CHAPTER IV

BUILDING THE OLYMPIC 650

After finding out a little bit about gliders and their habits, it's time to put a real one together — if you are still interested. This chapter, along with RCM Plan #845, will guide you through the construction of a first glider. This plan is available through R/C Modeler Magazine Full Size Plan Service for a modest price. Although the Oly 650 was designed as a trainer — stable and gentle — it is perfectly capable of winning thermal contests, and prototypes of the ship have done just that. It is easy to build and is very strong and durable. It is designed to take the hard knocks required of a first plane.

For the very first-time flier, it is advisable to build the Oly 650 as a glider and learn the basics of control on a slope, or on a hi-start. Later on, it can be modified to take an electric power system, or a glow engine to provide convenient launching options, as described in Chapter VIII. Before you start, read through the entire chapter, so as to have a clear view of what you are going to do.

Section 1 — Tools Required

Although the tools required to build models are rather simple, there are some that are indispensable. The first thing you will need is a good **flat** building board. It must be soft enough to stick pins into and must be knot-free. An ideal building surface is a cheap hollow core door. Defective doors or odd sizes are often on sale at lumber yards. Do not get one with masonite skins. You will want one skinned with 1/8" Philippine mahogany, or the like — soft enough for pins. Or, another good board is a piece of redwood 1" x 12", about 6' long. Redwood is generally soft and straight and less expensive than clear pine. The following hand tools will also be needed.

X-Acto knife with #11 blades.
Waxpaper.
Tack hammer.
"T" pins (Sig #16), 24 or so.
Sandpaper — 80 and 120 grit, #400 wet or dry.
Drills — 1/16", 5/32", 1/8", 3/16", 9/64" (a drill set from 1/16" to 1/4" is handy).
Electric or hand drill.
Square, or 90 degree triangle.
Metal meter, or yardstick (Lufkin #1261 or equivalent). A straight wooden yardstick can be used.
Hand coping saw (or jig saw if you have one).
Clothespins, 12 (preferably wooden).
3" C clamp, 2 (or Kraft 200-106 Modelers Clamp).
Thumb tacks.
Hacksaw.
8" flat smooth file.
1" hole saw and/or wood bit (optional, see photo for use).

Contact cement or glue the 80 and 120 grit sandpaper to each side of a 3/4" x 2¾" x 9" board to make a sanding block.

Adhesives:

Aliphatic resin glue (Titebond or Wilhold).
5-minute epoxy (Hobbypoxy No. 4 or equivalent).
Rubber cement (Sanford's #494 or equivalent, 4 oz.).

Note: I like to put the aliphatic glue in a small bottle with a screw lid and apply it with a brush.

Section 2 — Materials Required

Assemble the following materials. Everything should be available from your friendly hobby shop with exception of the pine nose block. This can be had from the scrap bin of your lumber yard, or the nearest construction site.

BILL OF MATERIALS:

Quantity	Size	Material	Use
1	12'' x 36'' x 1/8''	Air Ply or Lite Ply*	Fuselage sides and floor
2	1/16'' x 1/4'' x 36''	Spruce	Fuselage reinforcement
1	1/16'' x 3/16'' x 36''	Spruce	Stab and fin reinforcement
3	1/4'' x 1/4'' x 36''	Spruce	Wing spars
2	1/4'' x 5/16'' x 36''	Spruce	Wing leading edge
1	1/8'' x 5/8'' x 36''	Spruce	Skid (optional)
2	1/8'' x 1/4'' x 36''	Spruce	Outer wing spar
1	3/16'' Dowel x 36''		Wing hold-down
1	1/8'' Dowel x 36''		Elevator joiner
1	2'' x 2'' x 2½''	Pine	Nose block
1	1/16'' x 6'' x 12''	Birch plywood	W11, W12, Canopy hold-down
1	5/32'' dia.	Piano wire	Wing joiner
1	3/16'' O.D.	Brass tubing	Wing joiner
1	1/16'' x 3'' x 36''	Medium balsa	Fuselage and wing sheeting
4	3/32'' x 3'' x 36''	Medium balsa	Wing ribs, fuselage floor
1	1/4'' x 3'' x 36''	Soft balsa	W3 ribs and fuselage canopy
1	1/8'' x 2'' x 36''	Soft balsa	Elevator
2	1/4'' x 1/4'' x 36''	Medium balsa	Drag spar
3	3/16'' x 1/4'' x 36''	Medium balsa	Stab/rudder structure
2	3/32'' x 3/16'' x 36''	Medium balsa	Stab/rudder ribs
1	3/16'' x 3/4'' x 36''	Soft balsa	Stab/rudder tips, etc.
1	1/4'' triangular x 36''	Medium balsa	Fuselage reinforcement
2	1/4'' x 1'' T.E. Stock	Medium balsa	Wing trailing edge
1	3/4'' x 1'' x 12''	Soft balsa	Wing tips
1	1/8'' x 3/4'' x 36''	Medium balsa	Wing gussets
1 pack	Wing skids	Goldberg WS1	
1	Skid	Airtronics 9514	
1	Towhook	Airtronics 9508	
1 pack	Hinges	Klett RK 2-7	
1 pack	Small rudder horns	Goldberg CH 2	
2	Control Rods	Sullivan 515 (see note)	
2	Super MonoKote	Top Flite (color optional)	
1 box	Rubberbands	#64	
2 packs	Snap Links	Goldberg #207	

* Do not use birch plywood, it is too heavy — use Italian poplar.

Note: These are metal cable pushrods. They have the advantage of not changing length with temperature changes. They are, however, somewhat difficult to work with. The end connectors are meant to be soldered, although epoxy **can** be used. It is also hard to cut them cleanly without using something like the #409 cutting wheel in a Dremel tool. Good wire cutters will also work, or a Tuff Grind Wheel in a drill motor. If you do not have the proper tools, I recommend using Sullivan #504 Gold'N-Rods. These can be installed easily, using the recommended tools. Adjustments in control trim may have to be made during extreme temperature changes.

Removable Tail Option

If the removable tail option is taken, the following additional material is required:

2 — 2-56 x 1/2'' machine screws, with nuts.

1 — #2 x 1/2'' wood screw.

3 — #2 Washers.

1 — 1/16'' diameter x 36'' piano wire

Additional Tool

1 — 3/32'' drill bit.

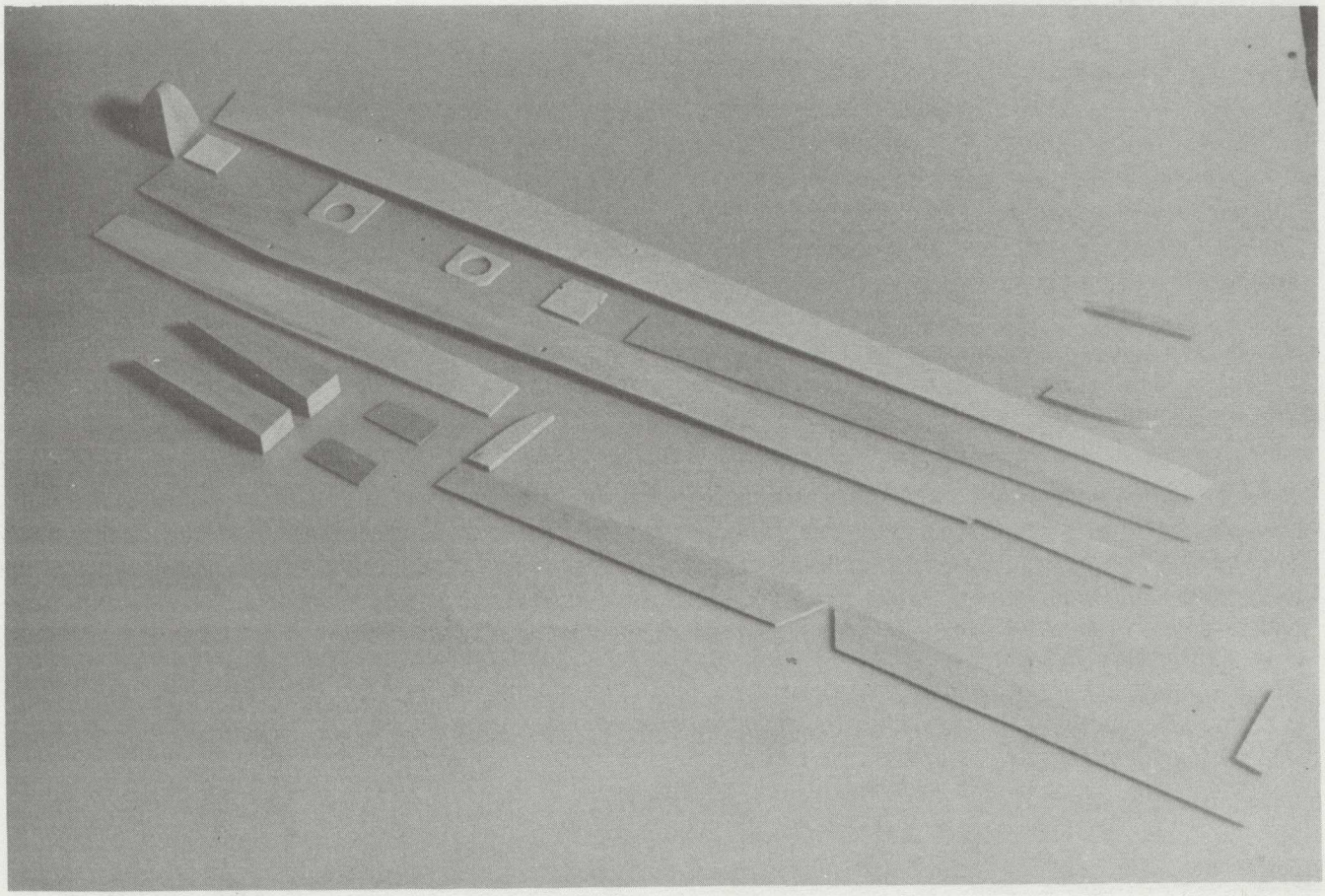
Section 3 — Material Preparation

We will begin construction by cutting out all the parts that must be cut to pattern. That way, we will have a complete kit to start. RCM Plan #845 contains a pattern sheet which we will use to cut the parts to exact size. In the construction, when the word "glue" is used we mean Titebond, or Wilhold. When using glue or epoxy, spread a thin layer on **each** mating surface.

Parts Preparation

(a) Since we will cut around the outline of the rib patterns with an X-Acto knife it is easier if the patterns are thicker than paper. You will need a light cardboard that can still be easily cut with scissors. The cardboard that laundries put in dress shirts is ideal. Cut the rib patterns from the sheet, leaving some trim all around. Now, glue them to the cardboard, using rubber cement. Wipe off the excess cement and let it dry a few minutes until not sticky. **Very carefully** cut to outline with scissors. It is important to do as good a job as possible, so the rib contours will be correct and they will fit properly. Cut out the spar notches using the X-Acto knife.

(b) From one of the 3/32" x 3" x 36" pieces of balsa, cut twelve W2 ribs. If you keep the blade against the pattern and cut a smooth contour, you will not need to sand the ribs. (See photo.) From the sheet of 1/4" x 3" x 36" soft balsa, cut four W3 ribs. Use the W1 pattern to cut three ribs from the 3/32" sheet balsa. You should plan your cutting pattern on the sheet balsa so as not to waste too much. Cut two each W4, W5, W6, W7, W8, W9 and W10 from 3/32" balsa sheet. It helps in assembly if you mark the number on each rib, but if you are going to use transparent covering, make this mark in the area between the top and bottom spar, where it can't be seen. Lay one of the 1/8" x 1/4" x 36" spruce spars on the building board and stack all the W1, W2, and W3 ribs together, and **square** on the spar. Now, with the sanding block, gently dress the leading and trailing edges so all ribs are the same length. If you use the edge of the building board, or the edge of a workbench to guide the sanding block, the ends will be square with the bottom. This is a good technique to use when squaring or sanding an angle on all small parts or strips. Put the patterns in a safe place in case you want to build another wing later.



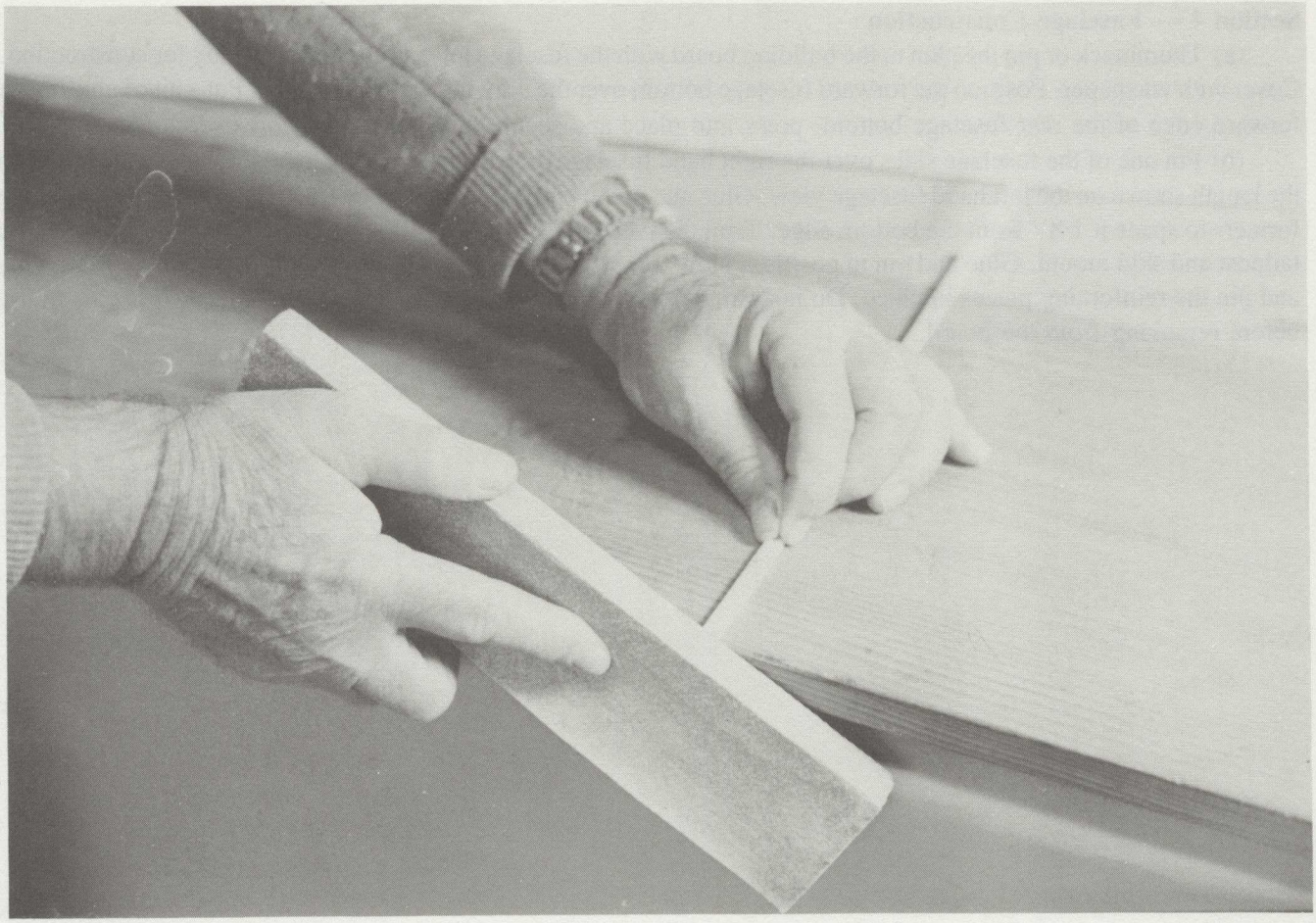
Material Preparation.



Wing ribs cut out.



Technique for squaring wing ribs.



Technique for squaring all parts.

(c) Cut two pieces of 2½'' x 36'' from the sheet of 1/8'' Air Ply. If you cut one from each side of the sheet, both will have one straight edge. Stack these with the straight edges together and fasten them together with three small brads, or a few dabs of rubber cement. Cement the fuselage side pattern to one sheet, with the straight side of the pattern along the straight side of the wood. Saw both pieces of wood to the pattern outline using the coping saw, or a jig saw, if you have one. Use the sanding block to sand the fuselage tops and bottoms straight, while still fastened together. Before taking them apart, mark the position of the reinforcing strips. Take the sides apart and lightly sand off any burrs.

(d) Rubber cement the patterns for fuselage formers F1, F2, F3, and F4 to 1/8'' Air Ply sheet. Cut all formers to the pattern outline and sand to size. If a 1'' hole saw is available, this is an ideal tool for cutting the 1'' holes in F2 and F3. If not, bore a 3/16'' hole in these formers, saw the 1'' hole, and sand smooth. It is not important that these holes be perfect, they are just used for cable access. Remove the patterns before the rubber cement completely dries.

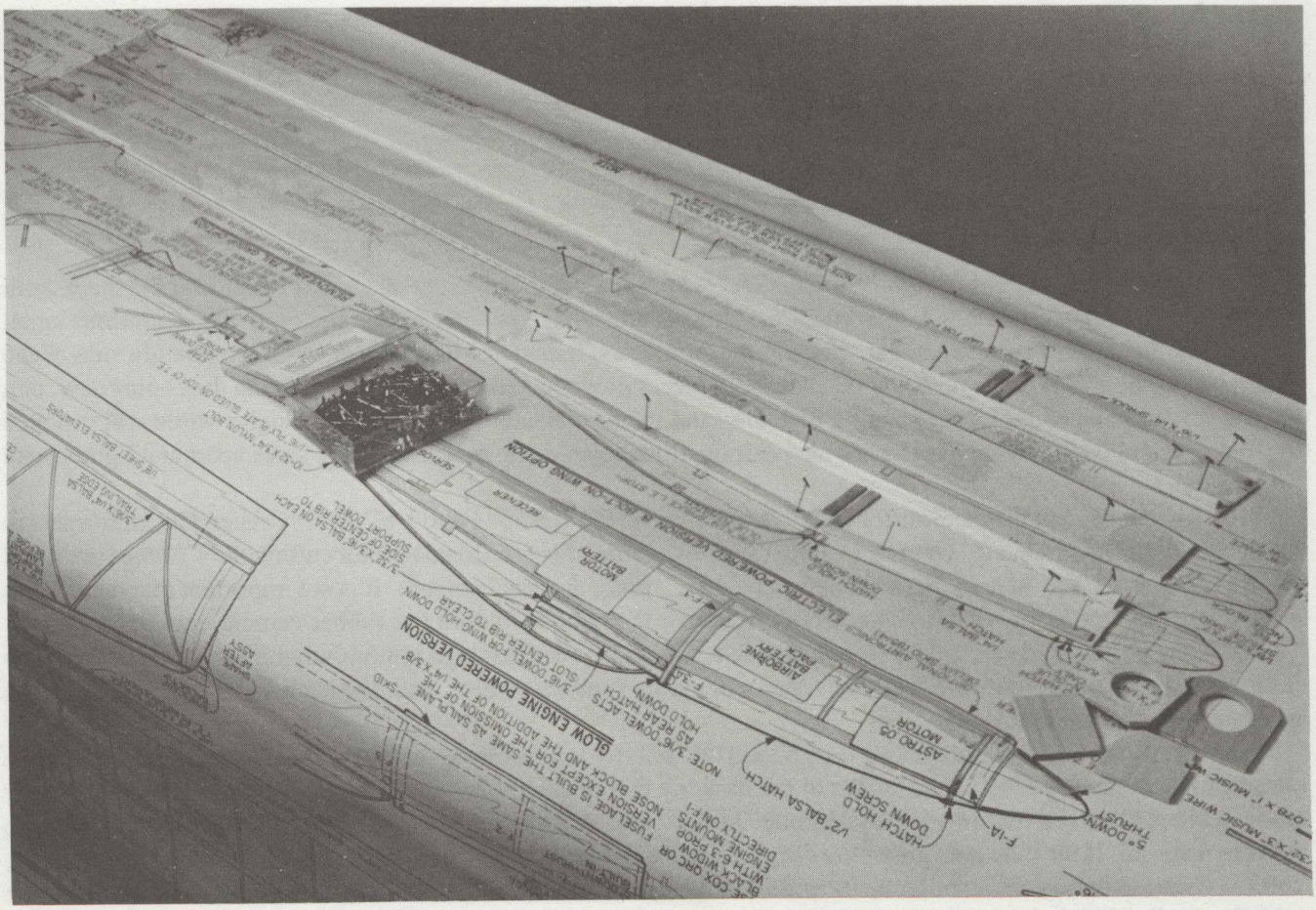
(e) In a similar manner, cut the forward fuselage bottom, rear fuselage bottom wing gussets, elevators, stab leading edge brace, fin root rib, spar webs (note: the grain runs vertically), and two each W11 and W12 from the material listed on the drawing.

