Bonanza

BUILDING AND FLYING INSTRUCTIONS

SIG®
CRAFTSMAN'S KIT

RC 41

SIG MANUFACTURING CO. . . Montezuma, Iowa 50171

BONANZA DESIGN FEATURES

The Bonanza model was designed for Sport Scale and Sunday sport flyers alike. The wing on the Bonanza has a high dihedral angle, with wing tip chamber and washout. These qualities are excellent for the sport flyer. For competition flying the model can be built with retracts and flaps. When flown with approved maneuvers the Bonanza is a fine choice for Sport Scale flyers. (As listed in flight manual stalls, chandelles, steep turns, and lazy eights.) The full size plans show construction and location for the retract system used in the prototype. Different retract units can be adapted to wing and nose mounting platforms by changing width dimensions and position. The nose wheel retract control wire is kept in place by the plywood floor of the access hatch, allowing for easy removal of the wing.

". . . . . read the book completely and study the full size plan before beginning to work."

A NOTE ON BALSA WOOD

We do our best to put as good a grade of balsa in our kits as the supply situation permits. The world-wide increase in demand for balsa has made it impossible to obtain as high an average quality as used to be the case and this situation is getting worse.

Every piece of balsa supplied cannot be 100% perfect or kit prices would have to be greatly increased. Mineral stains or small knots do not seriously affect wood strength. Even with the very best grades of balsa, there is a natural tendency for some sticks or sheets to immediately bow upon being cut off from a perfectly square block because of built-in stresses. In most cases, these can be bowed back into alignment during building. True up the edges of bowed sheets by trimming using a metal straightedge to cut against.

WOOD SIZES IN THE KIT

Sometimes, depending on the raw wood supply and sawing schedules, we may put a larger piece of planking wood in the kit. For example, you may get 2" wide wood for the wing trailing edge planking instead of 1-1/2" wide. This extra wood, cut off when planking, can be saved for some other use.

In other cases, the wood may measure slightly larger than the dimension called for on the plan. We feel that it is best to have enough wood when fitting a part in place, so it will adequately fill the spot, instead of an "exact" size that might be not quite big enough, given the tendency of model components to "grow" as the parts are glued together.

RECOMMENDED GLUES

The framework may be glued with either Sig-Bond resin type glue or Sig-Ment solvent type cement. In any joint involving plywood or hardwood, Sig-Bond is the best choice. Areas subjected to unusual strain, exposed to fuel or oil, or including metal pieces, should be epoxied with Sig Epoxy Glue or Sig Kwik-Set 5 minute type epoxy. Some specific pieces have other recommendations. You will find these in the directions concerning the part.

ABOUT THE BUILDING SEQUENCE

The quickest and most efficient way to complete a model is to work on several pieces at the same time. While the glue is drying on one section you can start on or proceed with another part. Work can even go forward on several sections of the same assembly at the same time, such as the front and rear of the fuselage. We occasionally get suggestions that our instruction books should be in exact step-by-step building sequence. But this would result in many sentences starting, "While the glue is drying on the fuselage, move to the wing.....etc." and a lot of jumping back and forth between assemblies with no consistent pictorial progression. Also, a pre-selected building sequence by our choice might not suit your workshop space and time allotments. Therefore, we feel the present system of covering main assemblies in a unit works out best for the majority of kit builders. So keep in mind that the numbering sequence used in this book was chosen as the best way of explaining the building of each major assembly and is not intended to be followed in exact one-two-three fashion. Start on the wing at No. 1 and after performing a step or two, flip over to the next main heading of "FUSELAGE CONSTRUCTION" and do a step or two there, then over to "FIN ASSEMBLY" and so forth. You will, of course, arrive at points where you can go no farther until another component is available. For example, you need a completed and mounted wing before the front of the fuselage on bottom can be completed. The way to understand these relationships is to read the book completely and study the full size plan before beginning to work.

SOME RULES TO FOLLOW

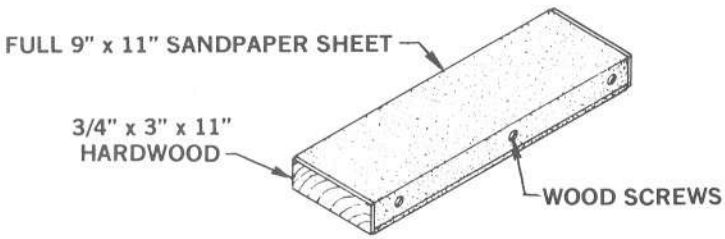
Cut all long pieces of balsa first, followed by medium lengths before cutting up any full-length strips into short pieces. Remove die-cut pieces from the sheets carefully. If difficulty is encountered, do not force the part from the sheet. Use a modeling knife to cut it free. Leave parts in the sheets until needed in construction.

A piece of Celotex-type wallboard makes a handy building board, into which pins can easily be pushed. Lay the building board on a table with a flat and untwisted top. Pins can be pushed through all pieces in the kit without any lasting damage. Don't be afraid to use plenty of pins. The holes will fill up during sanding and sealing. Be careful where you use a ball point pen for making marks. If not sanded off, these marks will bleed through many coats of dope and show on the finished model.

Any reference to right or left refers to right or left as if seated in the cockpit.

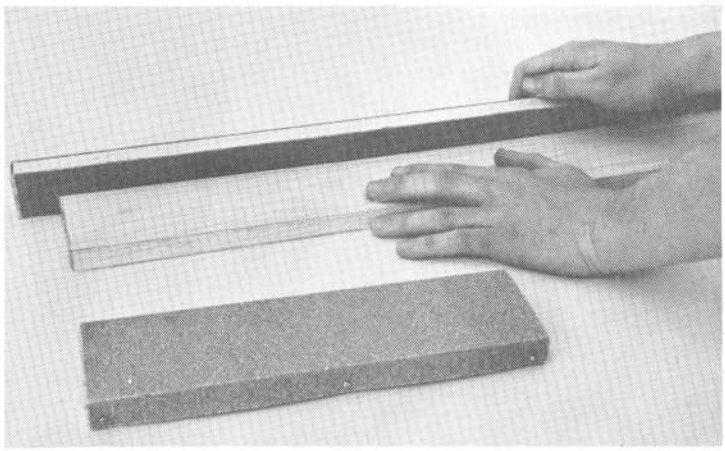
YOU CAN'T GET ALONG WITHOUT A GOOD SANDING BLOCK

An indispensable tool for proper construction is a large sanding block, sized to take a full sheet of sand paper. Use several wood screws along one edge to hold the sheet in place. I recommend 80 grit Garnet paper for use on the block during general construction. You can switch to 100 grit for final finish just before covering.



To supplement the large sanding block, sandpaper may be contact glued to several sizes of square hardwood sticks and round dowels. These are handy for working in confined areas of the model or smoothing corners.

In any conflict between the plan and the booklet, follow the booklet instructions. They are revised more frequently than the plan.

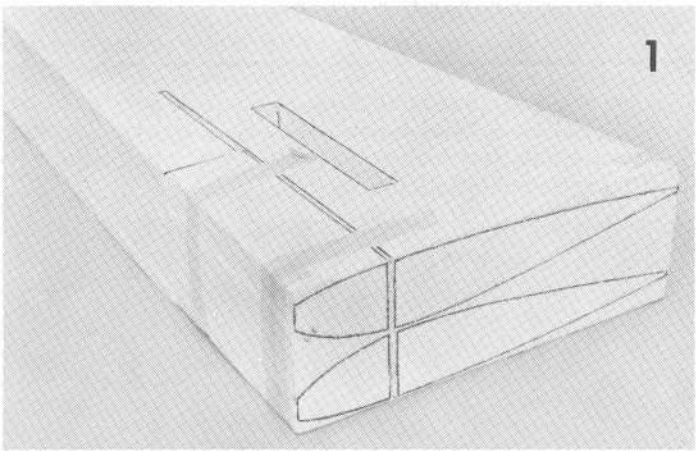


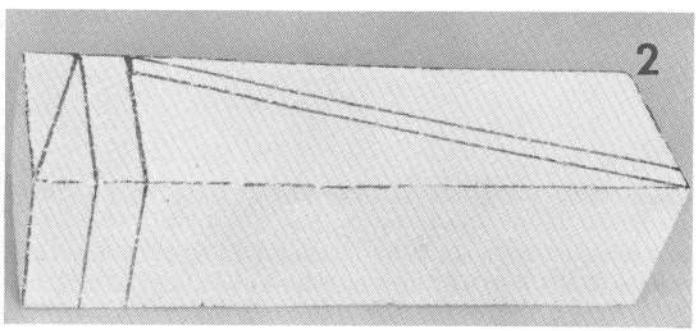
Another handy tool is a long piece of aluminum approximately 1" square 24" or 36" long, one side covered with sandpaper contact cemented. The long bar is used for trueing balsa sheets and sanding leading and trailing edges, the smooth side can be used as a straight edge. Most hardware stores carry a stock rack of aluminum, various shapes and sizes in 5' to 7' lengths.

CUTTING OUT PRINTED PARTS

A jig saw is best for this job. Cut just outside the lines, leaving all of the black line on the part. When fitting the part into place in the model, use the sanding block to bring the edges to an exact fit. If a modeling knife is used to cut out the parts, don't cut too close to the lines---leave some extra wood outside the line. True up and finish the edge with the sanding block.

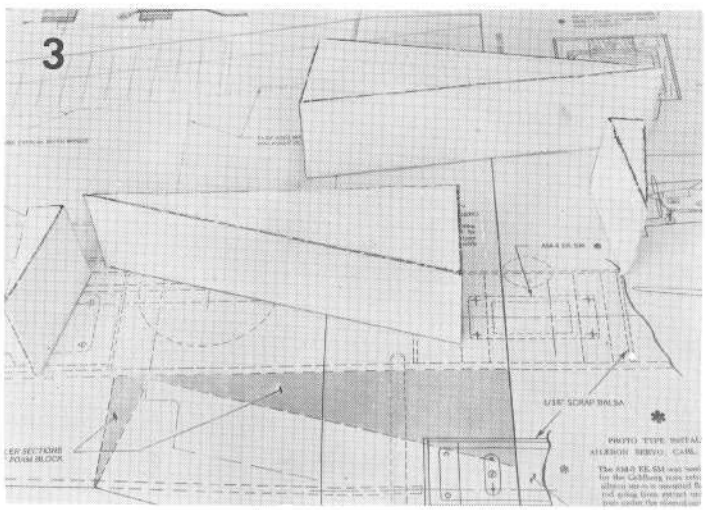
WING CONSTRUCTION



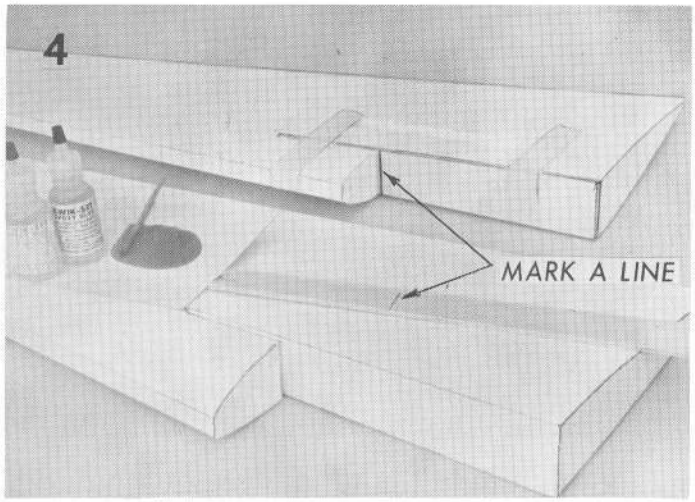


1. The foam wing cores are shipped in the block from which they are cut. DO NOT THROW AWAY. Check cores for small ripples, etc. Smooth out by lightly sanding with a large sanding block.

