsa — 2 @ 48" or 4 @ 24"
- 5/32" piano wire — 1 @ 36"
- 3/32" welding rod or coathanger wire,
1 @ 14"
- 1/16" piano wire — 1 @ 6"
- 1/16" I.D. brass tubing — 1"
- 3/32" I.D. brass tubing — 4"
- Landing gear retainers — 1 set
- Brass grommet, 4/40 bolt, 4/40 blind
nut — 1 each
- Fiberglass tape — 1" x 2 yards
(or use 4" wide x 2 yards)
- 2 3/4" or 3" wheels — 1 pair
- 1" or 3/4" tail wheel — 1 each
- Shim stock or tin can stock
- Wheel collars
- One cable type "NyRod" for motor control
- Two nylon control horns
- Motor mount (Fox, Kraft, Bridi, etc.)
- Nylon fishing line (12# limp)
- Gas tank (8 to 12 oz.)
- One set aileron horn swivels
- Four metal clevises with rods
- Two rolls Solarfilm or MonoKote
- Contact cement suitable for styrofoam —
spray or brush (Regular contact cement
is okay for doublers)
- Willhold Aliphatic Resin glue
- Epoxy Glue (Hobbypoxy #2)
- Paint — Superpoxy, Hobbypoxy, or Acrylic
Enamel (with plasticizer)

** One sheet 12" x 6" x 1/4" plywood won't quite make it, but you will have enough 1/8" plywood to laminate two pieces together with epoxy to provide the missing piece.

When the glue has cured, bring the tail ends of the fuselage sides together to determine the bevel cut required to make the tail end 3/16" thick when glued together. Trim the excess wood from the inside of the fuselage sides and stringers and glue the sides together in exact alignment. Clamp in place until the glue cures.

Glue the landing gear retainer block in place — make sure that the holes line up with the grooves in the vertical landing gear wire retainers. Glue the 1/8" plywood stiffener at the rear of the lower wing saddle in place. Install the 1/16" cross grain balsa fuselage bottom sheeting, and the 1/4" cross grain balsa sheeting from the plywood landing gear retainer forward to the firewall. The 1/8" cross grain balsa fuselage top may now be installed back to the leading edge of the horizontal stab. Epoxy or white glue the 1/4" plywood lid over the top of the firewall. Trim the 1/4" cross grain balsa pieces to clear the cabane struts and glue in place. Fill in the outside of the cabane struts with scrap 1/4" balsa.

Trim the 1/4" balsa hatch cover to fit, and glue the 1/16" plywood retainer lip in place on the underside of the hatch cover. Epoxy the 1/8" plywood hatch hold-down retainer to the underside of the 1/4" plywood firewall lid. Hold the hatch cover in position and drill through the hatch cover and 1/8" plywood retainer where shown. Remove the hatch cover, install a 4-40 blind nut in the plywood plate and a brass grommet in the hatch cover. Slide 3/16" dowel spreaders through the holes previously drilled in the upper wing mounts and glue in place (Zap is best, but white glue or epoxy works, too).

Glue the 3/16" x 1/2" balsa tips on the horizontal stabilizer, and a 3/16" dowel full length on the trailing edge. Pin the elevator halves down to a flat surface and space them so that the tips will line up with the tips of the stabilizer, and glue the 3/16" dowel to the leading edges. Sand all edges to a radius, if you insist on being neat.

Glue a 3/16" square balsa spreader between the top edges and at the front of the "headrest fairing" sides (I couldn't think of anything else to call it!). Make the spreader just long enough to reach the front edge of the vertical fin. Again, sand the top and front edges, if you must. White glue or epoxy the horizontal stabilizer in place — check to see that it is square with the centerline of the fuselage and that it lines up with the wing.

Trim 1/16" off the bottom edges of the back of the headrest fairing so that it will rest flat on the horizontal stab, and glue it in place. This should run exactly down the centerline of the fuselage because it will determine the fin alignment. Glue the 3/16" dowel to the back of the vertical fin, and glue the vertical fin in place between the extended ends of the headrest fair-

ing and down tight against the horizontal stab.

Epoxy the 1/16" I.D. brass tubing tail-wheel bearing in place at the rear of the fuselage, and epoxy a strip of fiberglass tape over it to hold it securely.

Sand the corners and rough edges of the fuselage to your taste and epoxy a strip of fiberglass tape over the joint between fuselage and firewall, lapping over both. The fuselage may now be given a couple of coats of epoxy paint. Forget all the filling, sanding, priming, etc., — just give everything a couple of coats of paint. This is a fun airplane, remember? Paint the fuselage, cabane struts, upper wing saddle, headrest fairing and vertical fin. The horizontal stab, elevators and rudder can either be painted or covered with Solarfilm to match the wings.

Lace in the hinges for the rudder and elevators, install the control horns and pushrods, tank, landing gear and tail wheel, engine and radio, and you're ready for some very pleasant hours of flying!

By the way, if you install the wheels with a few degrees of camber and toe-in (bowlegged and pigeon-toed), the plane will handle beautifully on the ground.

Trim for flying by setting all control surfaces zero-zero. Aileron travel should be about 1/4" to 5/16" up and down, elevators about 3/8" up and down, and rudder about 3/4" each way. Balance on, or slightly in front of, the point indicated. *Do not try to fly a tail-heavy biplane!* All-up dry weight should be about 4½ pounds, but don't be afraid to add weight to the nose if necessary. (The engine should be mounted forward on the engine mounts, like it shows on the drawings, and a spinner will add some weight forward.)

If the ship flies straight and level under low power, but tends to climb too much at full power, add a washer or two more down thrust on the engine.

If it wants to climb too much even at low power, decrease the incidence of the upper wing by raising the trailing edge 1/16" or so by putting shims between the trailing edge and the wing saddle. Try a popsicle stick for a temporary shim.

When you get the plane trimmed out, try some of the old-time maneuvers you normally don't see the pattern-ship jockeys trying — hammerhead stalls, wing-overs, tail slides, side-slip landing approaches, Chandelles, inverted spins — but mainly just have fun flying. The plane will perform the standard biplane maneuvers beautifully — snap rolls, Cuban Eights, inside and outside loops, and, from an absolute full stall, the most spectacular flat spin you will ever see.

Use plenty of rubber bands on the wings — and Go Get 'Em, Red Baron!! □

From RCModeler June 1977