(f) It will save a lot of hard carving later if the 1/4'' x 5/16'' x 36'' spruce leading edge material is trimmed to the shape shown in the upper left hand corner of the drawing before assembly. The angle can be trimmed using a razor plane, a block plane, or your trusty X-Acto knife. Just be careful of the grain. Irregular grain can cause a cut too deep into the material. If the cut starts going too deep, reverse the direction of the cut. It's really not as hard as it sounds, I'm just trying to draw your attention to the pitfalls as we go. When the bulk of the material is removed, sand straight with the sanding block. It's easier to do this carving now, rather than when the leading edge is glued onto the wing.

Section 4 — Fuselage Construction

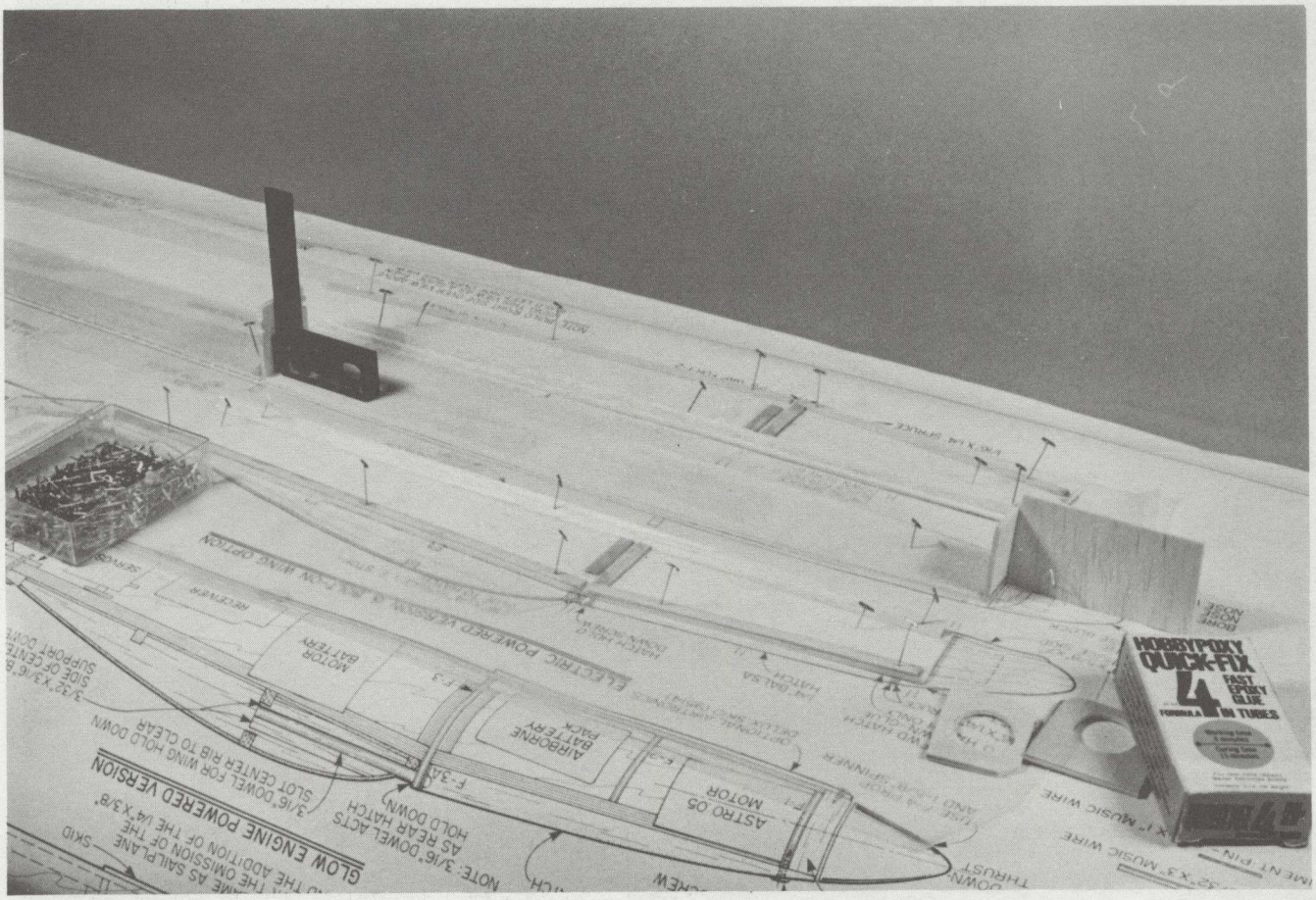
(a) Thumbtack or pin the plan to the building board with the fuselage top and side views handy for construction. Cover with waxpaper. Position the forward fuselage bottom over the drawing and pin in place. Put a bit of glue on the forward edge of the rear fuselage bottom, press into place and secure with pins. Wipe off excess glue.

(b) Pin one of the fuselage sides over the right hand fuselage drawing. Trim a piece of 1/4'' triangular balsa to the length shown on the left hand fuselage view. Glue and pin in place. Use a piece of 1/8'' ply or one of the fuselage formers to space it 1/8'' from the bottom edge. Trim the pieces of 1/16'' x 1/4'' spruce and the 3/16'' x 1/4'' balsa tailpost and skid mount. Glue and pin in position. Now, pin the left hand fuselage side over its drawing. Trim, glue and pin the reinforcing pieces in place. Do not put another tailpost and skid mount on this side. Allow glue to dry before removing from the board.



Reinforcements glued to fuselage sides.

(c) Try formers F1, F2, F3, and F4 in their places to make sure they do not overhang the fuselage bottom. They should be flush on both sides. Take a piece of cardboard a couple of inches square, and trim one side to the 5 degree angle of the forward fuselage side. This will be used to set F1 at the proper angle.



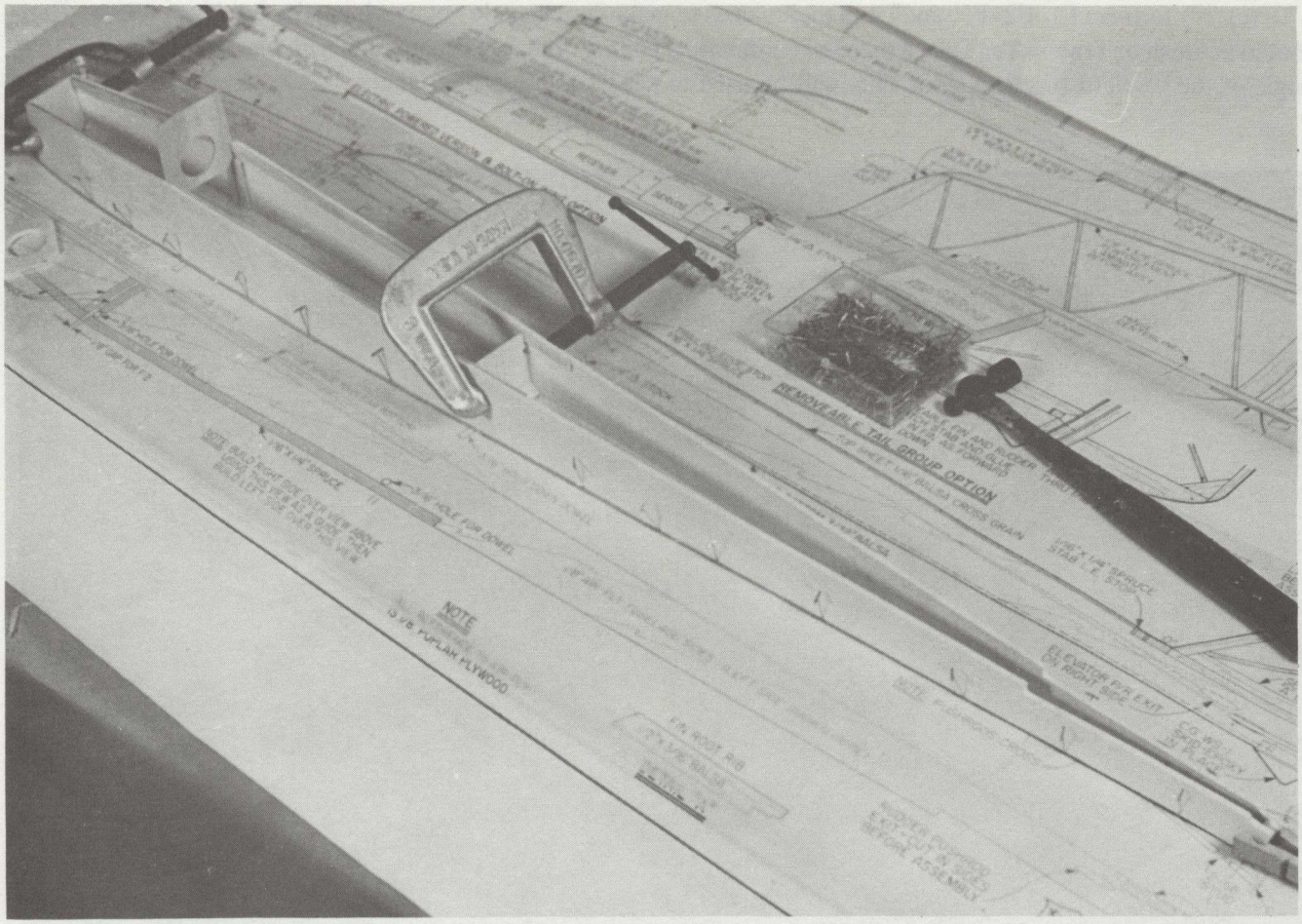
Formers F1 and F4 epoxied in place.

Cut a piece of 1/4'' triangular balsa stock to the width of F4. Mix a small amount of epoxy and epoxy F4, and the triangular brace in place. Check to see that it is square with the fuselage bottom. In the same manner, install F1. Use the cardboard template to set and hold the proper angle until the epoxy cures. Be sure F1 is tipped forward the 5 degrees, not backward.

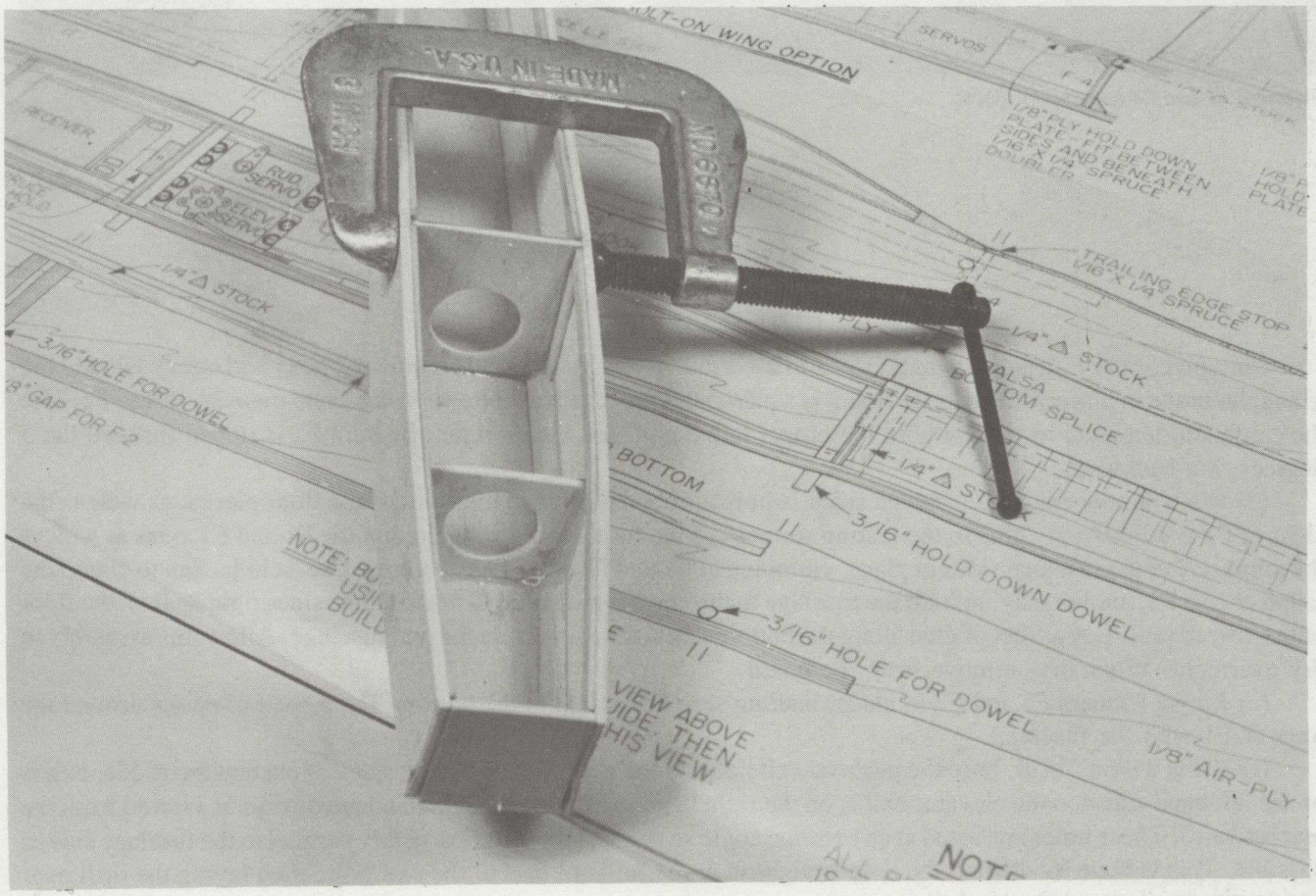
(d) We will now erect the fuselage sides. Apply a ribbon of glue to the sides of the floor pieces, as well as the sides of F1 and F4. Apply glue to the mating surfaces of the fuselage sides, including the F1 and F4 areas as well as the tailpost. Put the fuselage sides in place, clamping at F1 and F4 with 3'' C clamps. Use a clothespin to clamp the tailpost. Use F3, temporarily, to hold the fuselage to the correct width. Hold the fuselage sides tight against the floor with a row of pins. Lay a fillet of glue along the bottom and side seam inside the rear fuselage. Allow this assembly to dry overnight. When dry, remove from the board.

(e) Epoxy formers F2 and F3 in place, making sure F2 is tight to the bottom. Put a bead of epoxy around the joint of F1 with the fuselage.

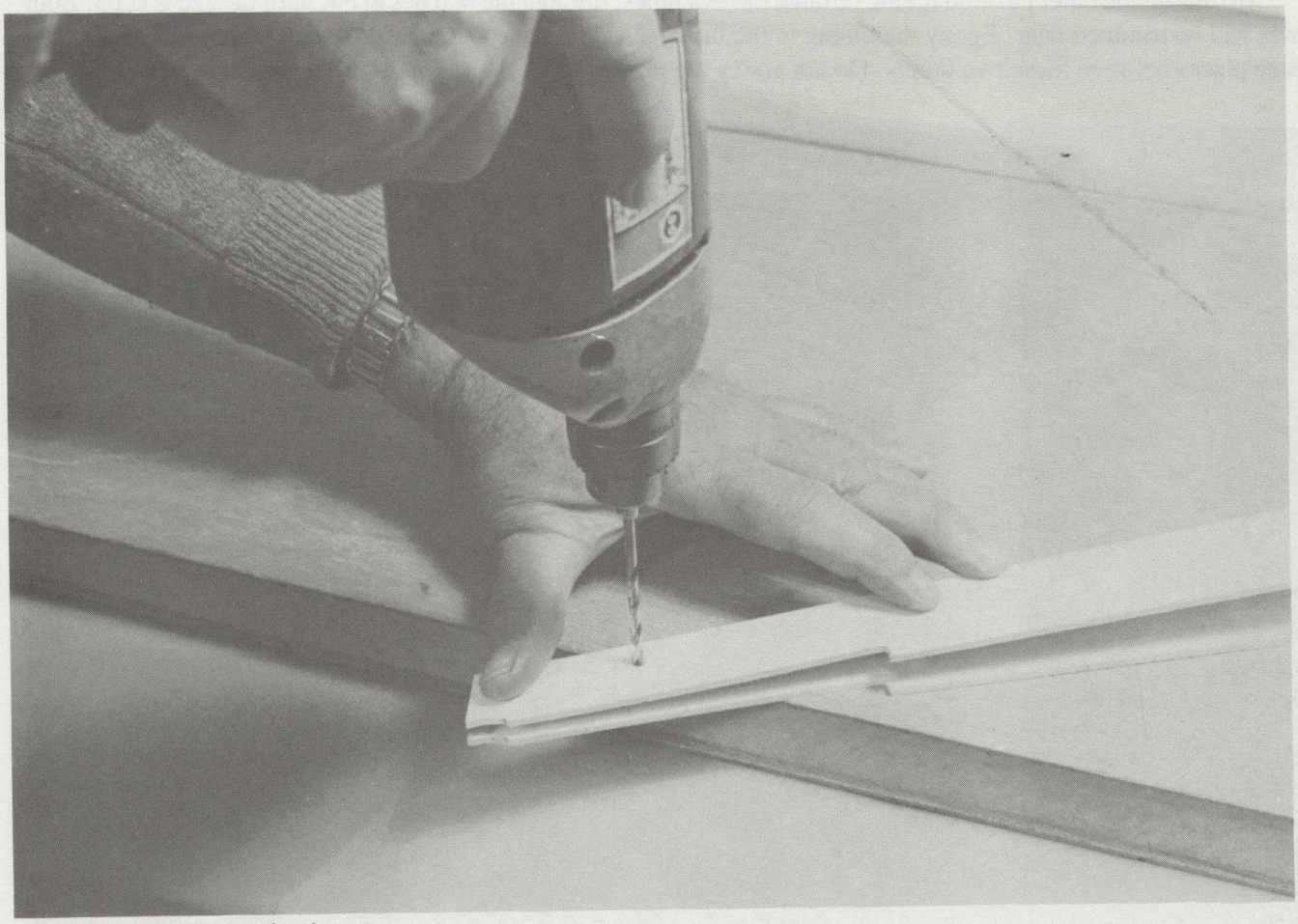
(f) Using a 9/64'' drill, bore the pushrod exit holes in the rear of the fuselage sides. Note that the rudder exit is on the left hand side and the elevator exit is on the right hand side (left and right hand are always as viewed from the rear forward). These holes are bored at an extreme angle so the pushrod exit is as nearly parallel to the fuselage side as possible. This is done by drilling the hole straight in at the forward part of the exit hole, then laying the drill over against the fuselage while the drill is running.