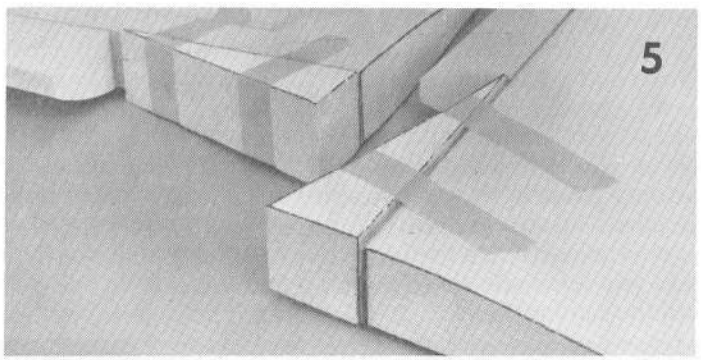
2. Another block of foam is provided for the triangle wing cuff insert.



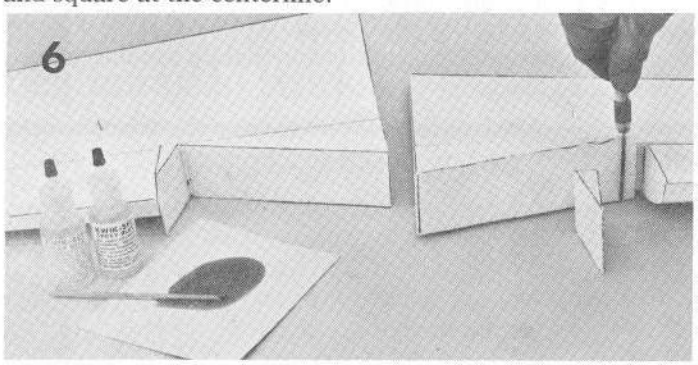
3. Draw the lines on this foam block. (See shaded area on Plan Sheet #2). Using a razor saw or knife cut the triangular filler blocks and true the cut surfaces with a sanding block.



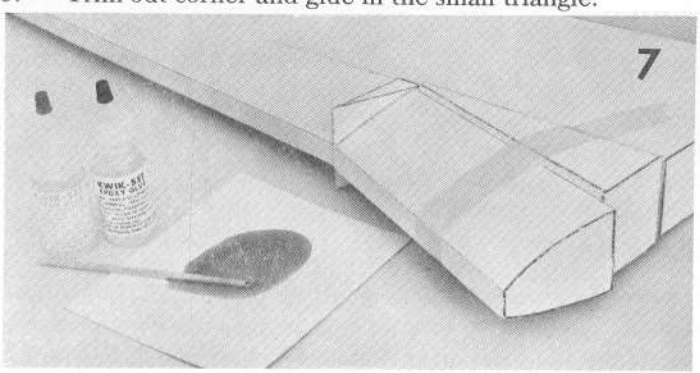
4. Mark a line at the end of cuff cut-out and spread glue on the two lite-ply wing braces. Spread glue on the whole backside and only up to the line on the front of the brace. Hold in place with masking tape.



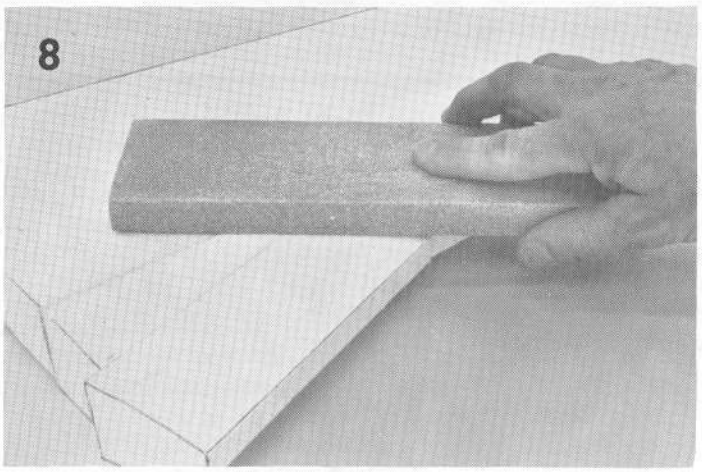
5. Glue the two large triangles of foam in place. Flush and square at the centerline.



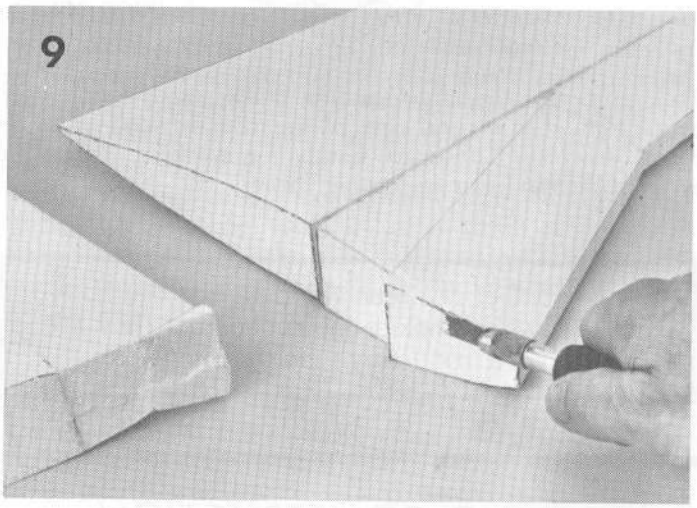
6. Trim out corner and glue in the small triangle.



7. Identify the left and right cuff - match them to the correct wing (airfoil). Glue in place - hold with masking tape. Align lead-edge and airfoil at centerline of wing.



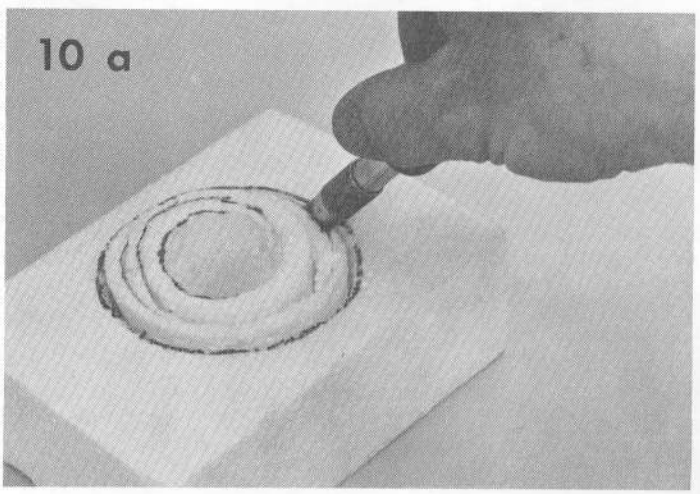
8. Trim and sand excess foam off the tops of triangles, do the same to bottom of wing and sand to match the airfoil.



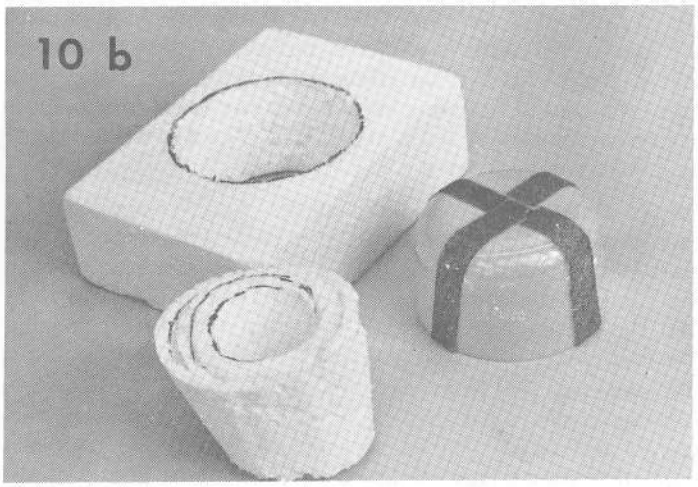
9. Trim off the small triangle from the forward edge of the cuff and glue it to form a flush centerline. Trim to airfoil when dry.

RETRACT CORE (OPTIONAL)

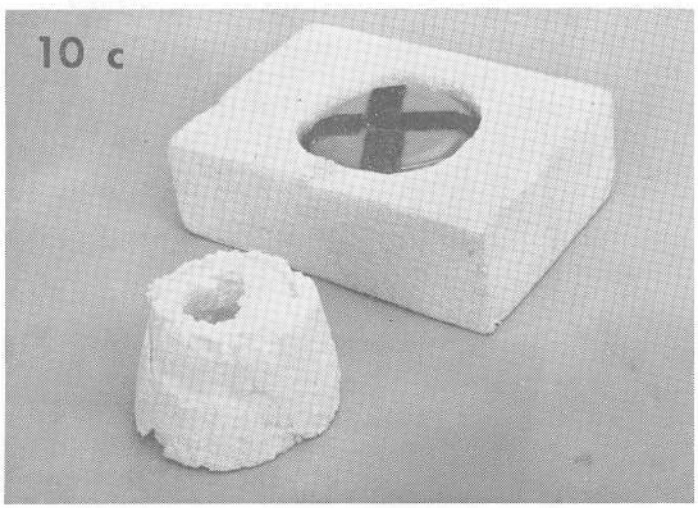
10. As an option the ABS wheel well liners are provided in the kit, suggested installation as follows.



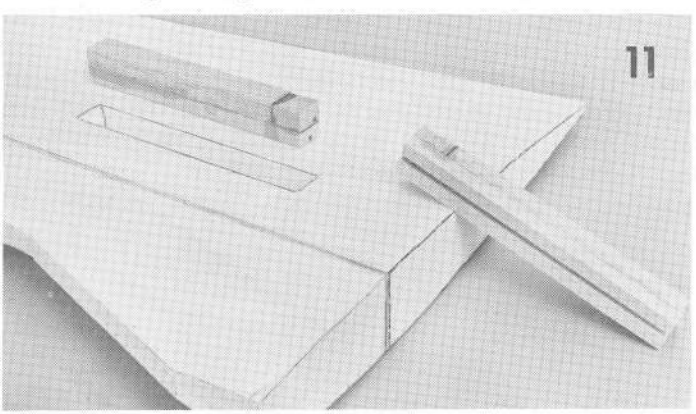
a. Retract core is cut by locating and drawing position of wheel well. Peel out in a circular cut until reaching the line.



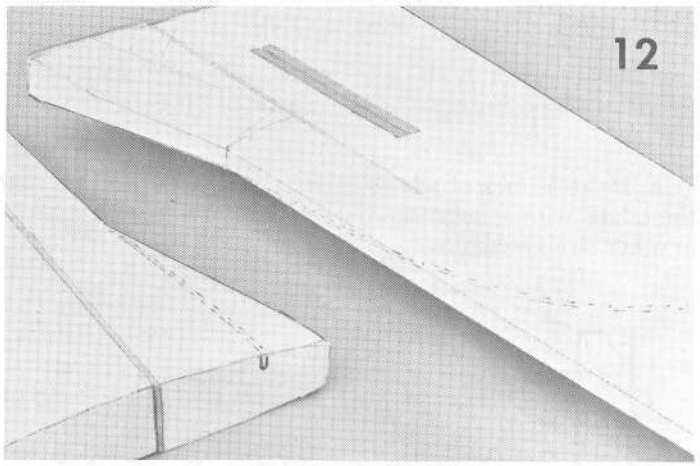
b. Stay inside the line with a slight taper in cone shape.



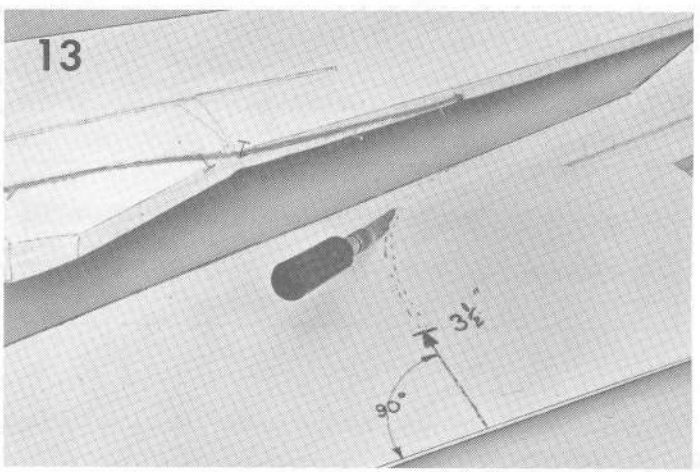
c. Use the ABS wheel well liner as a sanding and shaping block for final fit - glue a few strips of sand paper on the ABS wheel well and with rotating motion fit into wing hole till almost flush with top surface. Cut a round piece of 1/16" balsa sheet and glue into the hole to support top wing sheeting and bottom of the ABS wheel well, this also allows for flush sanding to wing contour.



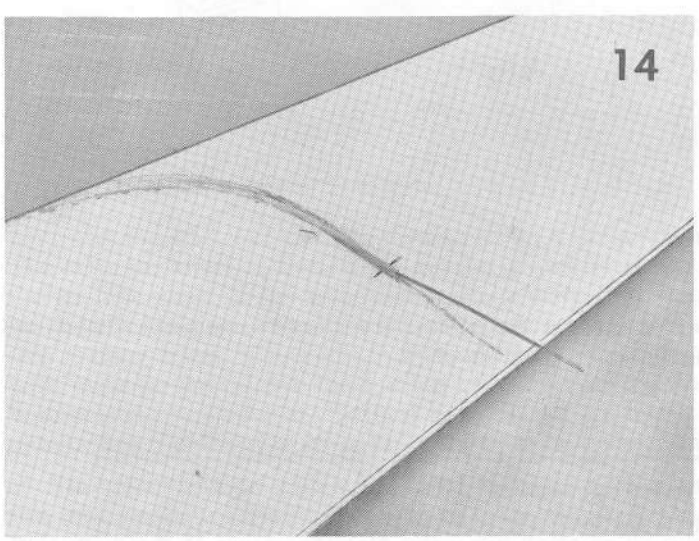
11. Use epoxy glue and glue the 1/2" x 3/4" x 3/4" hardwood block and the 1/2" x 3/4" x 5-5/8" balsa backup block to the slotted landing gear block. When cured drill the 5/32" hole through the 1/2" x 3/4" x 3/4" block and dry fit the assembly into the pocket, flush with foam surface. Put a piece of masking tape over the backside of the 5/32" hole to prevent glue from oozing into the wire hole.



12. Locate and draw the slot for the nylon aileron control tube. The nylon tube comes out the bottom for the aileron end and tapers to the top of the wing as it runs along leading edge.



13. Open up the groove in both wing cores with a modeling knife to imbed the nylon tube. Lay the tube in the groove and hold in place with a few pins. Glue with Kwik-set in spots along the length. The tube should exit just below top surface - flush with foam core at center and on the bottom side of wing - 3" to 3-1/2" from trailing edge.

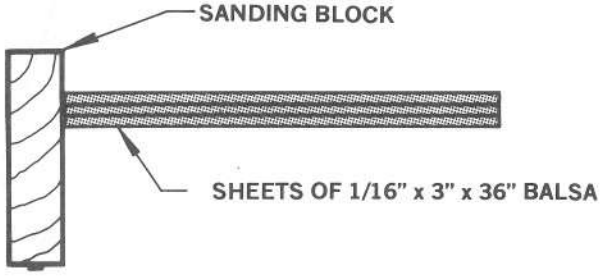


14. With the pins holding location give the tube a slight bend to angle the exit point so as to be in line with the aileron horn.

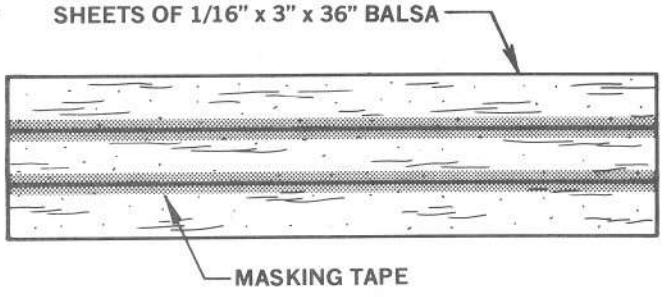
WING SKINS

Use the sheets of 1/16" x 3" x 36" joining them in a flat sheet as shown in the Wing Skin Layout on Plan Sheet #2.

a. Make a stack of wing sheets 1/16" x 3" x 36" and sand the edges with a large sanding block. Check with a metal or other straightedge.

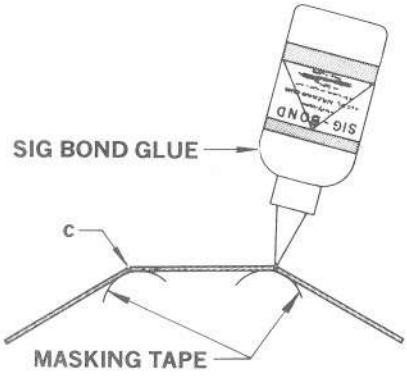


b. Tape the sheets of 1/16" x 3" x 36" wood tightly together on one side with masking tape. The diagram shows how the skins are assembled.



c. Turn over and open up the joints - the masking tape on the other side serves as a hinge.

d. Put a bead of Sig-Bond glue in the seam and close the joint. Lay the sheets flat, scrape off excess glue, weight down and allow to dry.



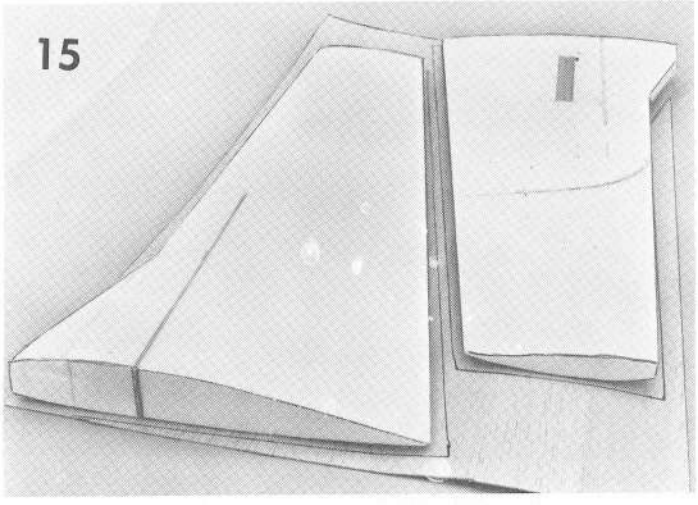
e. Repeat the process to make two complete wing skins, as shown on Plan Sheet #2.

APPLYING THE WING SKINS

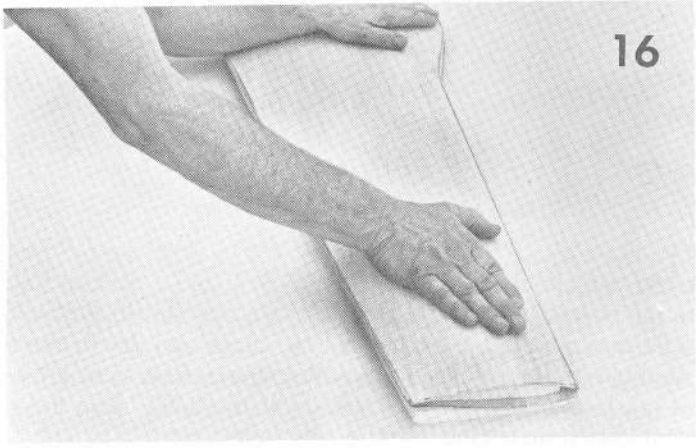
Proper application of the balsa skins to the foam core requires a perfectly smooth and flat surface. Sheet one side of a wing panel at a time. Use the pieces of the foam shipping block as work cradles while sheeting the cores. This helps prevent warping and enables the washout to be retained in the tips.

Sig Core-Bond is recommended for gluing the wing skin to the foam core. This is a special adhesive, light and strong, that will not attack foam when used as directed. Apply a thin even coat to the wing skin and to the foam core. Allow to dry completely at least one hour. The Core-Bond must be dry for good adhesion.

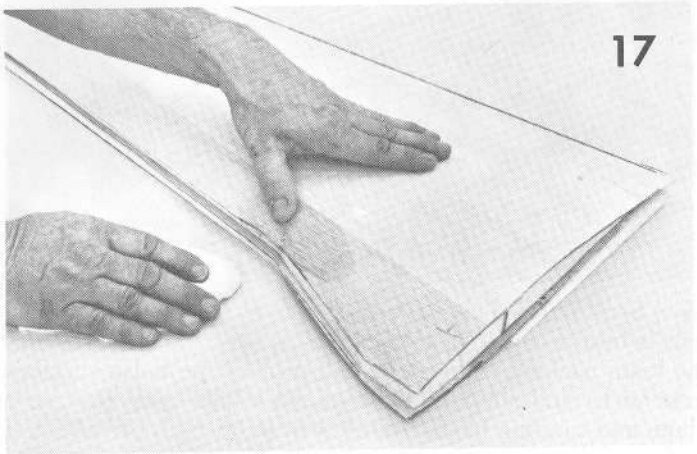
On the glued core, place two sheets of waxed paper, one on each side of the pushrod tube, so that the entire core is covered. Place the glued wing skin on the waxed paper with the aileron tube coming up through the skin. Make certain that the balsa sheet is correctly positioned before removing the two pieces of waxed paper. To remove gently pull out the waxed papers from each end. With easy hand pressure, rub outward toward the edges until the balsa skin is completely and solidly attached to the core. Sight down the leading and trailing edges. Remove any bowing by gently applying hand pressure and rubbing along the wing using the full flat palm of the hand. Trim the excess sheeting sticking over the edge of the core with a sharp single-edge razor.



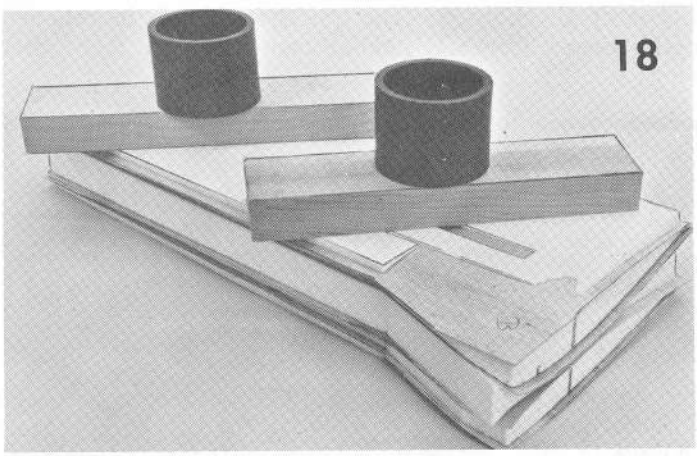
15. Lay both wing cores, one BOTTOM side up and one TOP side up, on the sheet and draw lines around them at least 1/4" away from the foam. Then turn the wing cores over and place them on the second wing skin sheet and repeat. Mark your sheets top and bottom. Be sure to leave extra width so that enough material is there to cover entire foam core. When cutting out the sheets stay outside the line. Check placement of wing sheets, top and bottom, of both cores. With the bottom sheets in place press down on the exact place of the nylon tube exit. Turn over the sheet and cut out a slot 3/32" wide by about 3/8" long in the exact area of the mark to allow for pushrod exit.