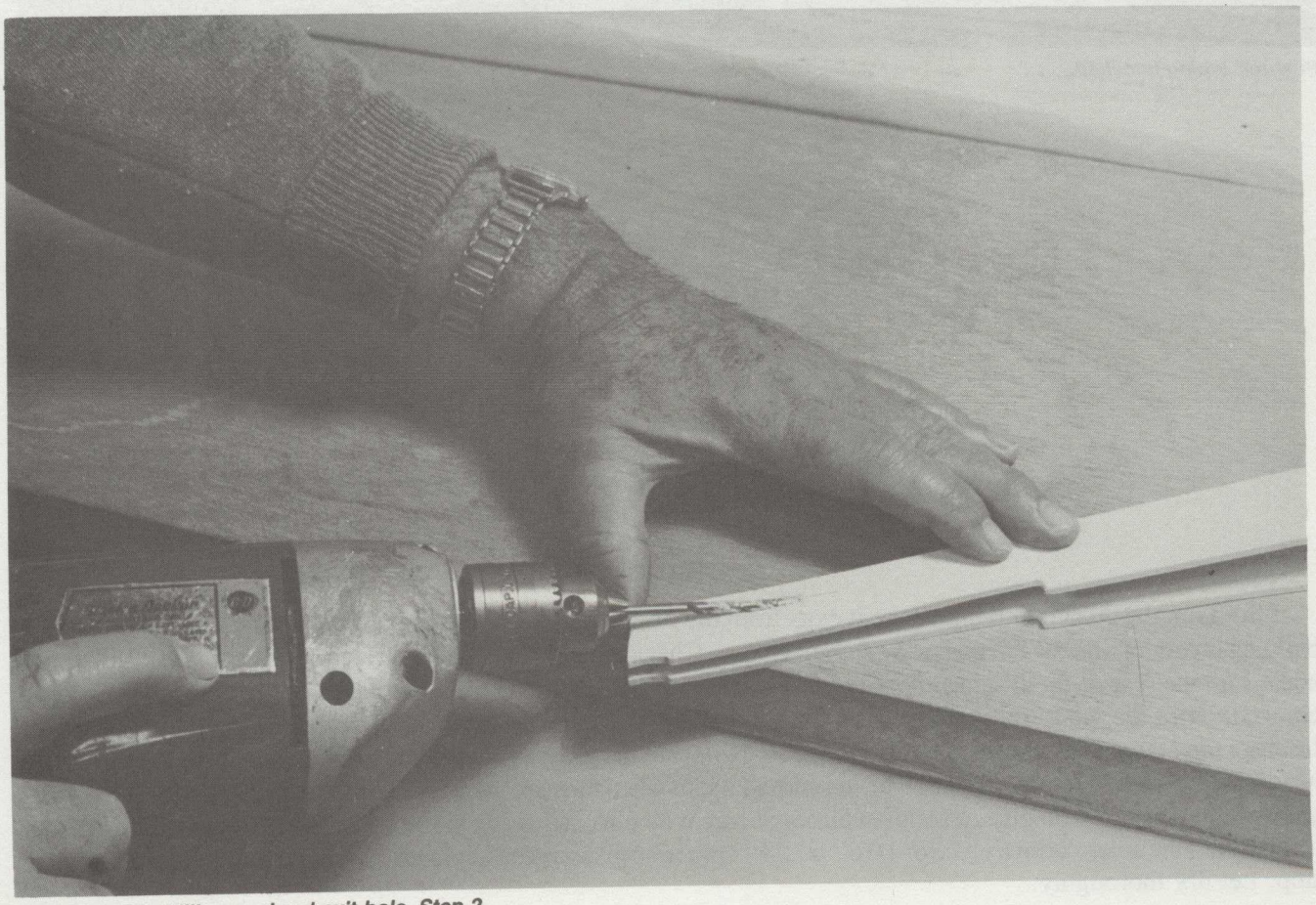
Fuselage sides erected.



Formers F2 and F3 added.

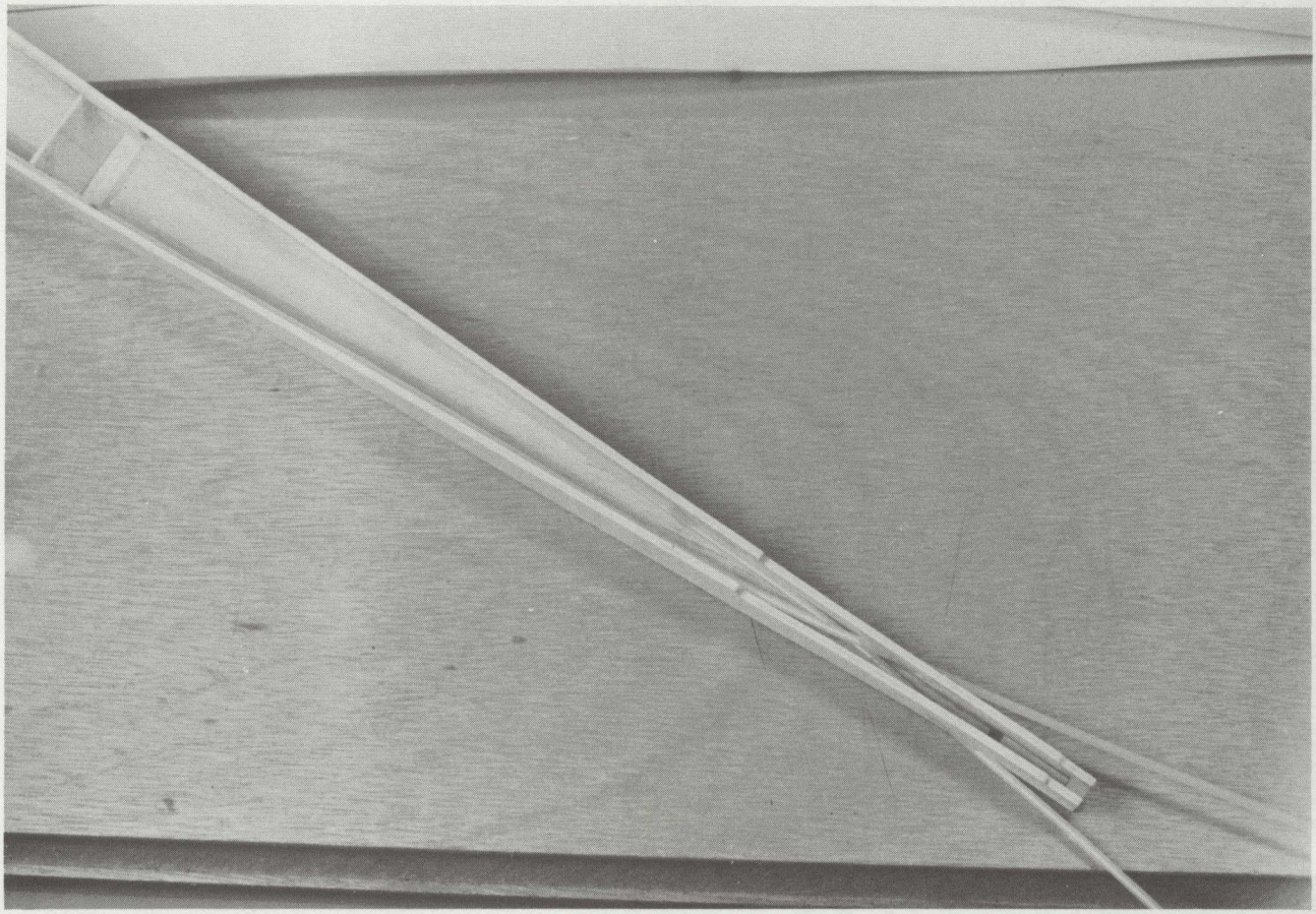


Technique for drilling pushrod.



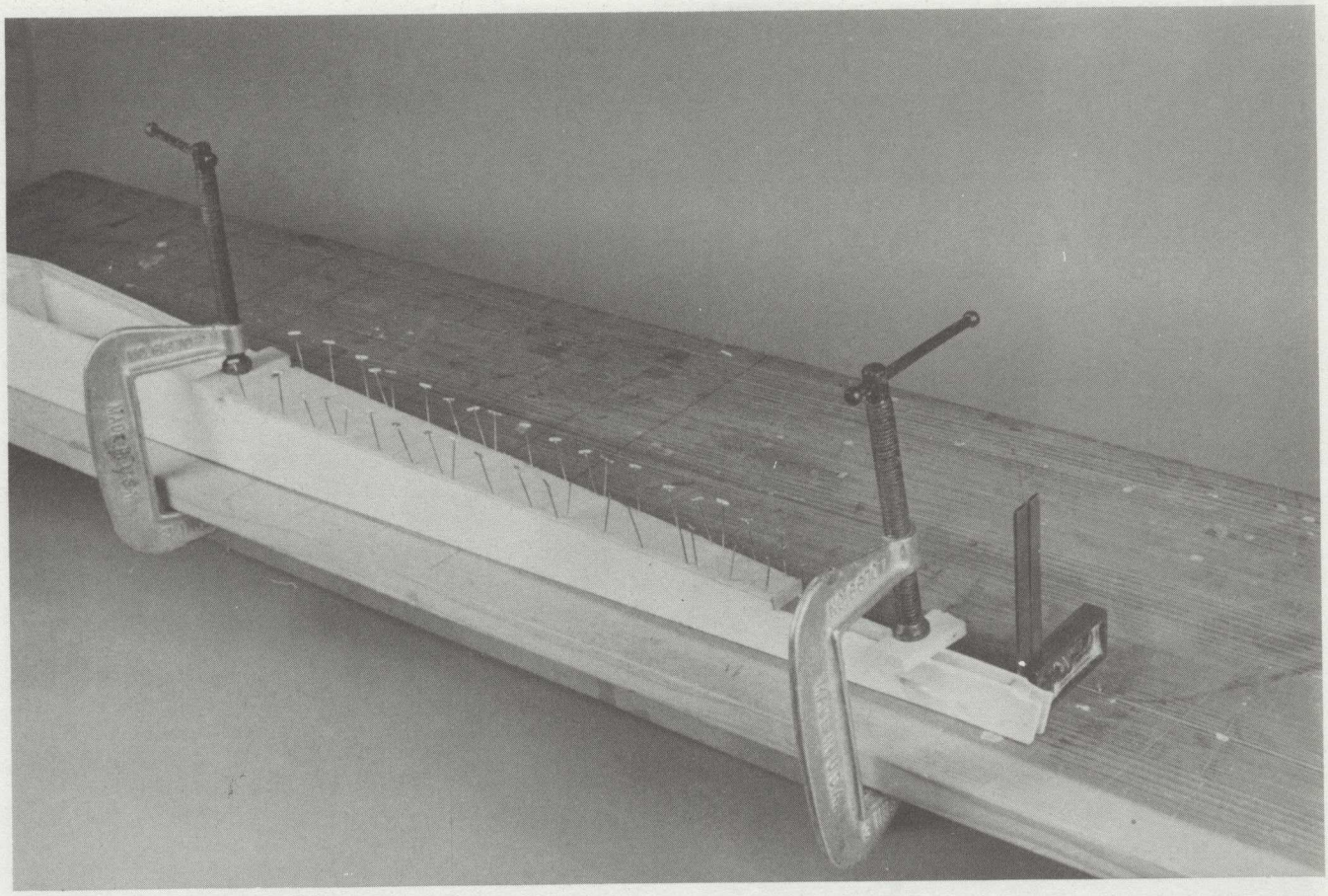
Technique for drilling pushrod exit hole, Step 2.

(g) Install the outer pushrod tubing through the exit holes, through the notches in F4, until the end is at F3. Both ends will be trimmed later. Epoxy the tubing to the fuselage sides inside and out, at the exit holes, former F4, and three places between these two points. Do not epoxy the tubing forward of F4 until the servos have been located.



Pushrod tubing installed.

(h) Trim the pushrod tubing where it exits from the fuselage to get it out of the way. Clamp the fuselage to the building board forward of F4, and in the stabilizer area. Check that the rear of the fuselage is vertical. We do all this to make sure the rear of the fuselage does not twist when we put on the rear top sheeting. If it twists, the fin will be crooked. Trim the wing trailing edge stop from 1/16'' x 1/4'' spruce, and glue in place. Trim the five pieces of fuselage top rear sheeting from 1/16'' x 3'' balsa. Note that the grain runs across the fuselage. These pieces should be trimmed to size so the fuselage will be the correct width when they are installed. Coat the fuselage top, and mating areas of the sheeting with glue, and put in place. Secure with pins, adjusting the width of the fuselage so the sheeting is flush with the sides. Trim a piece of 1/16'' x 1/4'' spruce strip, and glue in place to form the stabilizer leading edge stop. Let dry thoroughly.



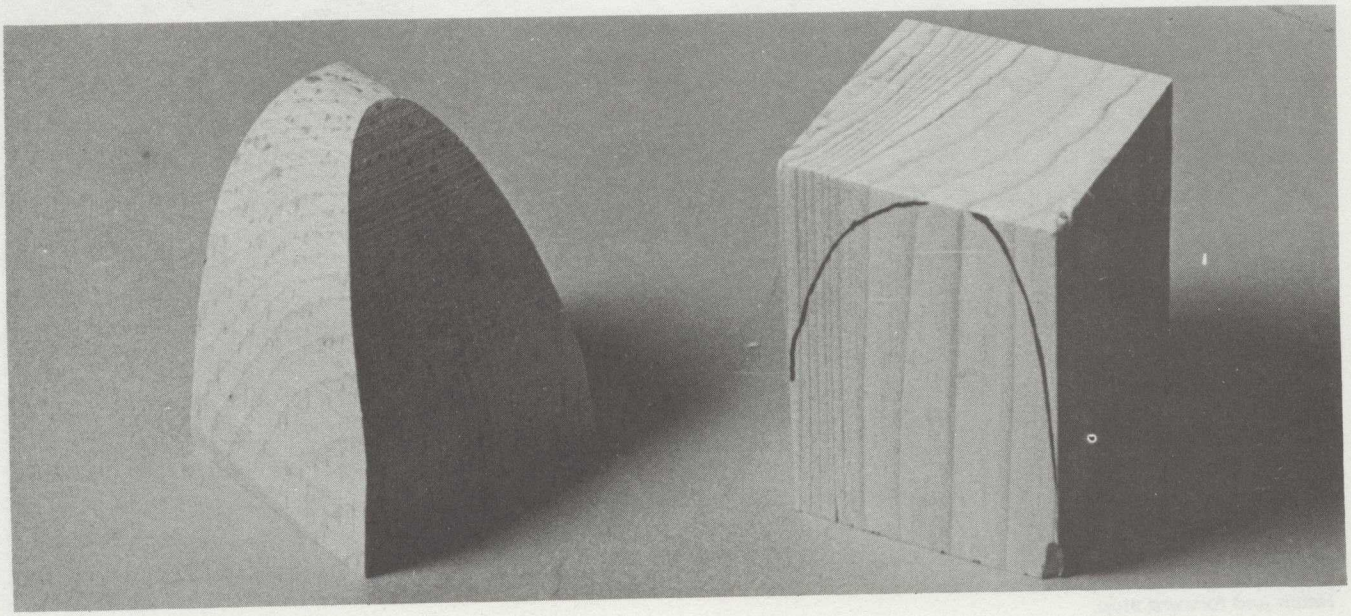
Fuselage is clamped down while rear top sheeting is installed.

(i) Trace the side view of the nose block on the 2'' x 2'' x 2½'' pine nose block material. Saw to shape, leaving a bit of material all round for final sanding. Do the same for the top view contour.

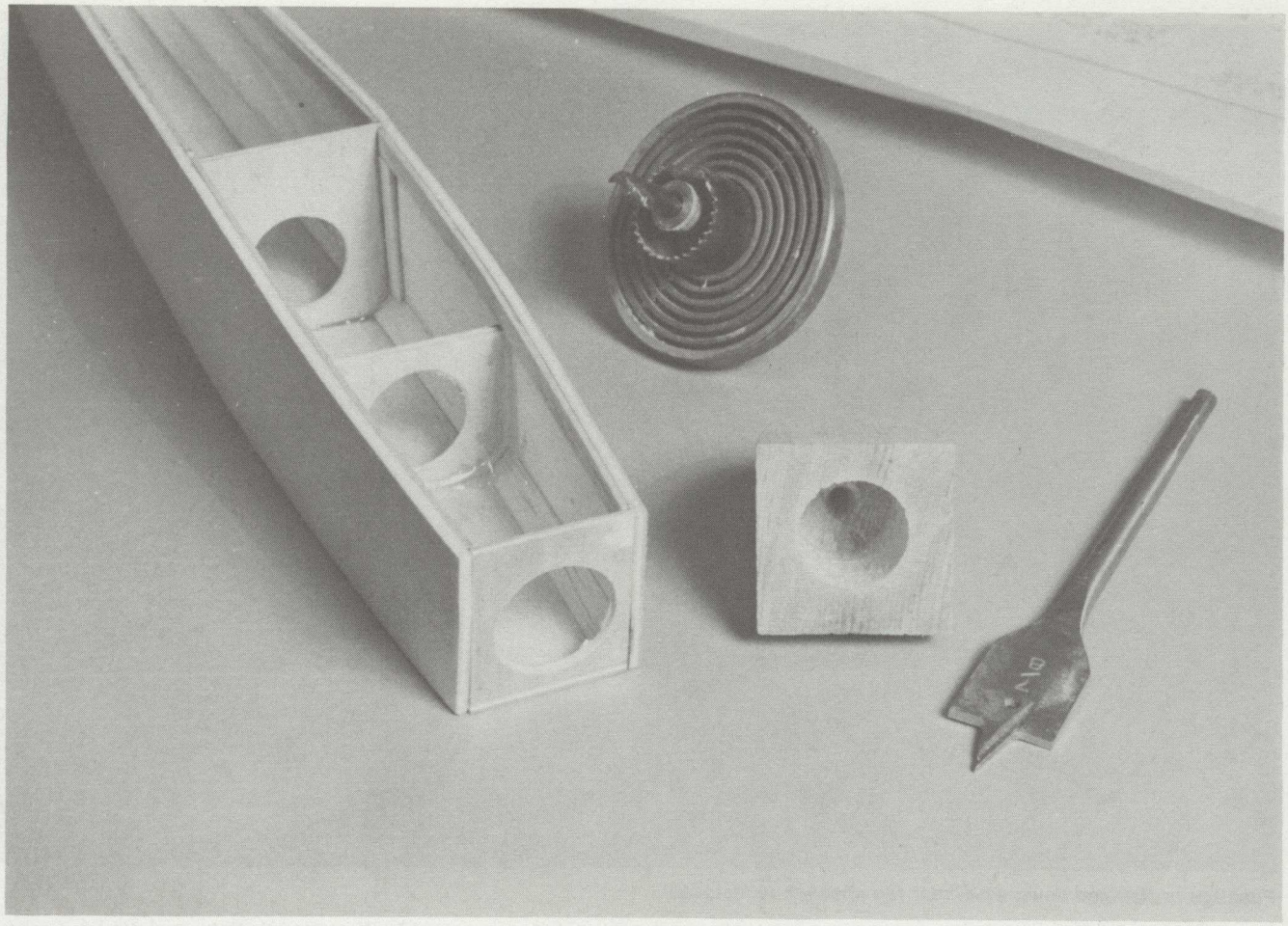
If you have a 7/8'' or 1'' wood bit, bore a hole in the nose block for nose weight. Cut a matching hole in former F1. If the tools are not available, the nose weight can be placed in the forward compartment with the battery.