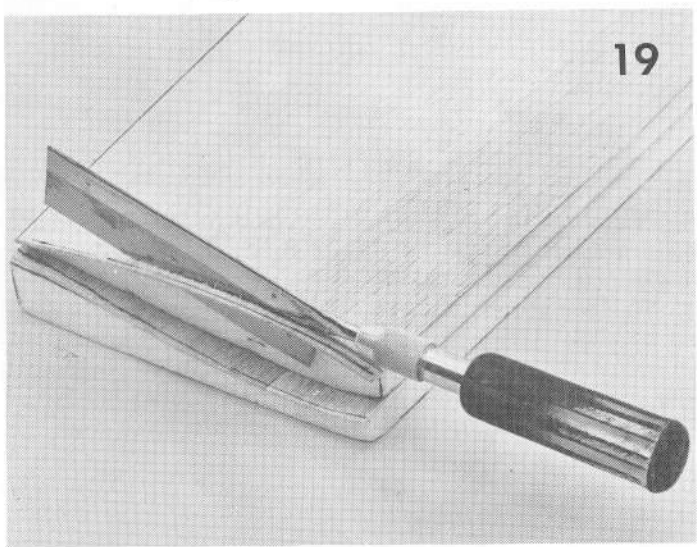
16. After both sides are sheeted put the wing back in the shipping cradle and rub down with firm motion and press down all edges checking for straightness as you work the wing.



17. The cuff depression needs a bit of hot water and firm pressure. Correct any bows as soon as discovered, preferably before applying firm pressure.

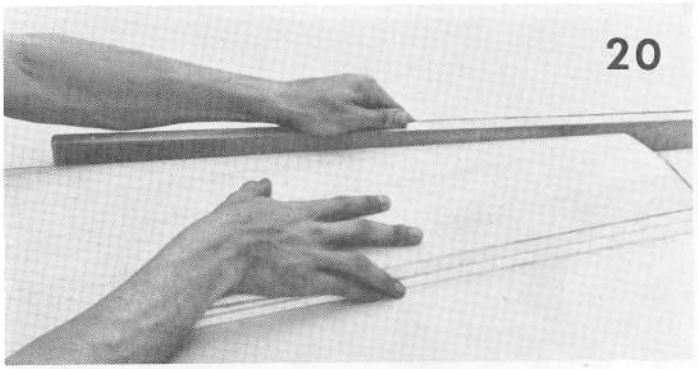


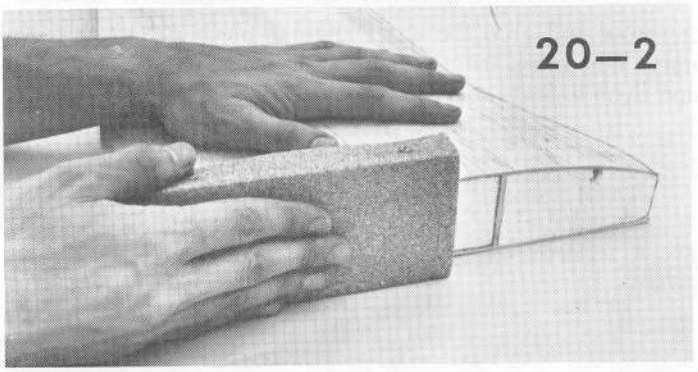
18. Stack the two wing halves in their cradle and apply some moderate weight.

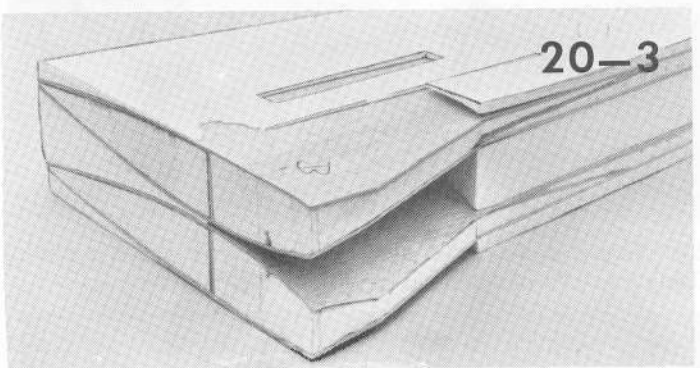


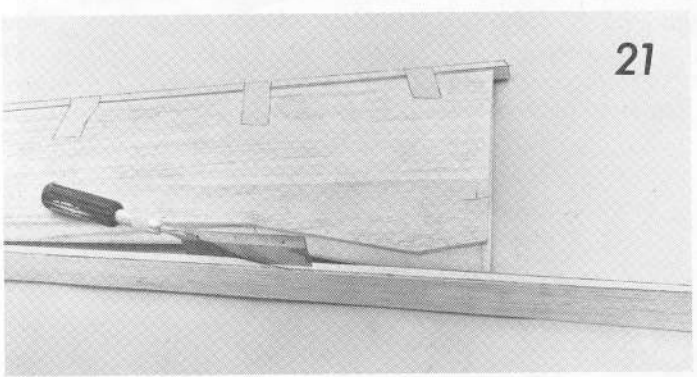
19. Trim edges all the way around, do not cut into the foam. A razor saw works best on the ends and a modeling knife or razor plane down the leading and trailing edge.

20. Sand all edges flush with the foam.





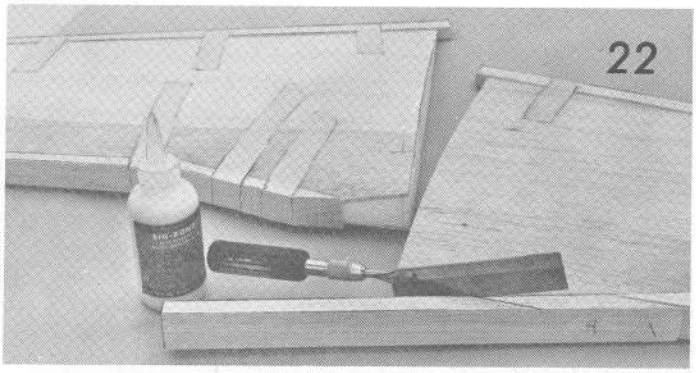




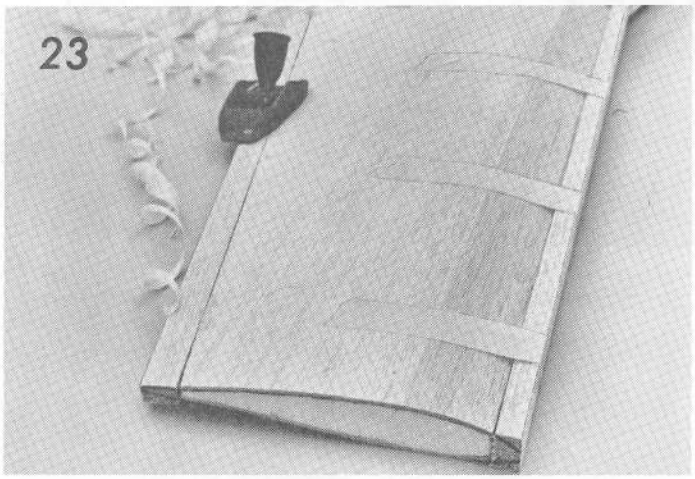
21. Cut the 1/2" x 3/4" balsa pieces for the trailing edges. The extra thickness of the 1/2" dimension allows for shaping the trailing edge. If the wood has a slight warp, the warp can be left hanging naturally without adding a strain to the thin trailing edge. Glue with Sig Bond and hold in place with masking tape, leave the trailing edge overlap top and bottom surface. Leave any natural bow, do not try to straighten. See the drawing lower left corner of Plan Sheet #2.

a. Mark the 1/2" x 2" x 36" piece of balsa to make the two leading edges - 3/4" in on each end and draw a diagonal line. Cut in half using a straight edge and knife or jig saw.

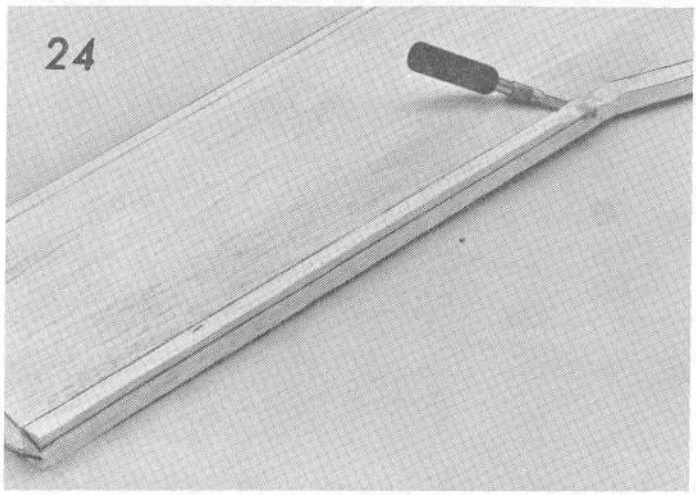
b. Cut the diagonal for the cuff on the long portion of the leading edge. Glue with Sig Bond and tape in place.



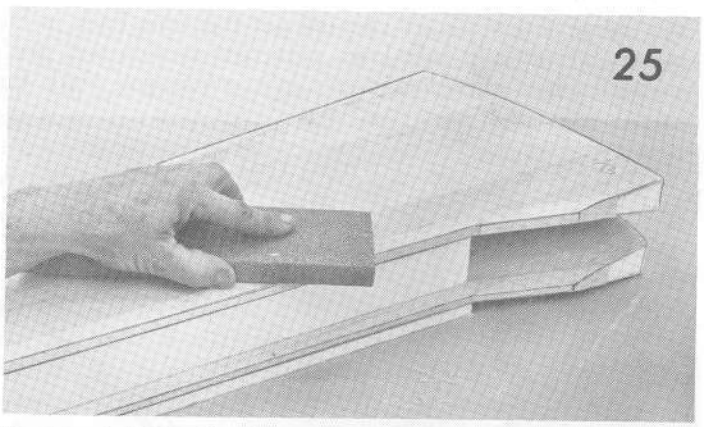
22. Cut and glue the short angular piece of cuff leading edge. When dry, trim ends of leading and trailing edge and sand flush to foam core.



23. Draw an extension of the airfoil on the tip as a guide. Using a razor plane, airfoil the top of trailing edge.

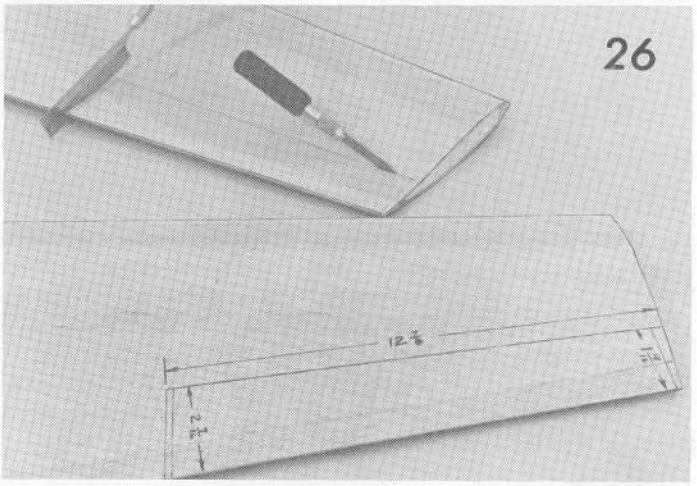


24. A modeling knife and razor plane are used to airfoil top of leading edge. Using the modeling knife carve out a small area by the cuff. This is an extension of the airfoil. Draw a straight line with a straight edge from this mark to the tip mark. Use this as a carving guide for top of airfoil. Carve to this line -- stay away from the line. Leave at least 1/4" x 5/16" flat surface on the leading edge. Check the leading edge for straightness before shaping the bottom side.