(j) Use the point of the X-Acto knife to poke holes in the mating surfaces of the nose block and former F1. These holes provide a ''tooth'' so the adhesive will hold more tightly. Mix some epoxy and apply a thin coat to both surfaces. Place the nose block on F1, making sure it is centered. Stand the fuselage on its tail until the epoxy sets.

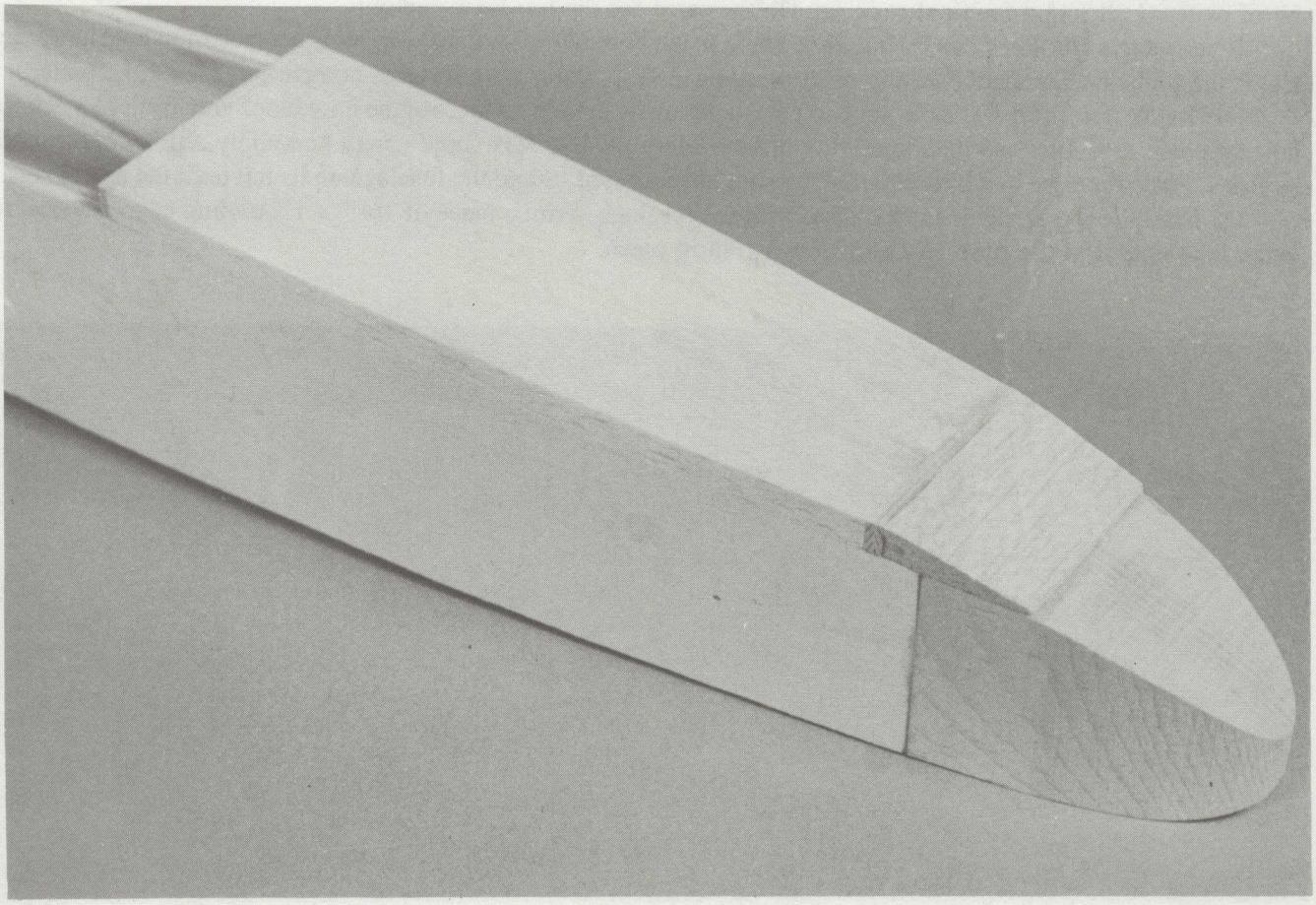
(k) Sand the top of the nose block flat with the fuselage. Trim a piece of 1/4'' x 1'' trailing edge material to length and glue it to the nose block as shown. Pin in place.



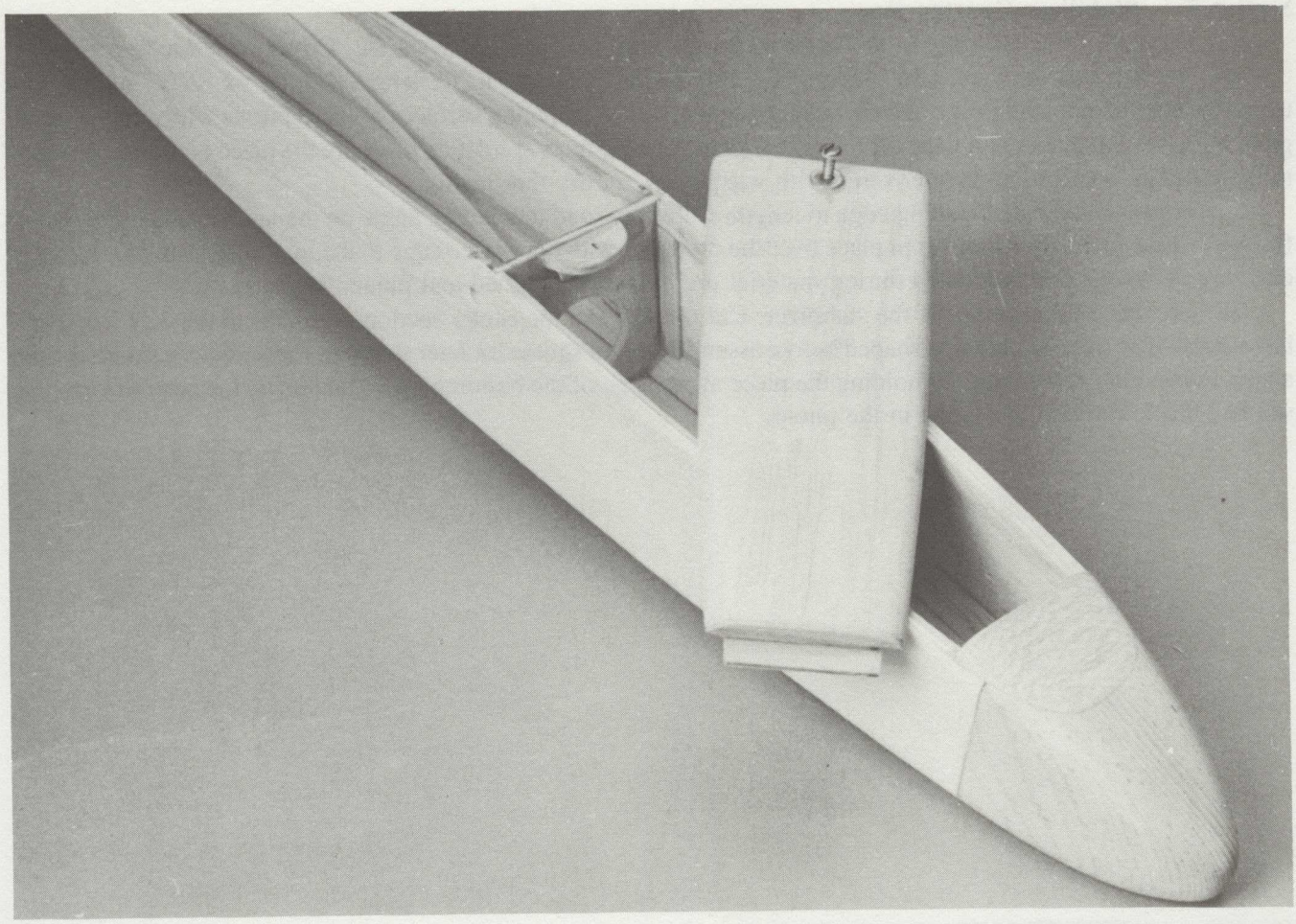
Noseblock cut to shape.



Tools for boring nose block.



Hatch and forward stop.



Hatch construction.

(l) Trim the sailplane version shape hatch from the 1/4'' x 3'' balsa. Trim the ends and sand to exact length but leave about 1/16'' material on both sides so it can be sanded to exactly fit the fuselage. Trim the 1/16'' x 1/4'' pieces of spruce and glue them to the ends. Trim the 1/16'' x 1¼'' x 3/4'' ply hatch hold-down and glue it in place. Allow glue to dry. Cut the canopy hold-down block from a scrap of 1/8'' Air Ply or 1/4'' sq. spruce and epoxy in place as shown on the drawing. Put the hatch in place, centered on the fuselage. Drill a 1/16'' hole through the hatch and hold-down block for the screw. This attachment can be made more durable by epoxying a small metal washer over the hole on top of the hatch; or by epoxying a short piece of the brass tubing into the hole; or, etc., etc.

(m) Locate and drill the 3/16'' holes for the 3/16'' wing hold-down dowels. Do not install the dowels, though, until after covering has been completed on the fuselage.

(n) Carve the nose block and hatch to a rounded shape that pleases you and sand smooth and flush with the fuselage. Sand the rest of the fuselage smooth, slightly rounding the edges. Be careful when sanding the rear top sheeting not to sand the edges thin — just make a slight radius on the edge. Finish with a light sanding using #400 wet or dry sandpaper.

(o) Cut a 7'' skid from the 1/8'' x 5/8'' spruce. Round the front edge. This can either be epoxied in place now, or you can wait until the covering has been completed. It makes covering the fuselage a little easier if the skid is not in the way.

This completes the basic construction of the fuselage.

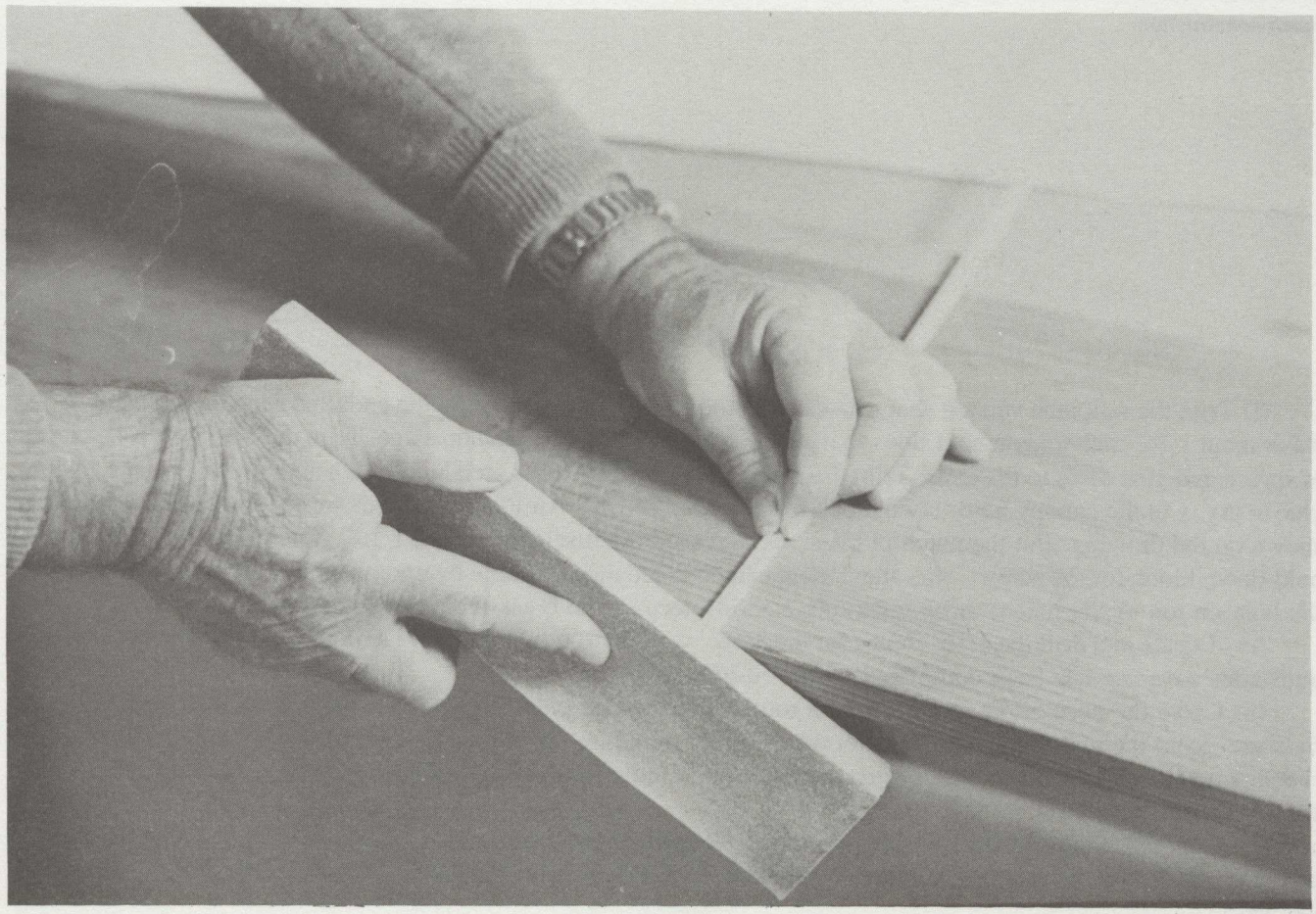
Section 5 — Stabilizer Construction

(a) Thumbtack the drawing to the building board with the stabilizer available. Cover with waxpaper.

(b) We will now laminate a 36'' length of 3/16'' x 1/4'' balsa and a 36'' length of 1/16'' x 3/16'' spruce, for use as the stabilizer leading edge and the rudder tailpost. Coat the mating surfaces of these pieces with a thin coat of glue. Press them together and wipe off the excess glue. Use the metal yardstick to assure the piece is straight and pin to the building board in an area covered with waxpaper. Let dry thoroughly.

(c) Trim the laminated leading edge to length. Carefully sand the mating angle on the leading edge for a good fit. Apply glue to the joint and pin in place over the drawing, with the spruce edge to the rear. The stabilizer leading edge brace, which was fabricated during material prep, should be glued and pinned in place.

(d) Complete the framing of the stabilizer. Cut the tips and the center section pieces from the 3/16'' x 3/4'' balsa stock. The tips can either be shaped before assembly or left square for later shaping. Pieces can be squared, and angles made quite accurately, by holding the piece at the edge of the building board and using the edge to keep the sanding block vertical, as shown in the photo.



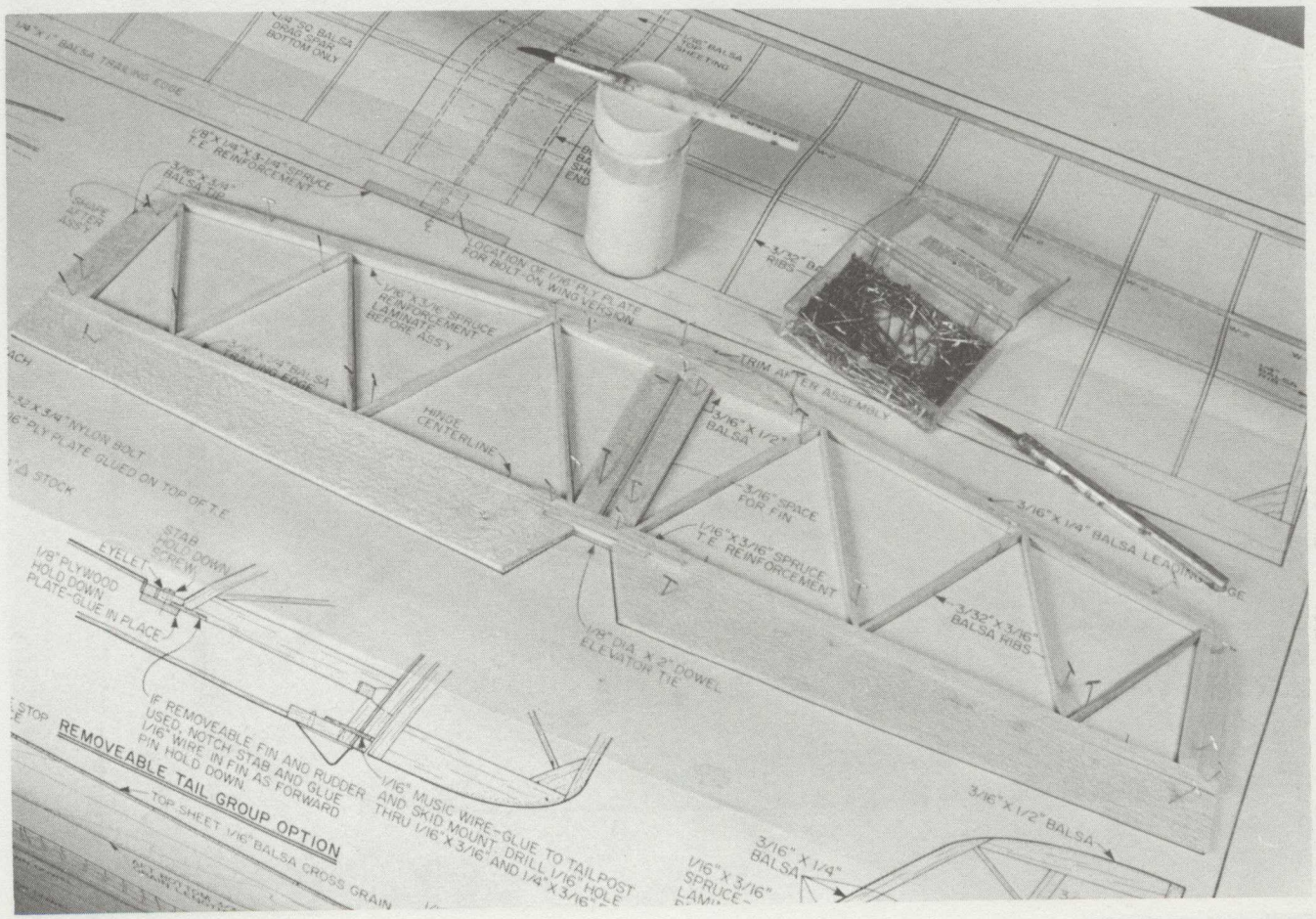
Technique for squaring all parts.

(e) The elevators were trimmed to shape in the material prep step. Cut a piece of 1/8'' dowel to a length of 2''. Cut a piece of waxpaper about 1'' x 4'' to keep the epoxy from sticking to the trailing edge. Use the X-Acto knife to poke holes in the mating surfaces for good adhesion of the epoxy. Epoxy the dowel to the elevators. Put the small piece of waxpaper between the dowel and trailing edge, and pin the elevator in place against the stabilizer trailing edge.

(f) Allow the assembly to dry overnight. When dry, remove from the building board. Put a fillet of glue at each joint. Allow to dry.

(g) Sand the top and bottom surface smooth. Sand the leading and trailing edges and the tips to a smooth radius. Finish with a light sanding with #400 wet or dry sandpaper.

This completes the stabilizer construction.



Stabilizer construction.

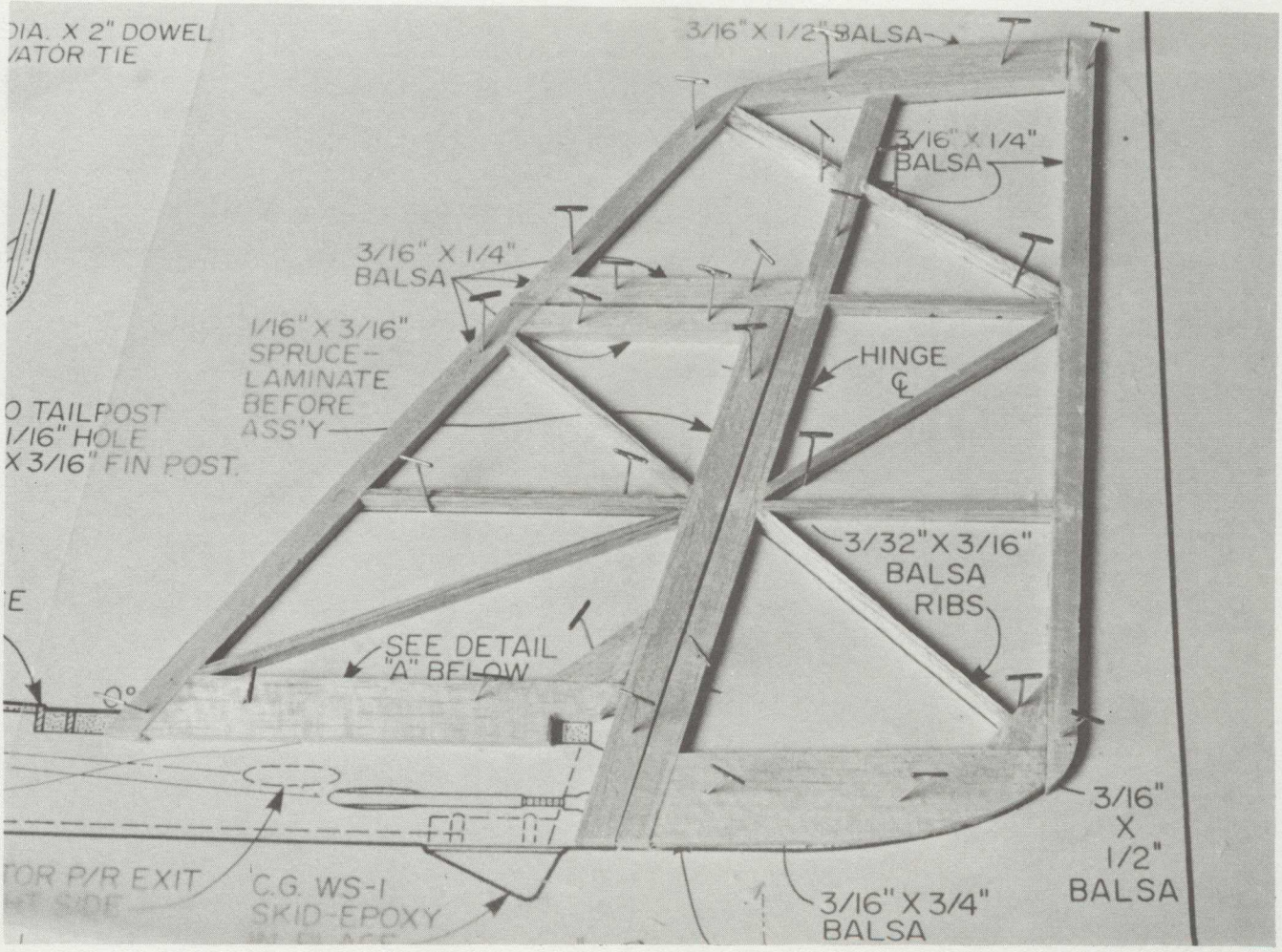
Section 6 — Rudder/Fin Construction

(a) The fin and rudder are constructed in the same manner as the stabilizer. Note that the fin tailpost is made from the piece of laminated material left from the stabilizer leading edge. The fin root rib shown in Detail "A," was cut to shape during material preparation. Be sure the laminated tailpost is pinned to the drawing with the spruce edge facing forward, as shown. Do not glue the rudder to the fin tailpost.

(b) When the assembly is dry, remove from the building board and put a fillet of glue at each joint. Allow to dry.

(c) Sand each side flat. Sand a smooth radius around the outside of both fin and rudder as well as the hinge line of both pieces. Lightly sand the assembly with #400 wet or dry sandpaper.

This completes the rudder and fin construction.



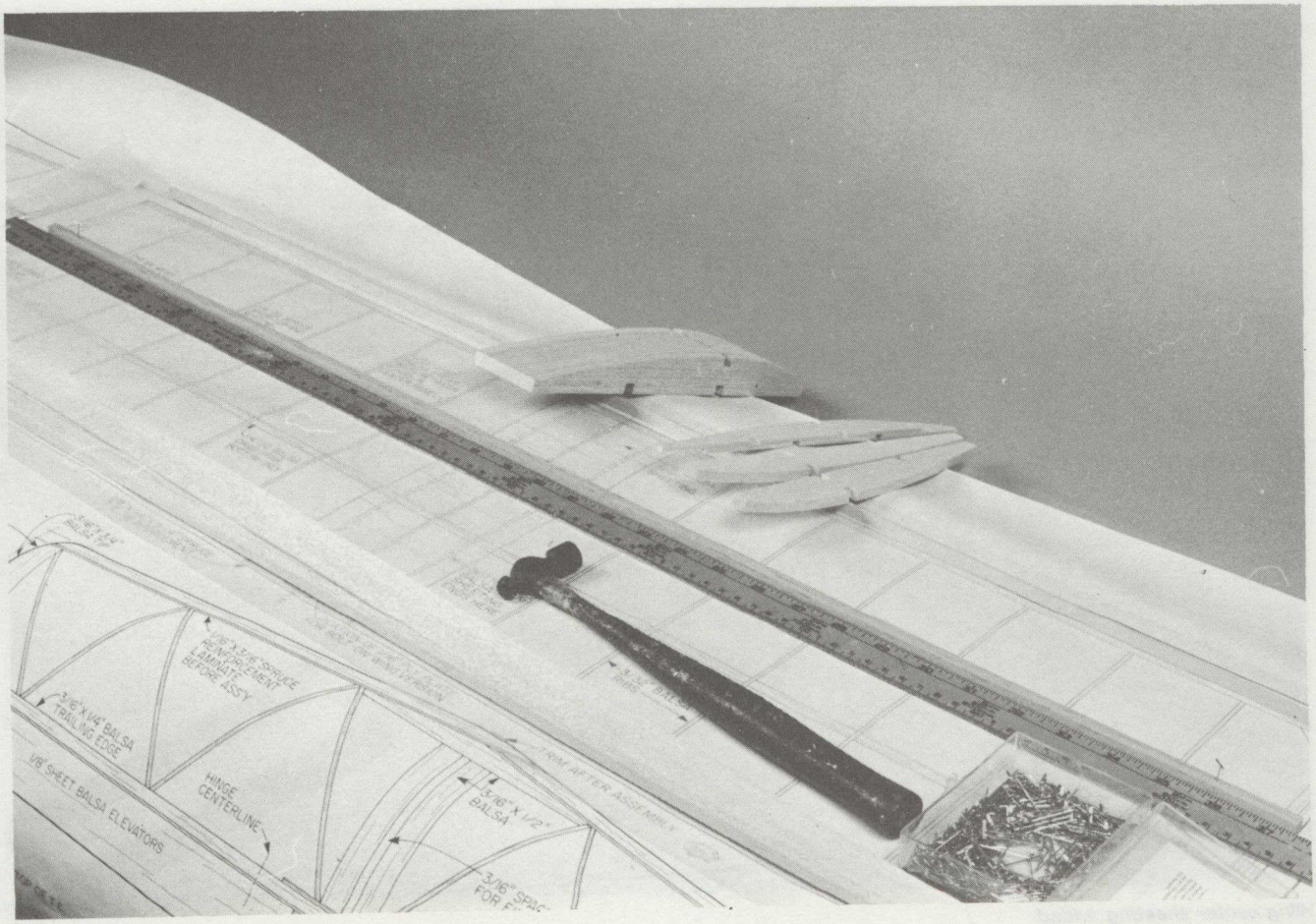
Fin/Rudder construction.

Section 7 — Wing Construction

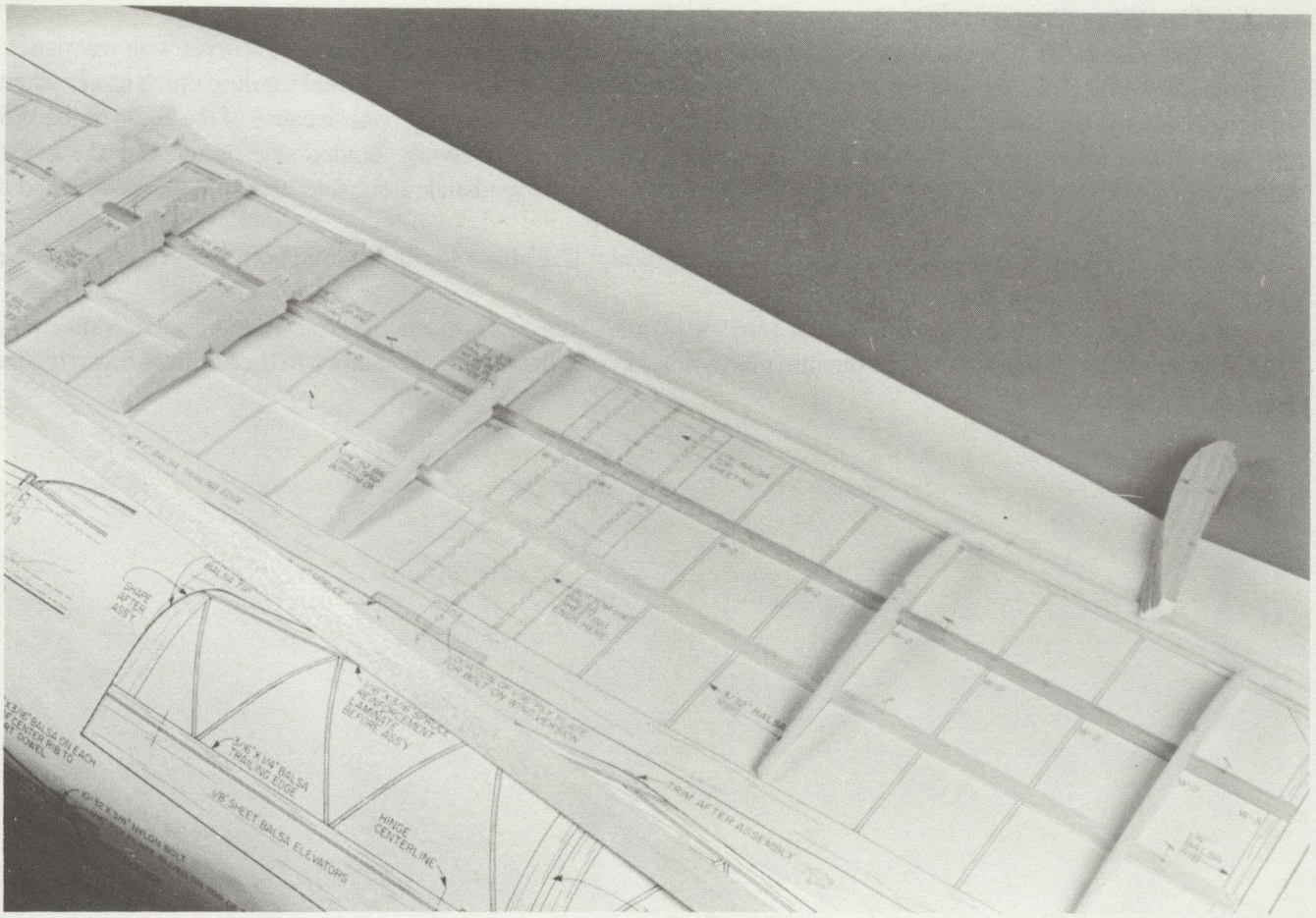
(a) Thumbtack the drawing to the building board so the wing center section is available. Cover with waxpaper. Sand one side of the 1/4'' sq. and 1/8'' x 1/4'' spruce spar material. This will make final sanding much easier when the wing is assembled. Note that the top spar is somewhat shorter than the bottom one because of the angle of the W3 rib. With this in mind, pin the bottom 1/4'' sq. spruce spar over the drawing, sanded side down. Use the metal yardstick to make sure it is perfectly straight. Pin the ends, hold the yardstick alongside, then pin the middle and a couple of other spots.

Place the 1/4'' sq. x 36'' balsa drag spar over the drawing. Use six or so ribs set onto both spars to establish the exact position of the drag spar, and pin in place.

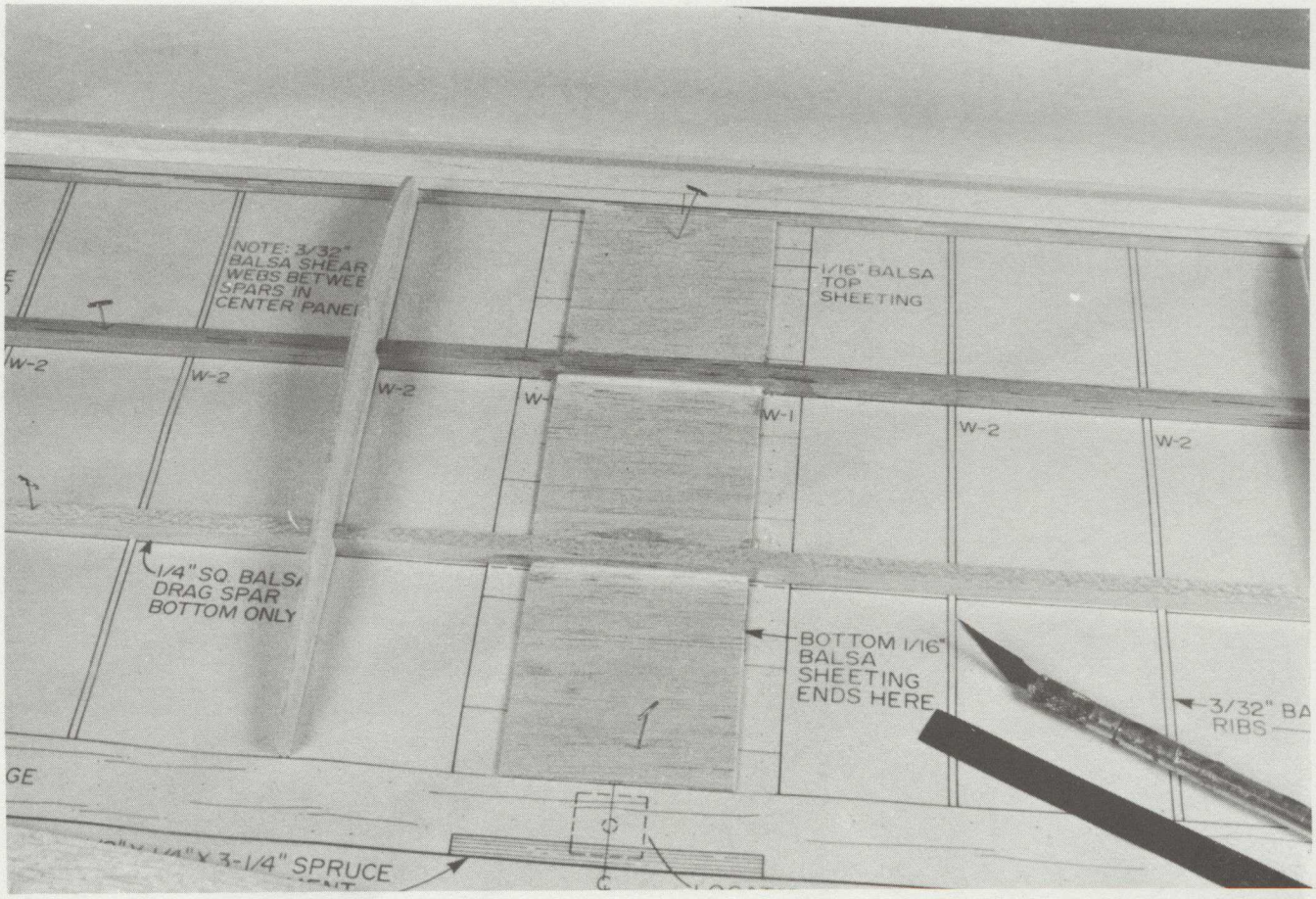
(b) Cut three 2½'' pieces from a sheet of 1/16'' x 3'' x 36'' balsa. These are the bottom center section sheeting. Trim to fit between the spars. Glue and pin into place, making sure they are pressed down to the building board where they join the spars.