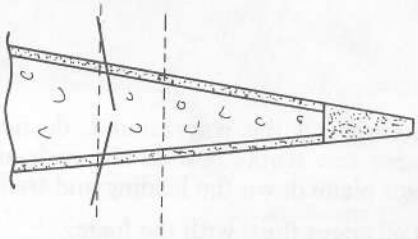


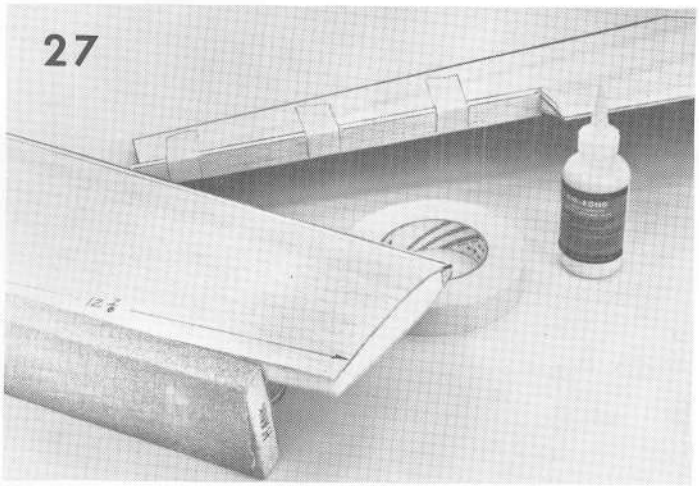
25. Semi-finish shaping and sanding of top and bottom airfoils is best accomplished using the stack of foam cores and the foam packing. The stack will protect the balsa surfaces from nicks and support the contours while using the razor plane and sanding block. Work a little on each of the foam surfaces watching straightness and shape of airfoil. This way you can bring both wing panels along in all respects. Leave the rounding of the leading edge until last. Also leave 1/8" or 3/32" trailing edge. Touching these up at a later time is simple and easy. The true shape should be retained at this time. The final sanding can always be done after wing assembly.

AILERON CONSTRUCTION

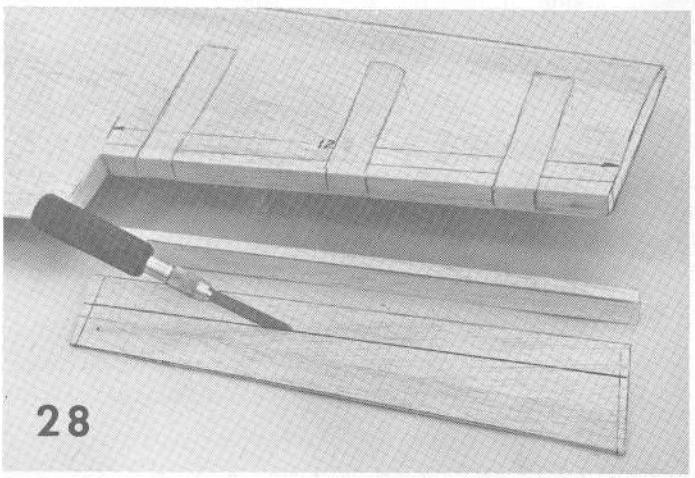


26. Copy the dimensions from the drawing Plan Sheet #2 and draw the ailerons on the TOP and BOTTOM of the wing panels. Draw the outer most line of the aileron about 1-15/16"deep at the tip and 2-7/16" deep at the control horn and by about 12-7/8" long. Use a modeling knife and cut the balsa skin and foam. Go about one-half way through from both sides, align the cuts towards each other but favoring towards the aileron. Use razor saw on the cross grain.

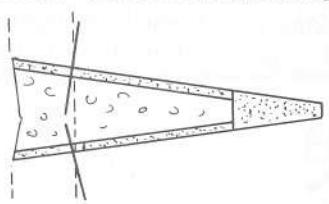


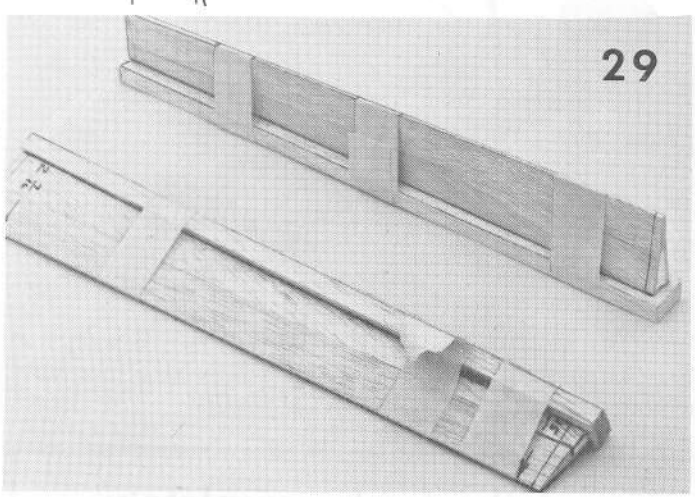


27. Sand the wing pocket square and glue the 3/8" x 3/4" balsa in place. Hold with masking tape.

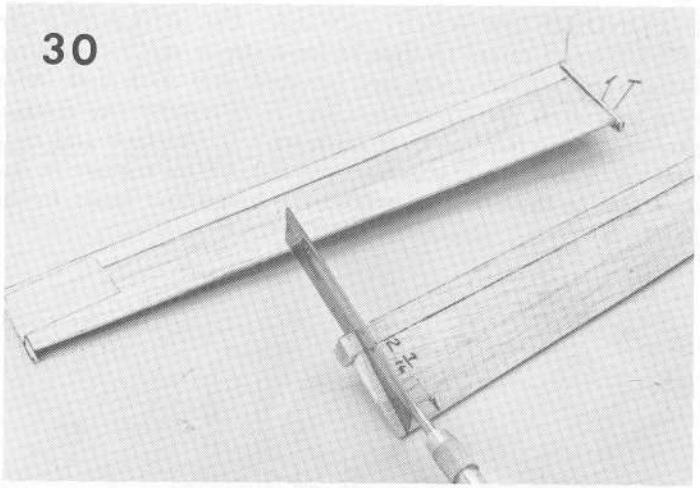


28. Cut a piece of 1/16" sheet balsa scrap and glue in place. Trim and sand the ends of the 3/8" x 3/4" (end of wing tips.) Draw a line 3/4" from leading edge of aileron, top and bottom. Cut off with modeling knife.

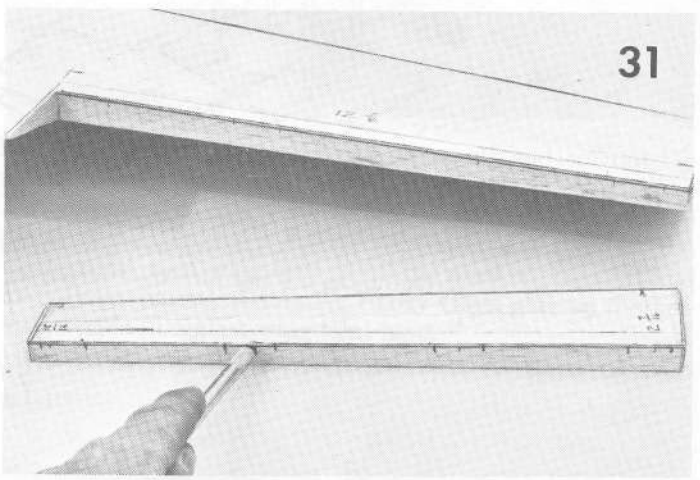




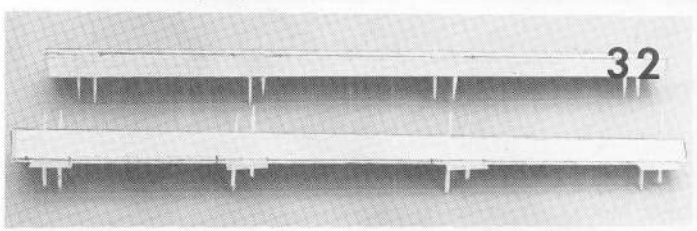
29. Sand smooth and glue the 3/8" x 3/4" balsa in place on the aileron. Hold with masking tape.



30. Trim ends off the ailerons and glue on the 1/16" scrap ends. Sand these flush with the aileron airfoil when dry.

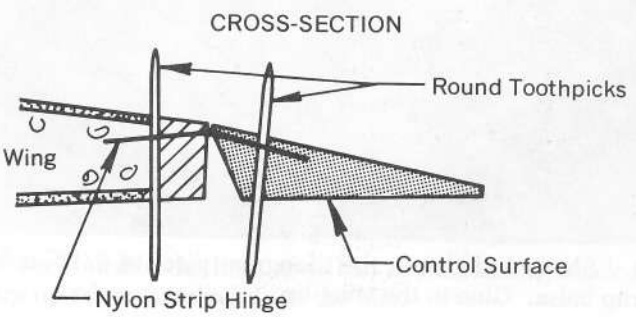


31. Draw a line 1/16" below the top of the aileron pocket and a matching line on the top of the aileron. Mark the hinge location and slit the hinge location on the 1/16" line. Taper cut the aileron from the 1/16" line towards the bottom on a 3/16" bevel. Dry fit the hinges and assemble the ailerons to the wing, slipping in place and hold in level position with masking tape.