Wing spar aligned.



Positioning the wing spars.



Wing center sheeting added.

(c) Glue the two W3 1/4'' balsa ribs to the two spars. Use the W11 marked ''pattern'' to set the proper angle shown on the Tip Joiner Detail on the drawing. Pin tightly to the board.

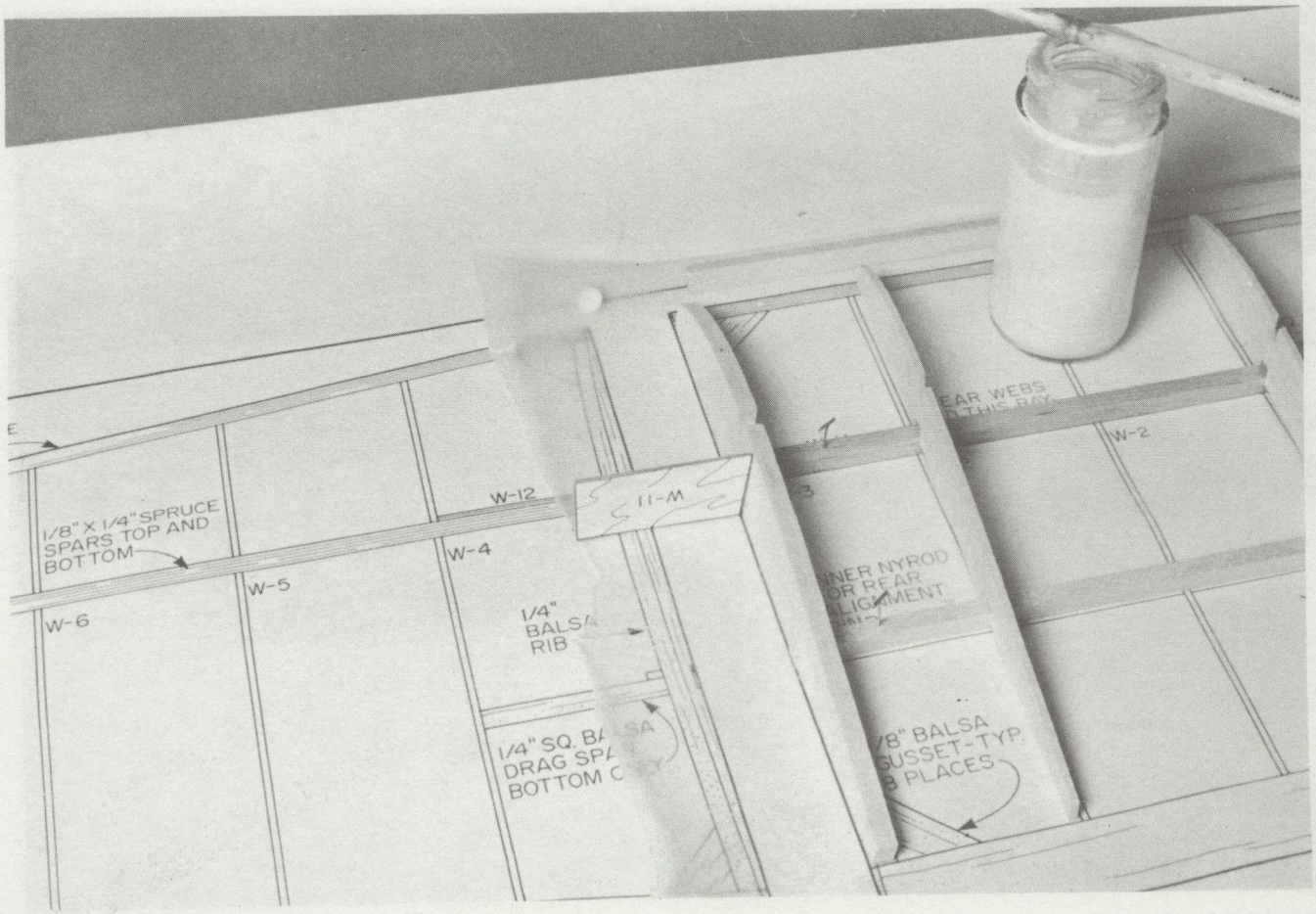
Now, install the rest of the ribs, gluing them to the spars and the bottom sheeting in the case of the W1 ribs. Be sure you have the right ribs at W1. Check each rib with a square to make sure it is vertical. Pin all ribs in place.

(d) Lay the yardstick along the leading and trailing edges of the ribs to make sure they are all aligned. Carefully sand any that protrude, until the yardstick touches all the ribs (or very nearly so). Put a dab of glue on the leading edge of each rib, and one at the mating spot on the 5/16'' side of the shaped leading edge. Pin in place, tightly against the ribs. Similarly, install the 1/4'' x 1'' trailing edge stock and glue it to the trailing edge of the ribs. Note that the trailing edge must be installed right side up, or the ribs won't be flush against it.

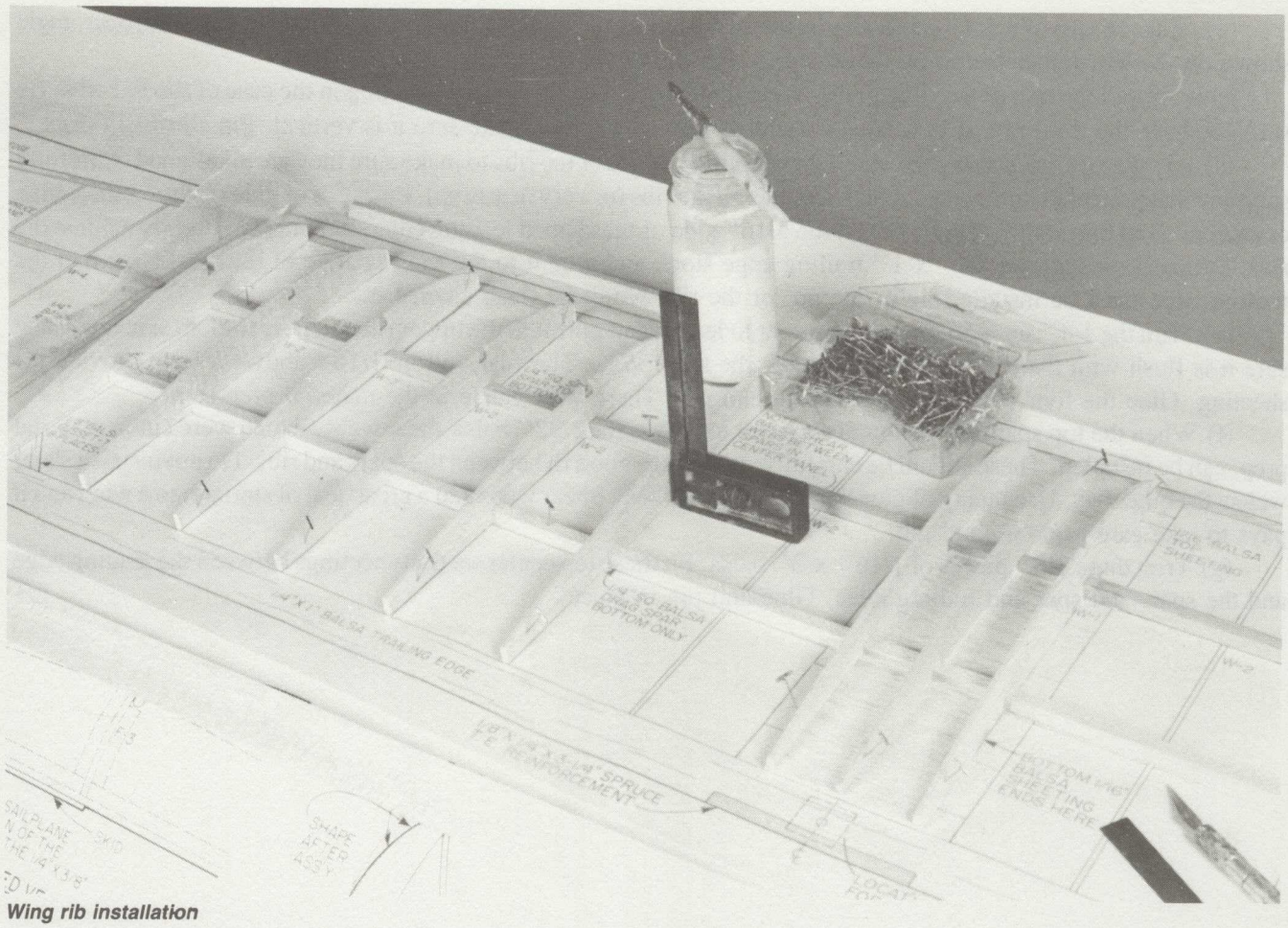
(e) Trim the 1/4'' sq. x 36'' spruce top spar to length and glue it in the upper rib notches, smooth side up. Make sure it is flush with the tops of all ribs, except the three W1s. The spar will be 1/16'' above W1s to provide for sheeting. Glue the four wing gussets in place and pin. These were made in the material prep step.

(f) When the top spar is dry enough so as not to move, the 3/32'' balsa shear webs, which were cut in material prep, can be installed. These should be carefully sanded to a good fit between the spars and ribs. Do not install a shear web in the outer bay. Use plenty of glue when putting in place. Shear webs add a great deal of strength to a wing and it pays to take care to do a good job.

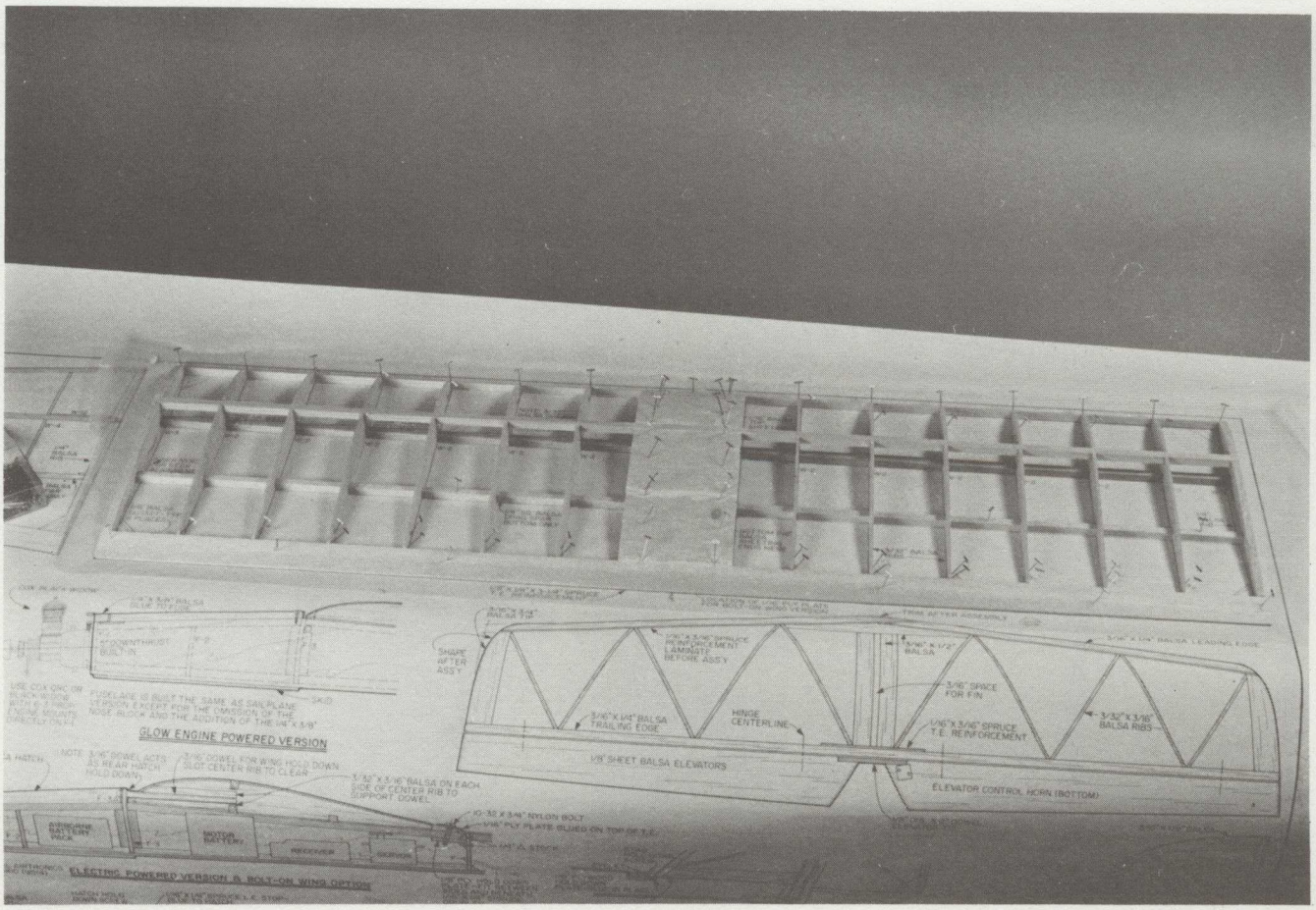
(g) Trim three 3½'' pieces of 1/16'' x 3'' balsa. Fit these top center section sheetings between the leading edge and the spar, and spar and trailing edge. Glue and pin in place.



W11 used to set angle on W3 rib.



Wing rib installation



Completed framing of wing center section.

(h) When dry, remove from the building board. Put a generous fillet of glue at each joint, standing the assembly up so the glue will not run until somewhat set.

(i) Thumbtack the drawing to the building board so one of the outer wing panels is handy. If your building board is large enough, you can build both outer panels at the same time. Cover with waxpaper. Trim the lower spar from 1/8'' x 1/4'' x 36'' spruce. Trim carefully. The rest is used for the upper spar, and there is just enough left to make the filler between the upper spar and W3. Pin the spar to the drawing, checking for straightness with the yardstick. Glue the 1/4'' W3 rib in place. Use the W11 angle pattern to set the 8 degree angle, and pin securely to the board. Now, glue ribs W4 through W10 in place, checking each to make sure it is vertical. Pin in place.

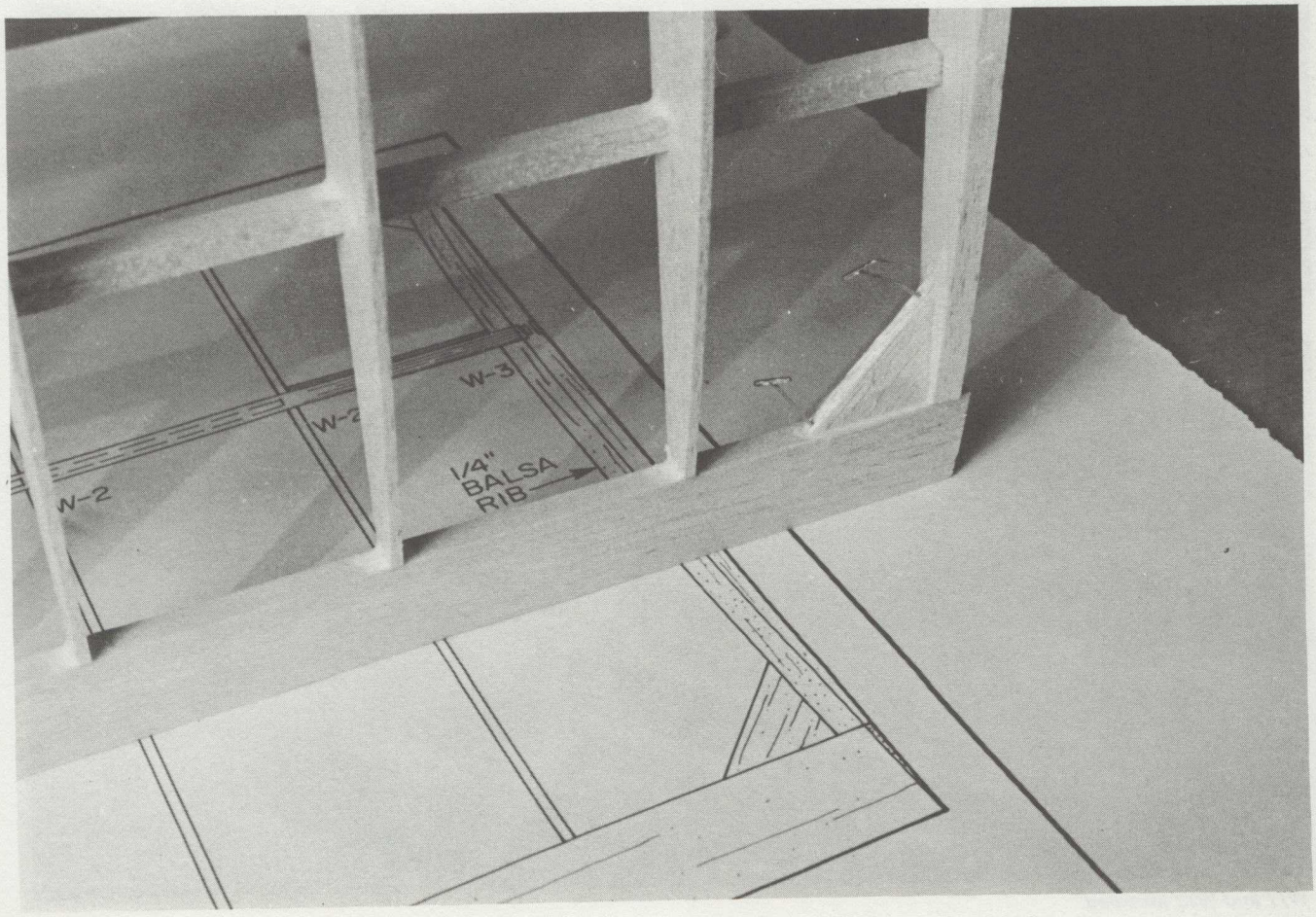
(j) Trim the top spar and the W3 filler from the remaining 1/8'' x 1/4'' spruce. Glue the filler to the spar and the spar to the ribs. Clamp the filler with a clothespin. Make sure the spar is flush with the tops of the ribs.

(k) Check the alignment of the leading and trailing edges of the ribs with the yardstick as you did with the wing center section. Trim the leading and trailing edge material to length, leaving a bit of overhang to be trimmed later. Glue these pieces to the ribs and pin in place.

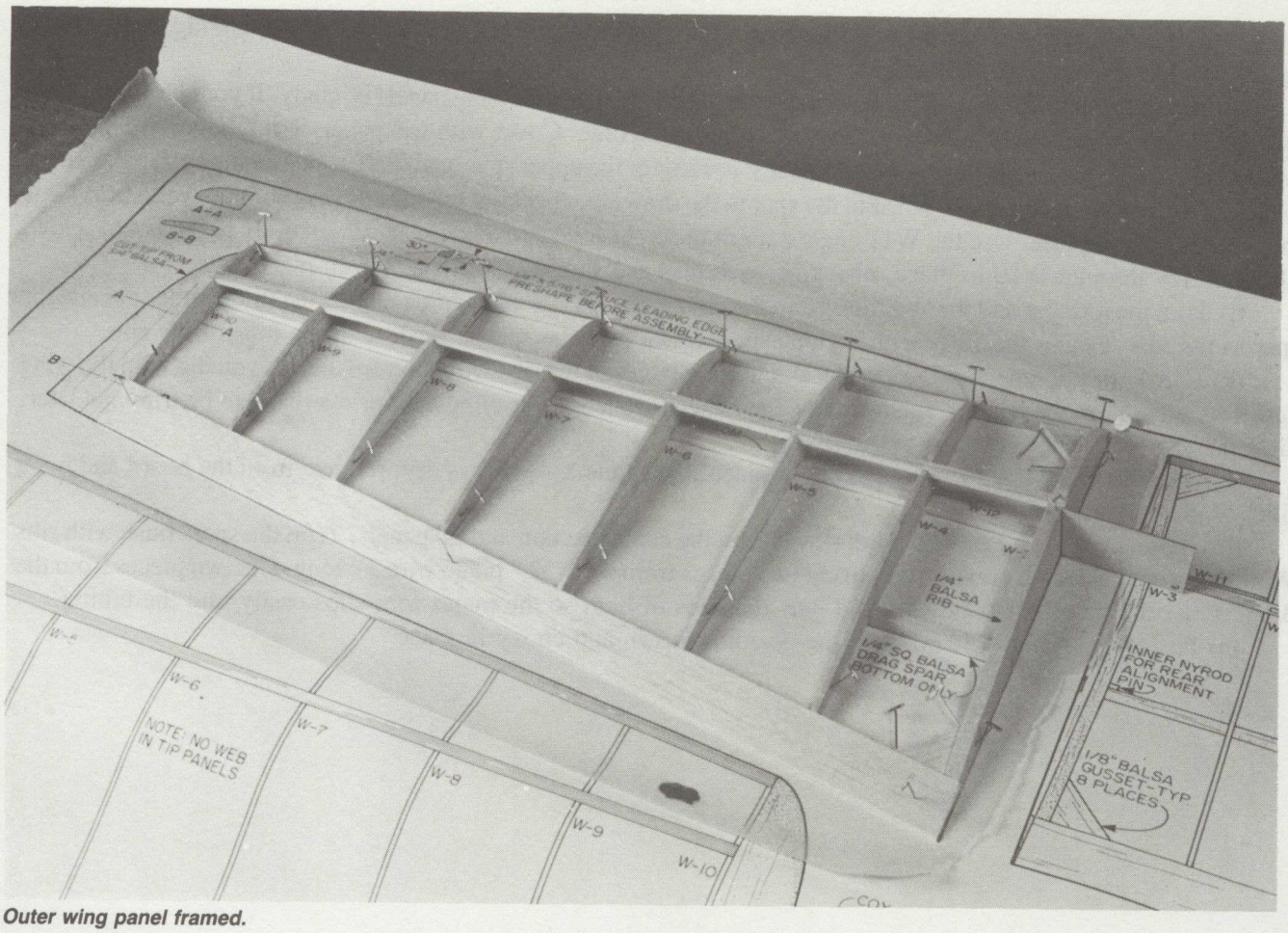
(l) Trim the gussets to fit; glue and pin in place. When the assembly is dry, remove from the board and put a fillet of glue at each joint.

(m) Trim the spars, etc., flush with ribs W3 on the center section and tip panels. Trim the spars flush with ribs W10. Use your hacksaw, or whatever, to cut two pieces from the 5/32'' piano wire 3'' long. Cut two pieces from the 3/16'' brass tubing, 1⅝'' long. File and burr the ends of both so the piano wire slips easily into the tubing.

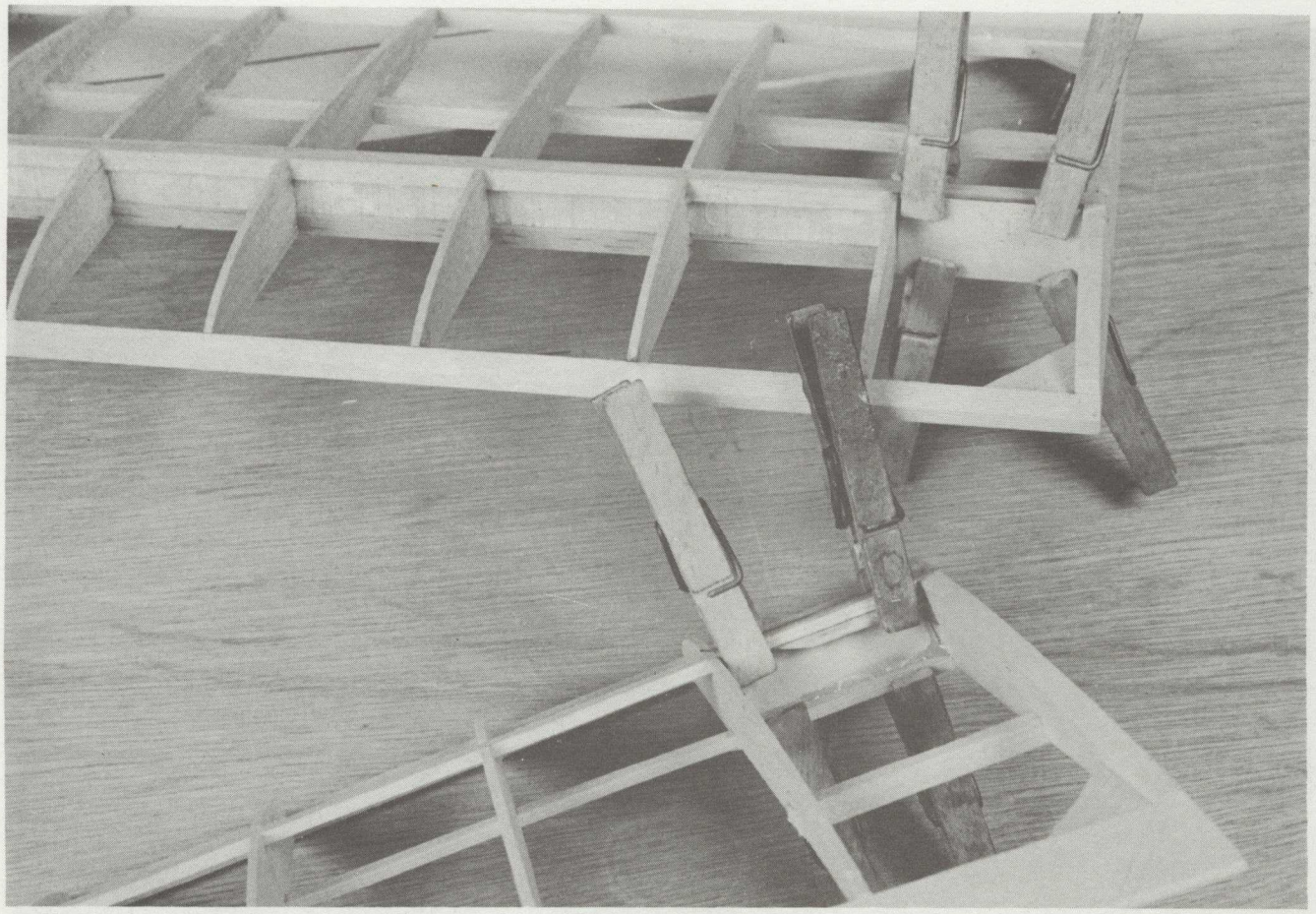
(n) Fit the W11 and W12 webs to the position shown and epoxy in place.



Joints receive extra fillet of glue.



Outer wing panel framed.



W11 and W12 installed.

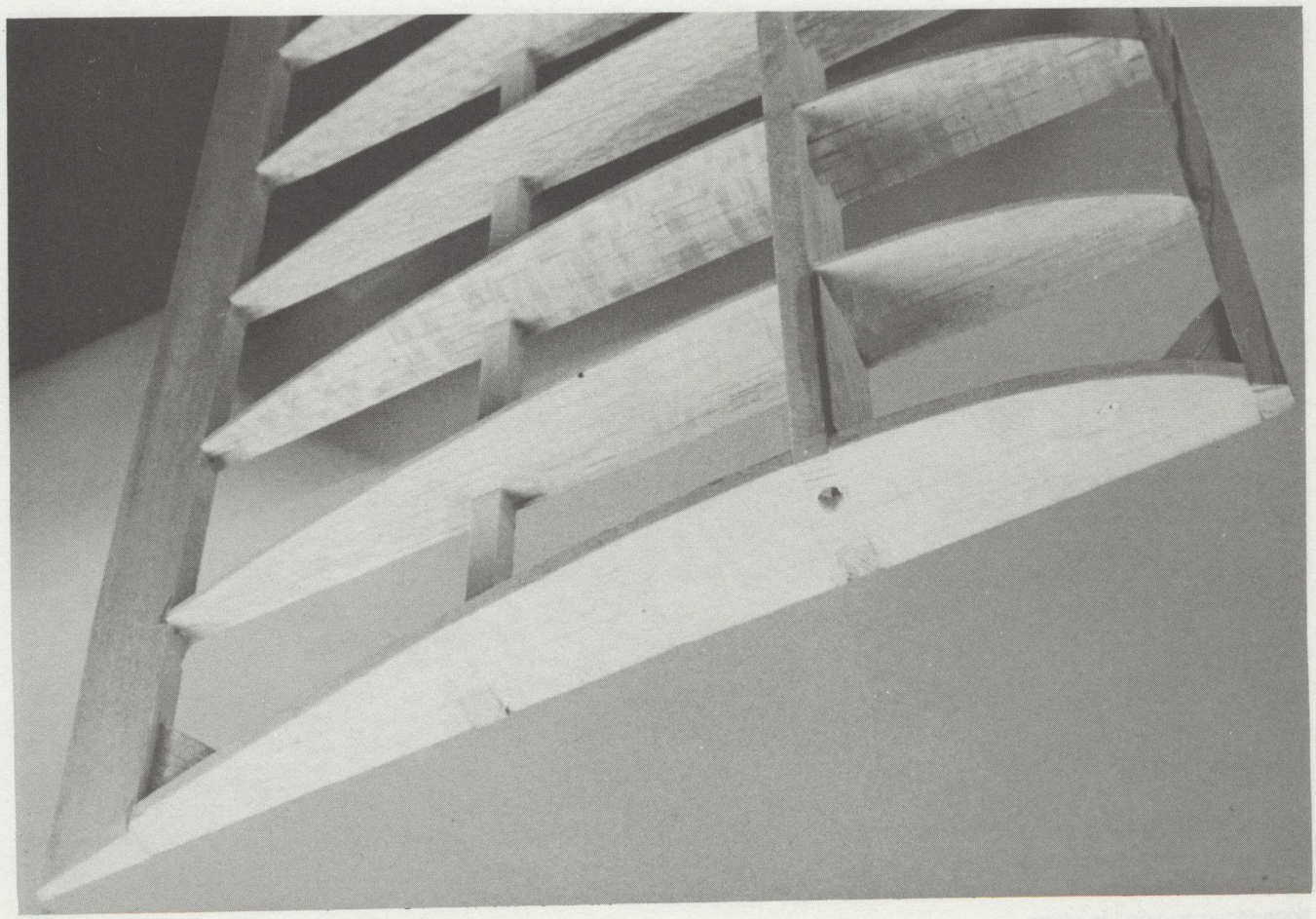
Clean the 3/16'' brass tubing with sandpaper. Holes for the tubing are located in W3, touching the top spar and W11 and W12.

Mark this location on W3 of both the center section, and tip panels. Drill a 3/16'' hole in each. Slip the tubing into the holes and check that it lies flat against the W11 and W12 webs. If it doesn't, open up the hole with a round file or X-Acto knife. It is more important that the tubing be snug against the web than snug in the hole.

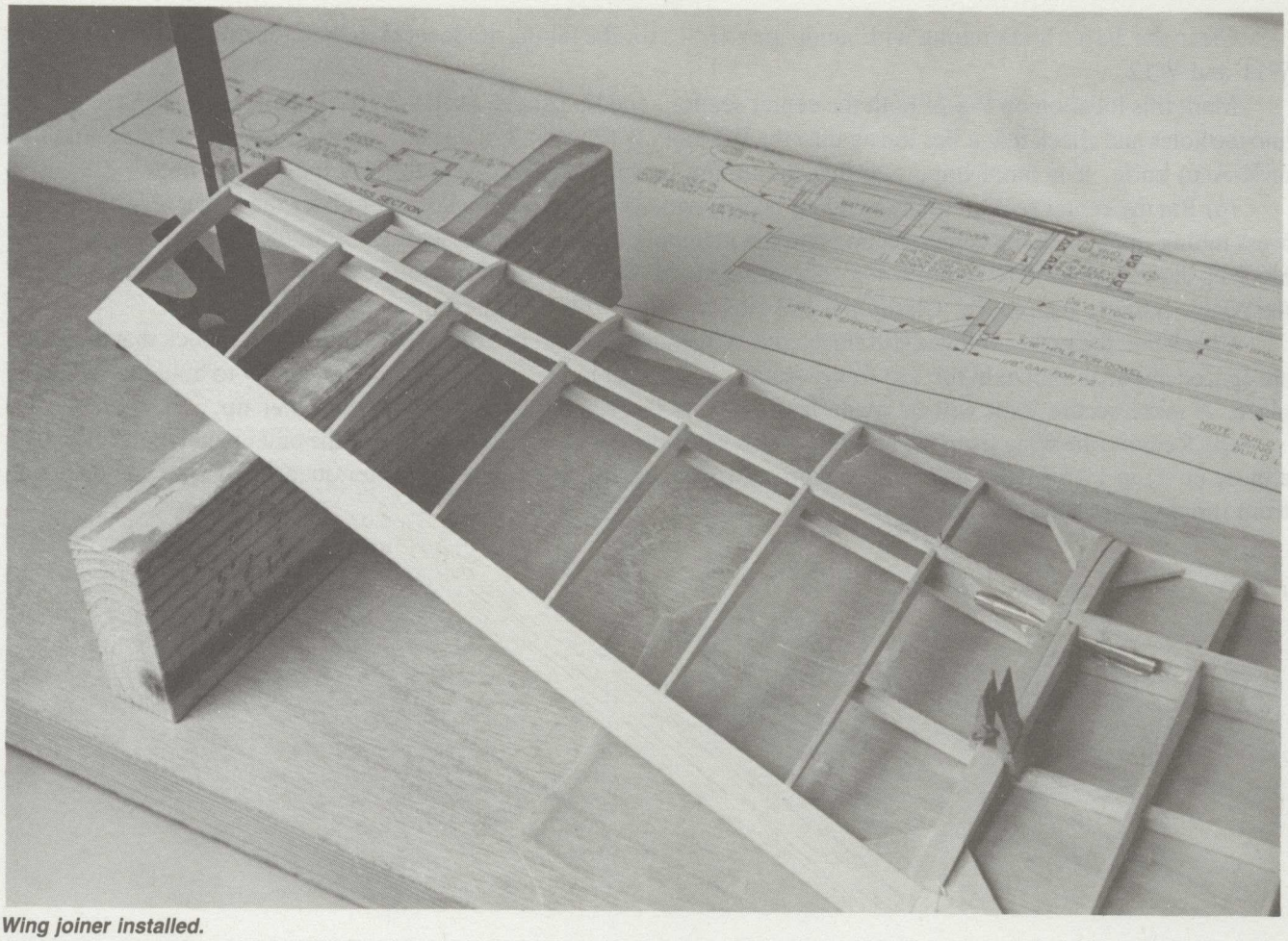
(o) Pin the center section to the building board, with a small piece of waxpaper under the joiner area. Slide the brass tubing in place in the center section and the matching tip panel, flush with W3. Put the tip panel in place and block up the end, until W10 is raised 4⅞'' above the board. Remove the panel, insert a 5/16'' wire joiner, and replace the panel, pinning it in place. Clamp the W3 ribs together with a clothespin.

Check that the brass tubing is still flush with W3, and hasn't slid in a bit. Mix a bit of epoxy; check that the tubes are spaced about as shown in the Tip Joiner Detail, and epoxy in place. Use just enough epoxy to hold the tubing in place. A more secure joint will be made later. Repeat the whole procedure with the other tip.

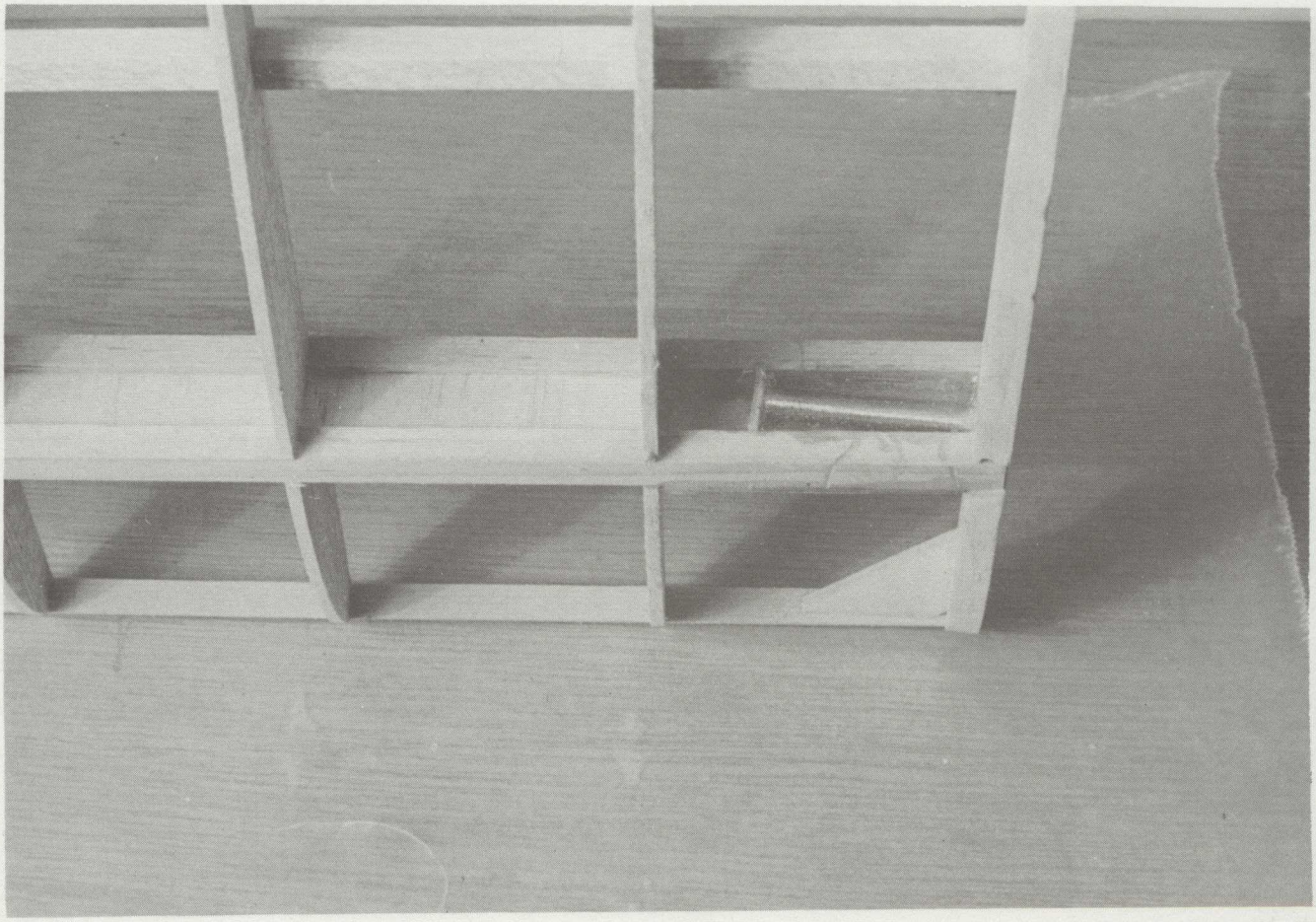
(p) Remove the wing from the building board when the epoxy is hard and remove the outer panels carefully. Cut a piece of scrap 1/16'' balsa and make a dam across the cavity, to confine the larger quantity of epoxy and keep it from running into the brass tubing.