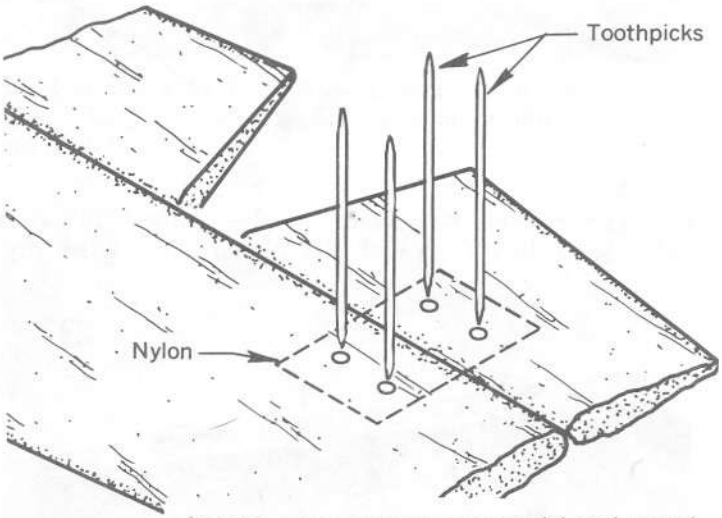


32. Hinges can be installed on ailerons now or later - builder's option.

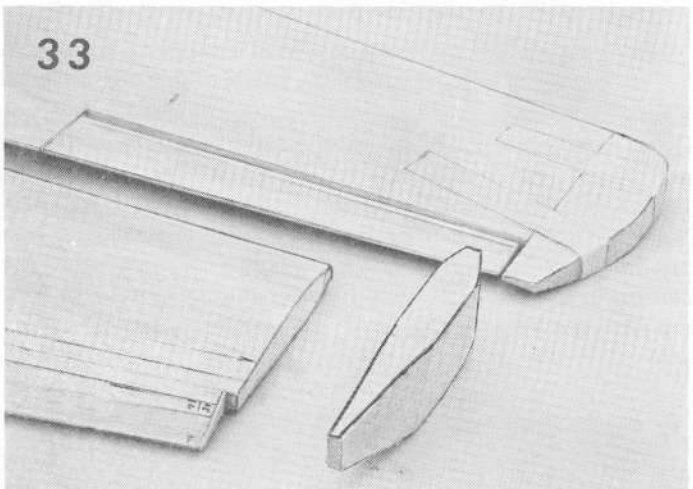
ALTERNATE CONTROL SURFACE HINGES



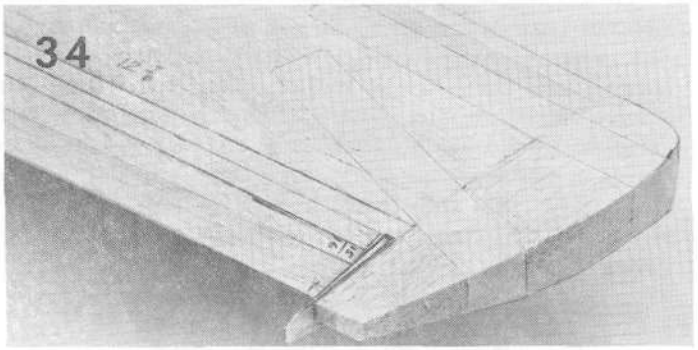
SECOND METHOD FOR HINGES: Use .010 Strip Nylon (SH-237) and round toothpicks for a strong method of hinge installation. Toothpicks are inserted into 4 drilled holes, (Put a drop of Sig-Bond Glue into each hole). Use a razor saw to cut the toothpick off flush with the surface and sand smooth. Later, while painting, put the control surface in one direction or the other to expose the hinge line areas to the paint spray.



*NOTE: The nylon hinge material and round toothpicks are not furnished in the kit.



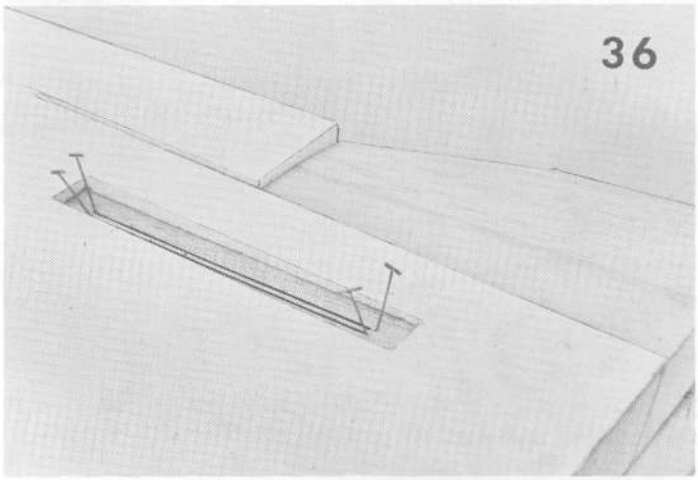
33. Trace the outline of wing tips on the 1" x 2" x 7-1/2" balsa blocks. Cut to the outline, staying outside the line. Glue with Sig Bond and hold in place with masking tape.



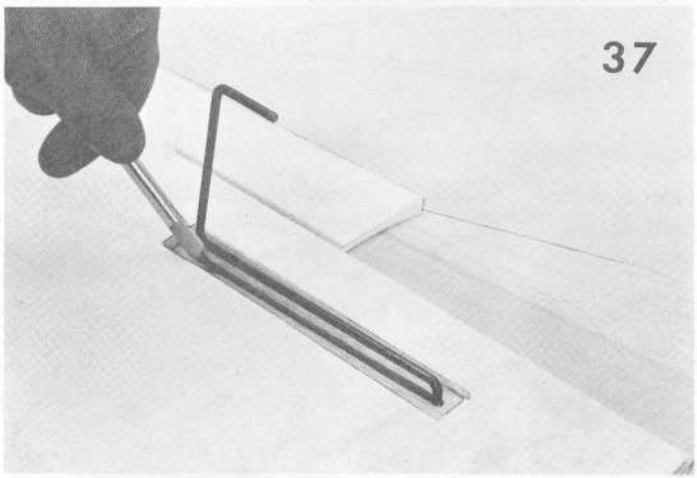
34. Shape and glue in the triangular piece of 3/16" x 3/4" scrap balsa. Glue to the wing tip.

35. With aileron taped in proper alignment shape and sand top and bottom airfoil of wing tip.

When sanding on the wings use the cradle and support them as much as possible. Use the foam every chance you can. They will save nicks and make the shaping and sanding much easier.



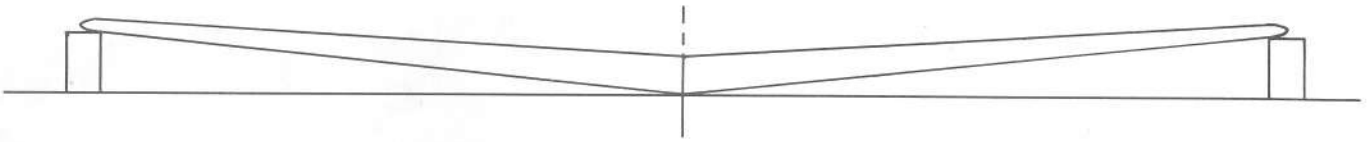
36. Using the packing foam (bottom piece) locate the landing gear block by sticking pins through the balsa until the slot is located. Draw two parallel lines from the pin to pin.

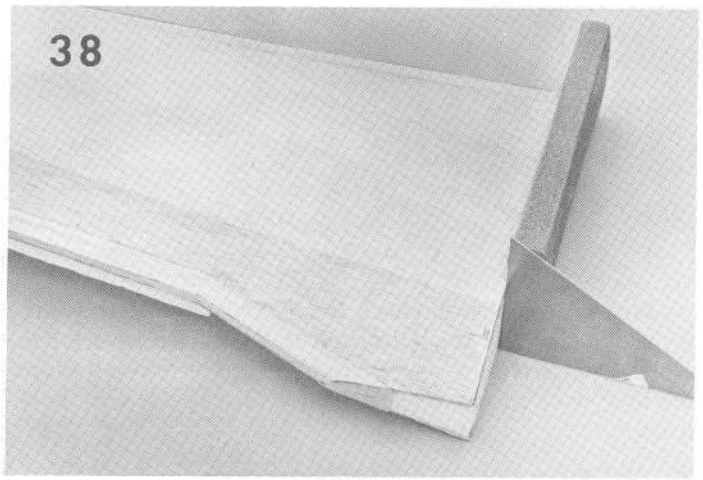


37. Open up the landing gear slot a little at a time until the wire drops in.

read the book completely

WING DIHEDRAL

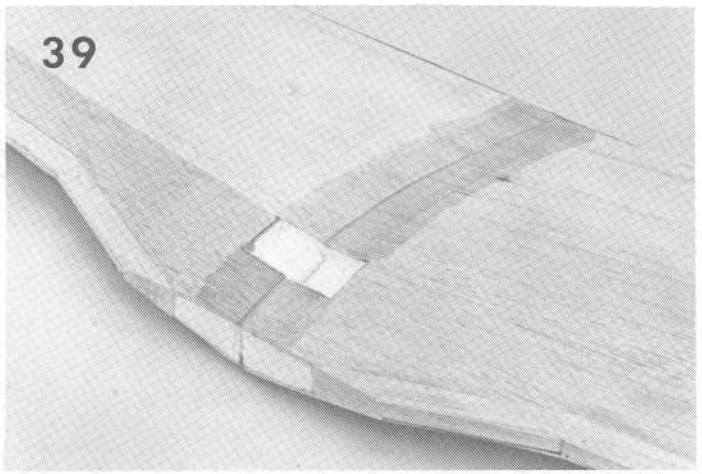




38. The dihedral is 3-1/4" under each tip. With the wing panel laying on the thin bottom foam packing piece block the tip up with about 3" under the foam. Use a small square and sand the center joint. Do the actual sanding by placing the wing on the edge of the table with a bit of overhang. Sand a bit and slide the wing back on the table to check for square. Do the same to both panels.

Block up the wings to the proper dihedral. Make a dry set-up checking for all the contact points.

Using Sig Epoxy Glue, wet both wing halves at the center joint. Put a piece of 1" wide masking tape on the bottom of one of the wing halves so that one-half of the tape makes contact on the second half. Smooth the tape to prevent glue from running out of center joint. Place the glue-wet wing halves back onto the blocks, same as in the dry setup. Push together and check for alignment. Let cure.



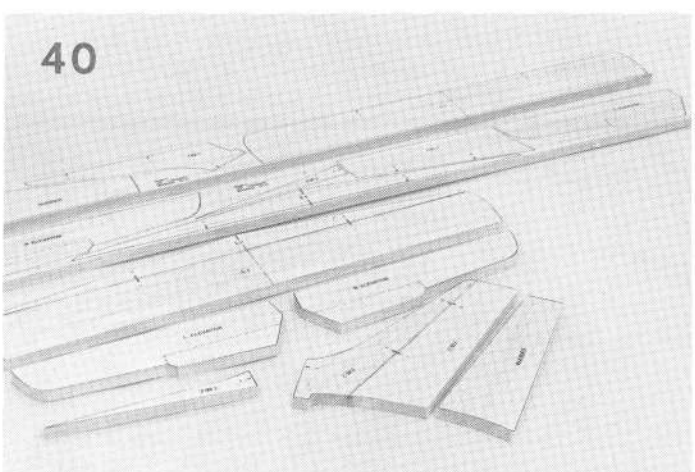
39. Locate and cut out the servo pockets and cut out the pocket. Wet pieces of 2" wide fiberglass tape with Epoxy Glue and place on top of the wing joint. Smooth out all bubbles until the wet tape is down on the joint smooth and tight. When cured, turn wing over. Pull the masking tape off and sand off any bumps. Using Sig Epoxy Glue, glue on the bottom 2" wide fiberglass wing joint tape.

NOTE: The 1/4" x 2" x 10" wing to fuselage spacer is glued on later.

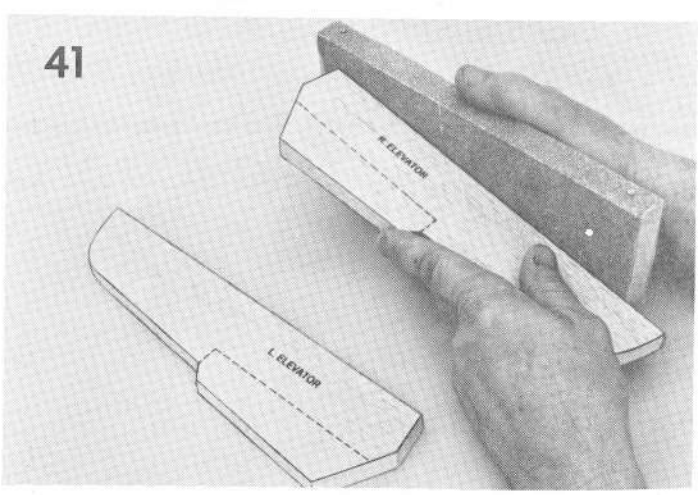
IRON ON MATERIALS ARE NOT RECOMMENDED

Heat from irons and heat guns will most likely damage the ABS plastic parts and wing foam cores - DO NOT USE.

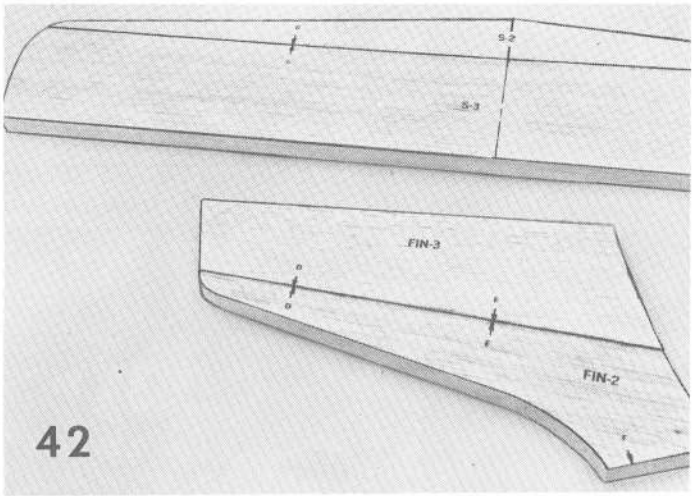
ELEVATOR AND RUDDER PARTS



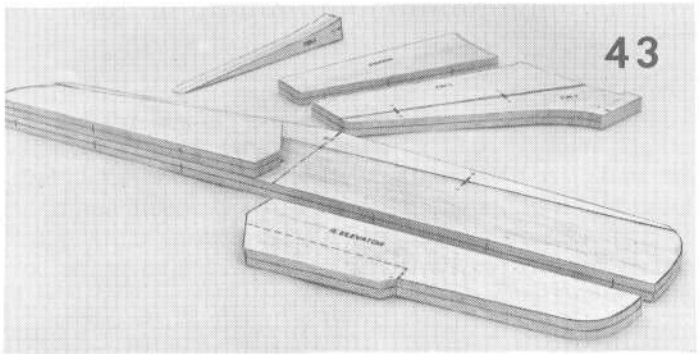
40. All parts are printed on a 1/2" balsa sheet. Cut out parts with a sharp modeling knife or a jig saw.



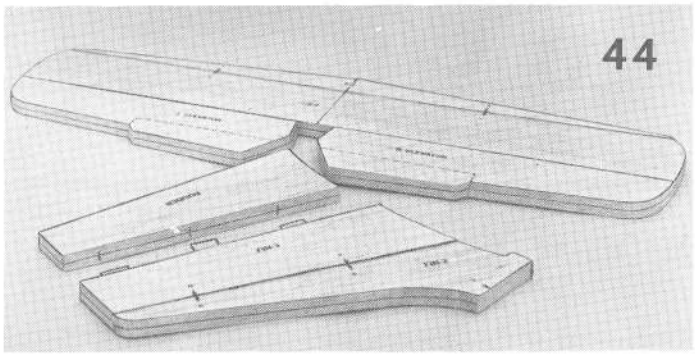
41. Stay outside the lines and then use a sanding block to square up edges, sanding up to the line.



42. Several parts are match-sanded in preparation for gluing. They are S-2 to S-3 and FIN-2 to FIN-3. Glue and pin them together on a sheet of wax paper.



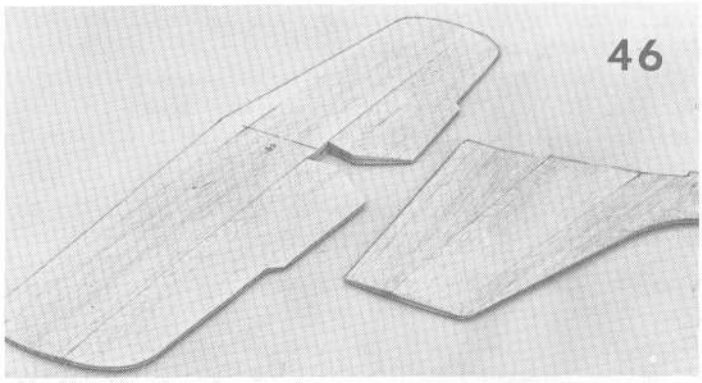
43. Draw a centerline around all rudder, fin stabilizer and elevator parts. Using the plan, mark the location of all hinges. Slit the hinge pockets and slip hinges into these slots.



44. Match the mating part and push together. DO NOT GLUE.

45. Look at the plan to check the airfoil shape of the various parts, using the shaded airfoil cross section as a guide. Shape the parts with a coarse grade of production paper on a sanding block or use a razor plane. Shape the airfoils to the drawn center line to retain a semitrical airfoil.

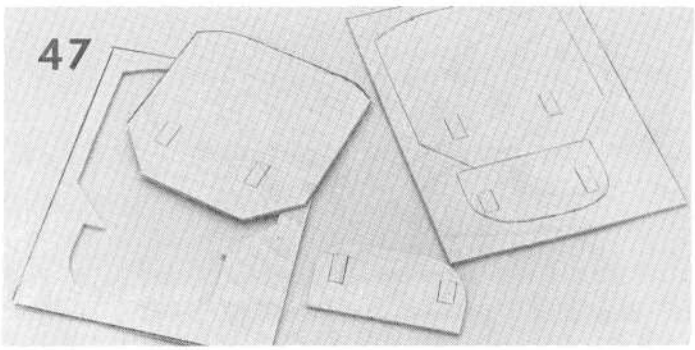
Taper the shape from center to tip and be careful not to remove great amounts of wood at one time.



46. Go easy and leave some for final sanding and truing up.

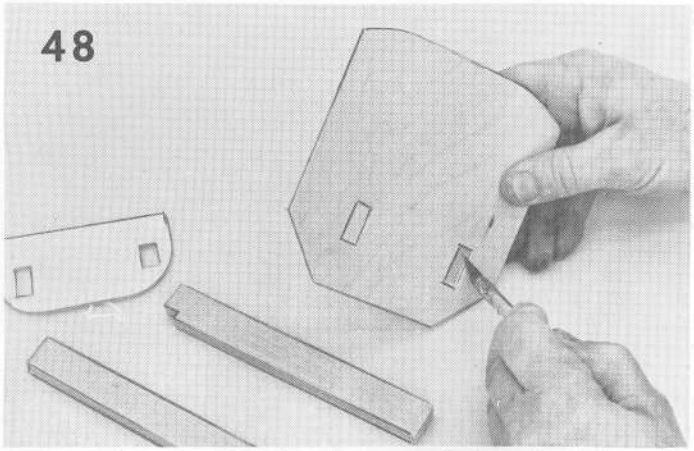
study the full size plan

FRONT SECTION CONSTRUCTION

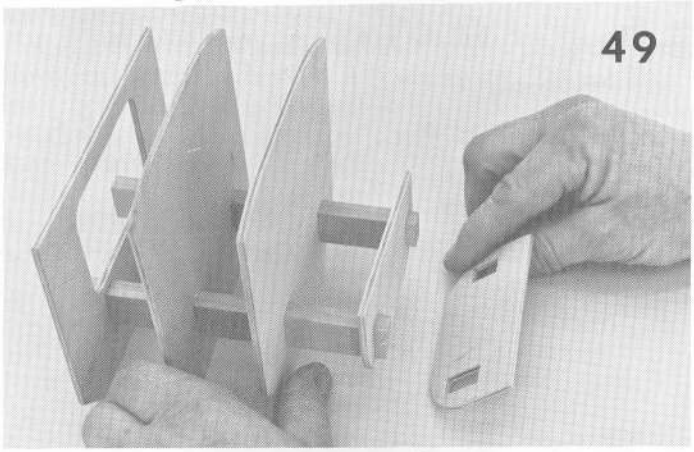


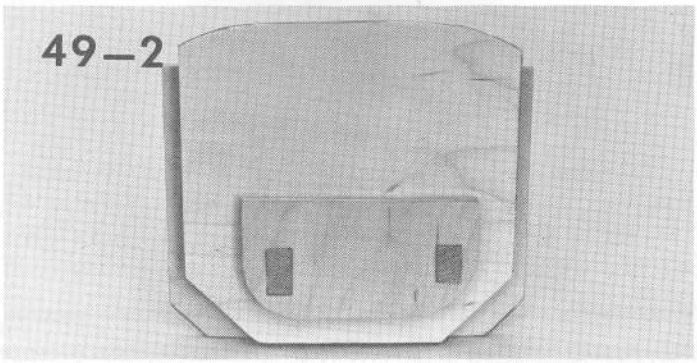
47. Remove all plywood formers from die cut sheets and identify each by laying on the full size plan. Sand the edges of all formers cleaning off the splinters from die cut & lightly smooth the edges.

NOTE: Die cut rectangular holes 3/8" x 3/4" are offset to the fuselage left side to facilitate GOLDBERG RETRACT INSTALLATION. These die cut holes are undersize and will need trimming for a snug fit to the hard wood rails.

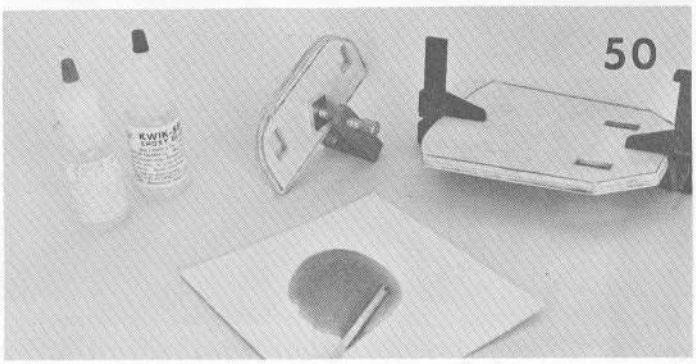


48. Hardwood rail, left side is notched to fit the 3/8" x 5/8" hole F-1. Former F-1 is slanted towards the rear - see full size drawing.

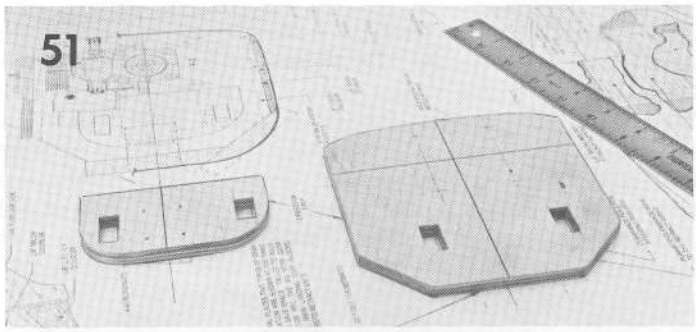




49. Dry fit all five pieces — 2 F-1's, 2 F-2's, and F-3 to the hardwood rails - trimming the rail holes for final alignment and a nice push fit. Note that F-2 and F-3 are the same height from bottom of the formers to the rails.