Wing joiner hole drilled in W3.



Wing joiner installed.



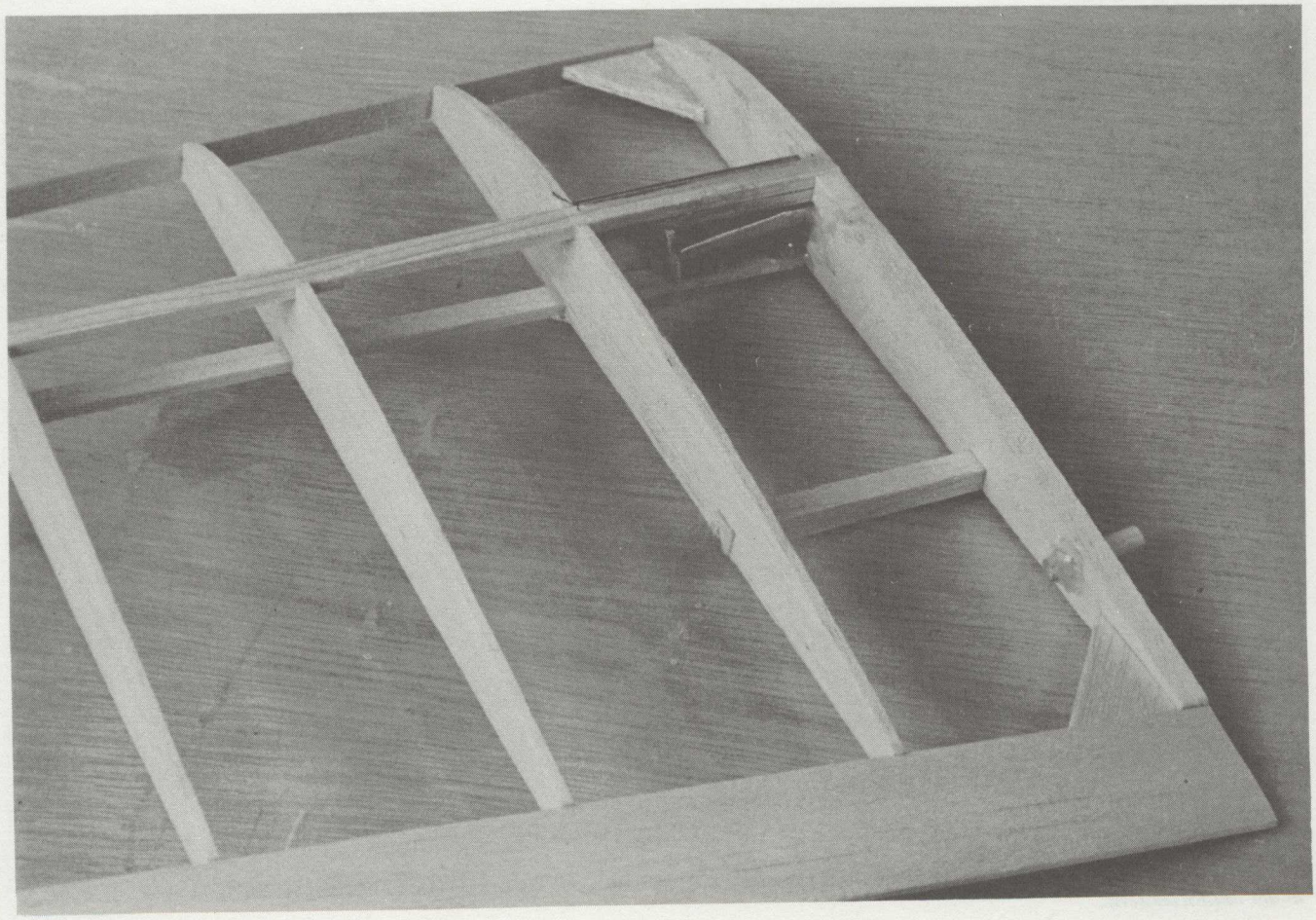
Wing joiner epoxied in place.

(q) Insert one 5/16'' wing joiner wire into the tubing and slip the tip panel in place. Carefully align the trailing edges and clamp the W3 ribs together with a clothespin. Mark the position of the 3/16'' dowel alignment pin on one W3. Making sure it is straight and square, push a pin through both ribs at this point. Now, drill a 3/16'' hole in both ribs at the pin mark. Cut two 3/4'' pieces of 3/16'' dowel, rounding the ends slightly. With the tip panel in position, push the dowel through both ribs. Make sure the trailing edges are still aligned. If not, open up the holes in the tip panel until they are. Epoxy the alignment dowel into the outer panel **only,** holding the ribs in position with a clothespin.

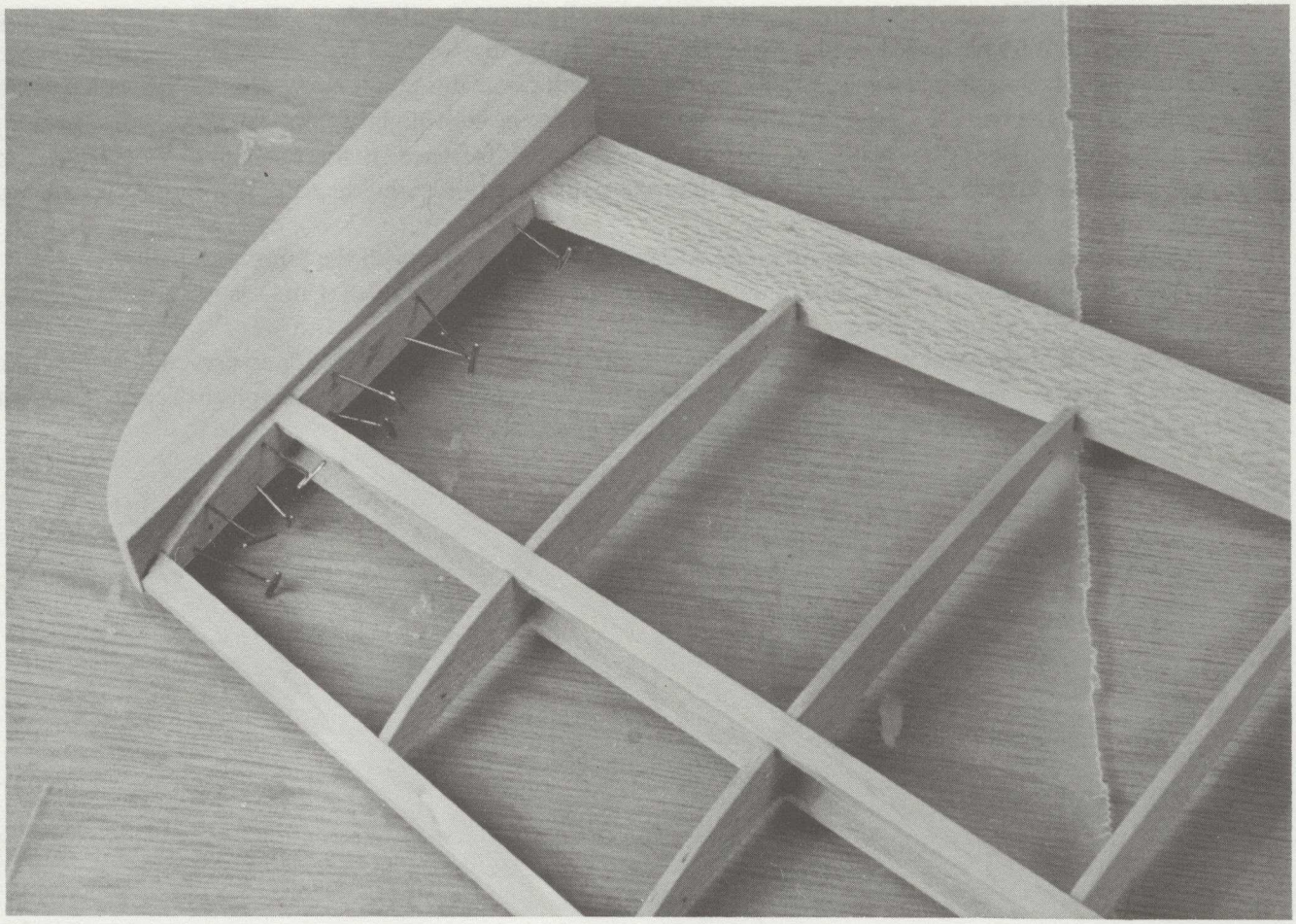
When the epoxy is set, remove the tip panel and repeat the procedure with the other panel.

(r) Trace the top outline of the wing tips onto the 3/4'' x 1'' x 12'' balsa block. Cut both tips roughly to size. Glue the tips to W10 and pin in place.

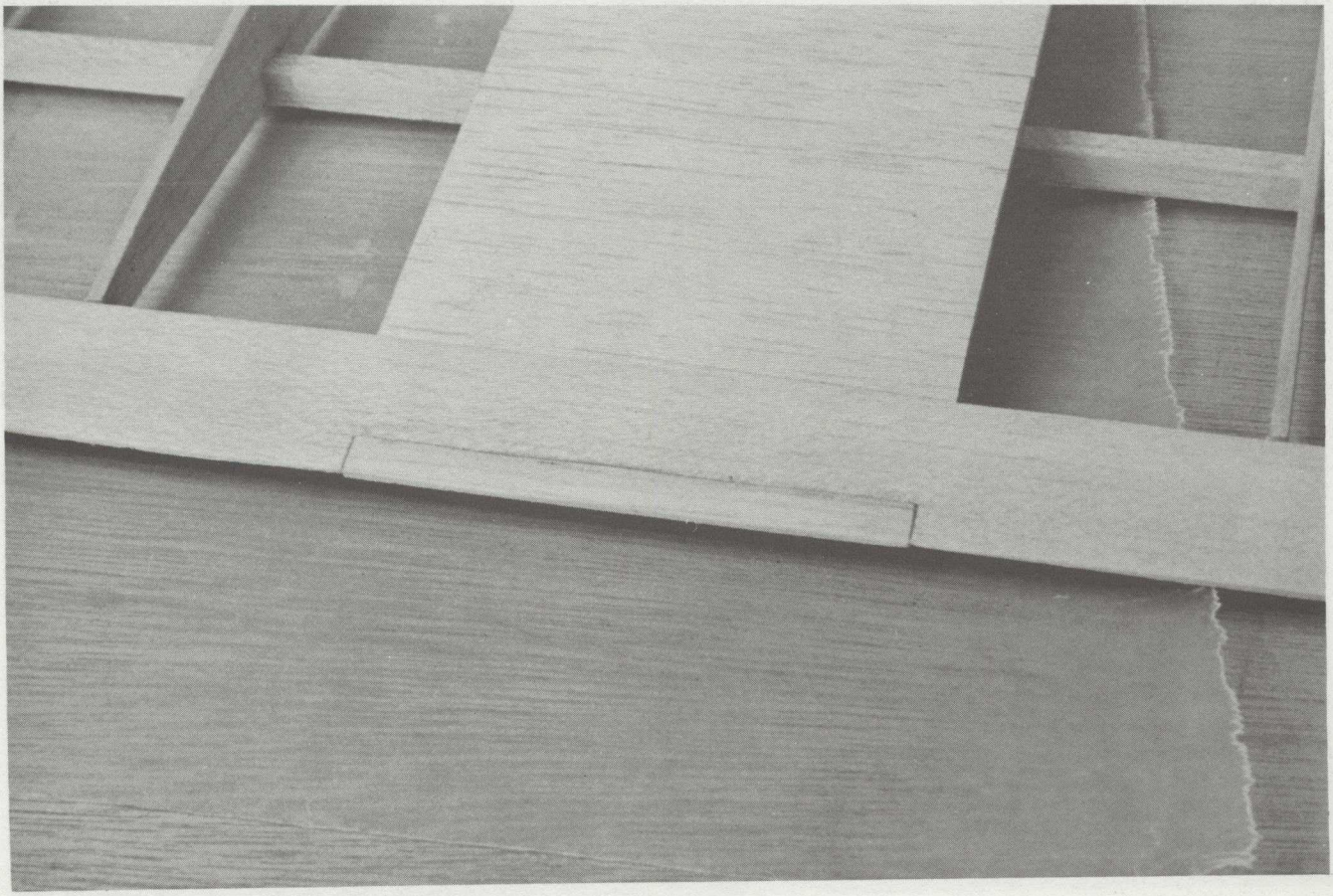
(s) A spruce reinforcement is inlaid into the trailing edge of the wing center section to prevent damage from rubberbands. Cut a 3¼'' piece of 1/8'' x 1/4'' spruce. Notch the trailing edge to receive this piece. Taper and sand it to match the trailing edge. Epoxy in place, wiping off any excess



Rear wing joiner epoxied in place.



Wing tips glued in place.

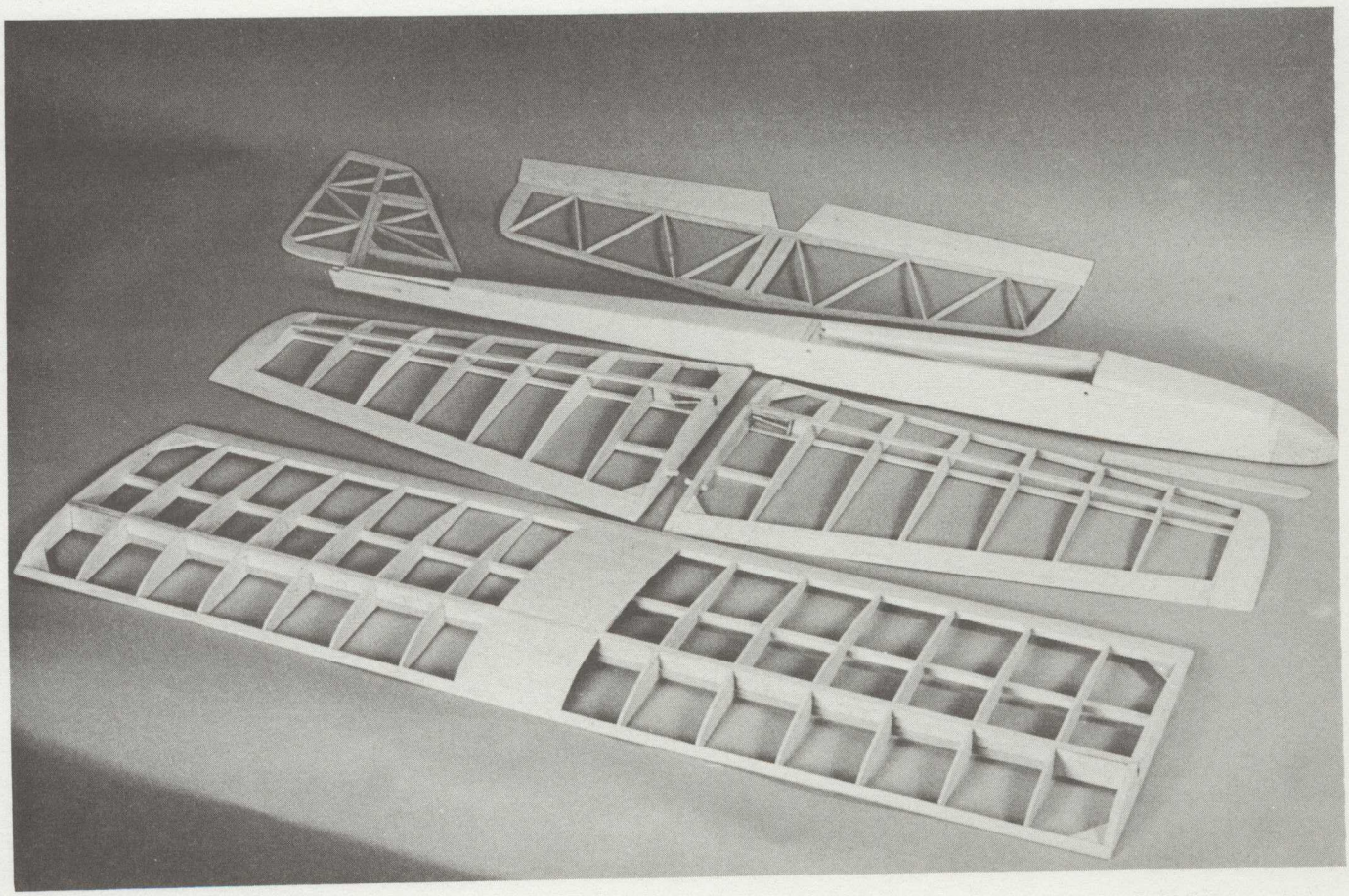


Inlaid reinforcement.

(t) Using the X-Acto knife, carefully carve the leading edges to the contour shown on the drawing. Watch the grain when carving. Slightly uneven grain can cause the knife to dig in and take out a bigger chip than desired. It is safer to sand the contour but spruce is fairly hard and it's easy to damage the structure during vigorous sanding. In any event, finish up with the sanding block, so the leading edge contour is smooth and not wavy when viewed from the end. It pays to take time to get a good leading edge as this is an important factor in the aerodynamics of the wing. Now, blend the rib contour in with the leading edge. Do not sand back very far on the rib or the airfoil shape will be changed. Carve the wingtips to the shape shown on the drawing and sand smooth. Carefully sand the trailing edge so the ribs blend smoothly and, again, sand the top of the ribs only as absolutely necessary. Finish with a light sanding with #400 wet or dry sandpaper.

(u) Assemble the wing, using the wire joiners. Balance the wing at its center to check that one wing is not heavier than the other. If so, tape a small weight to the tip rib of the light wing. Trim the weight until the wing balances, and epoxy in place.

We have now completed the structure of the Oly 650. Next, we will install the hardware and radio before covering the framework.



Completed Oly 650 framework.

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