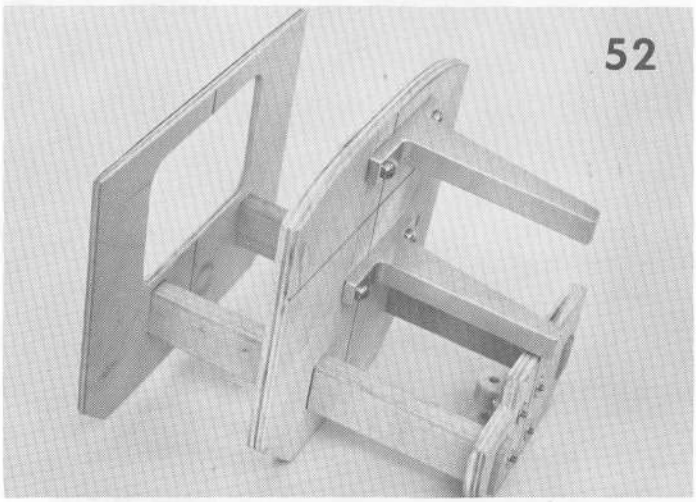


50. Glue the 2 F-1's together and also both F-2's.



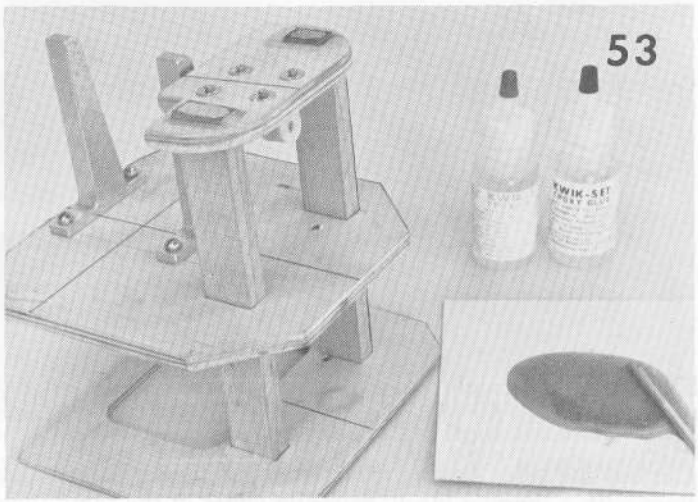
51. Lay the formers on the plan and draw the center lines on the formers. Mark locations of engine mounts and nose gears.

Drill holes for 6-32 blind nuts for engine mounts and the 4-40 blind nuts for the nose gear mounting. The cutouts in F-1 and F-2 for retracts and muffler should be cut at this time. The different types of engines, retracts, and muffler installations may vary the exact location of the cut-outs.

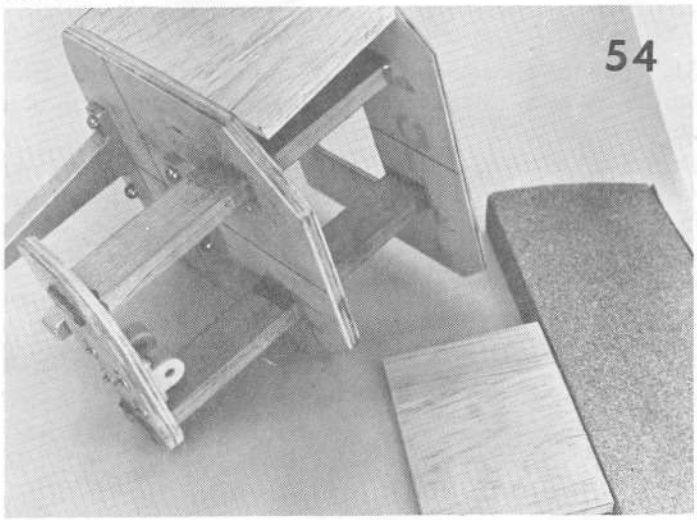


52. Screw the motor mounts to the firewall, F-2, using the 6-32 bolts. Note the nose gear bearing is mounted to the backside of F-1. Lay the motor mount rails on the plans and mark F-1, F-2, F-3 locations. Dry assemble the front section and check for squareness and alignment. Locate the steering arm pushrod clearance holes in F-2 and F-3 - Pushrod Sig SH-559 is recommended. Drill holes in F-2 and F-3 for the nylon tubing.

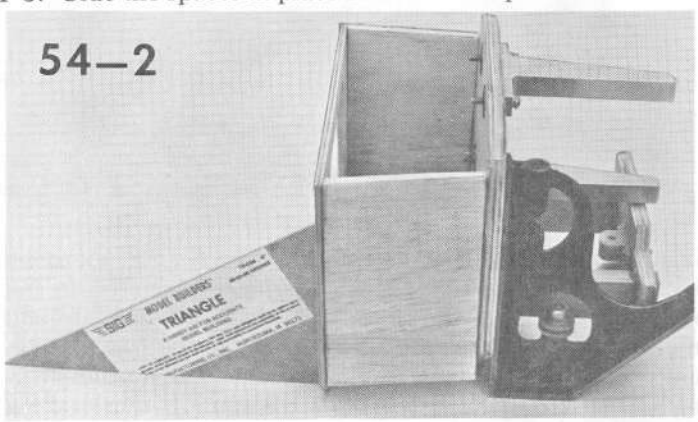
Inside hole of F-3 should be well-rounded to prevent fuel tank damage.

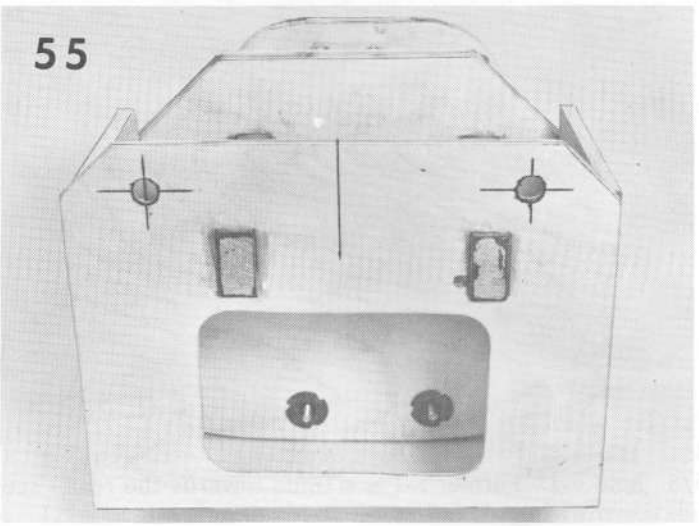


53. Check the dry assembly for square. Glue F-1 onto the rails with Kwik-Set. Be sure to wet both rails and the rectangular holes with a coat of glue. Check alignment, let dry. Wet rails on the location for F-2 firewall. Slide firewall into position. Move it back and forth to wet inside of holes with glue. Place assembly on flat surface. Slide F-2 into position and square up motor mounts with center line of F-1 and at 90• to the flat surface. Use a triangle or square head if available, let dry.

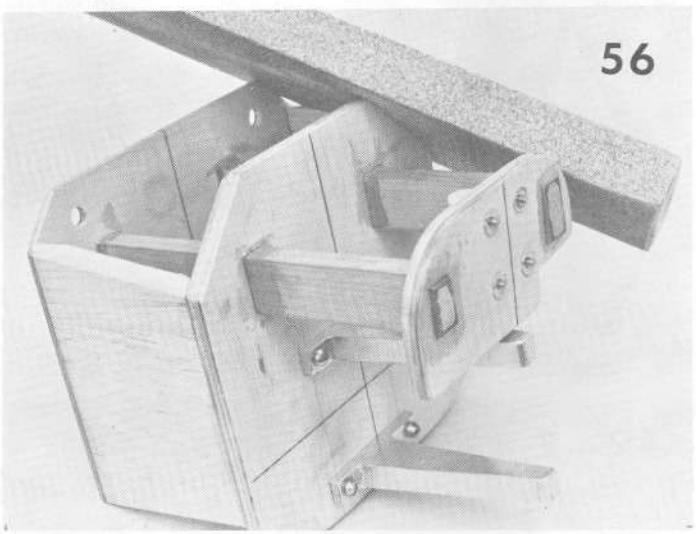


54. Sand and fit the 3/16" balsa spacer between F-2 and F-3. Glue the spacer in place flush at the top with F-3.



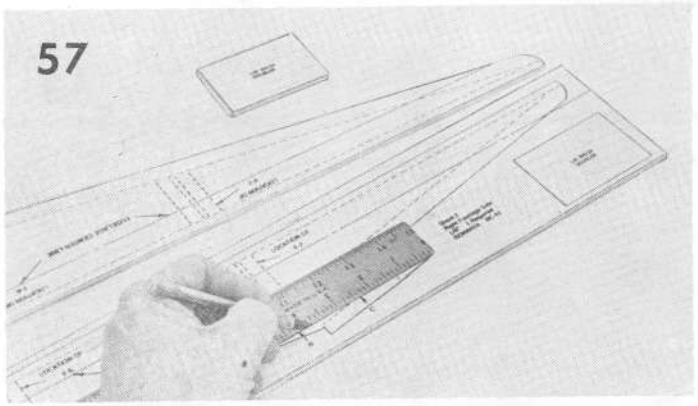


55. Locate and drill the 1/4" wing dowel holes in F-3.



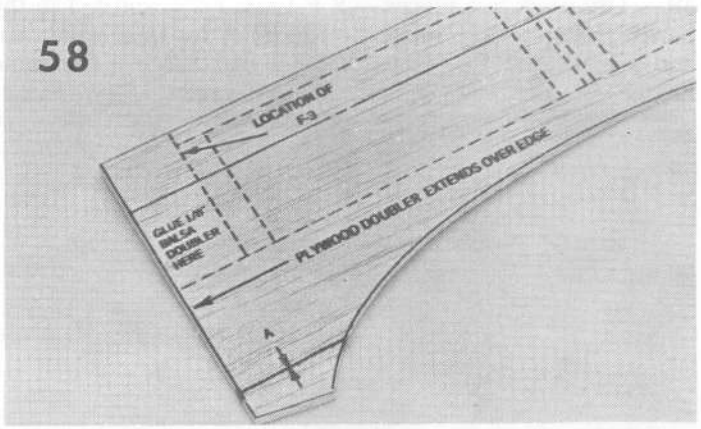
56. Trim and sand off the angle on bottom the 3/16" balsa spacer, sand enough material off the 45• edges of F-2 and F-3 to make a glue surface for the two 1/2" x 3" 3-1/2" fuse blocks.

FUSELAGE SIDES

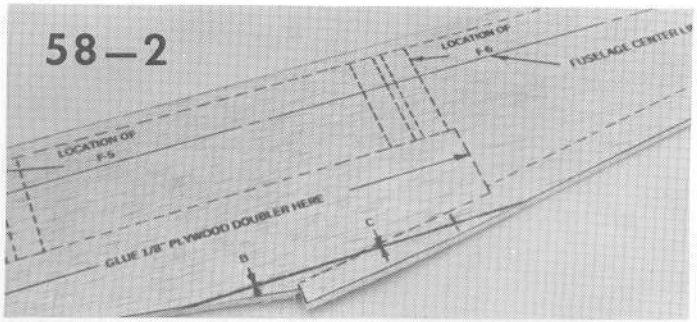


57. Using a straight edge and sharp model knife cut out the small pieces for gluing to Fuselage Sides A/A, B/B, and C/C.

Cut out the sides staying away from the lines. Sand to the lines with a sanding block, squaring edges at the same time.



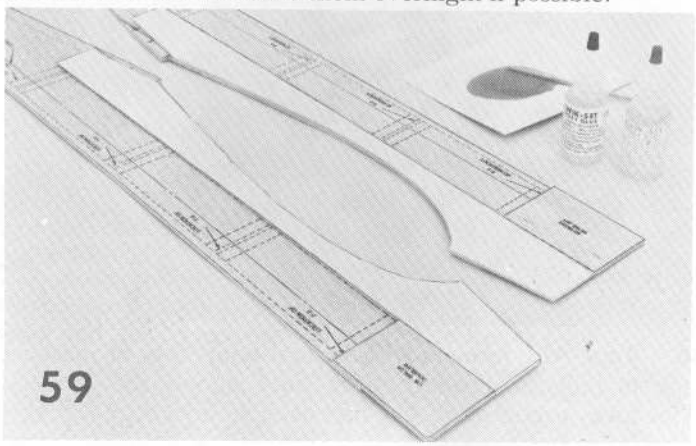
58. Glue A/A, B/B, and C/C to the side sheets and sand to the lines.



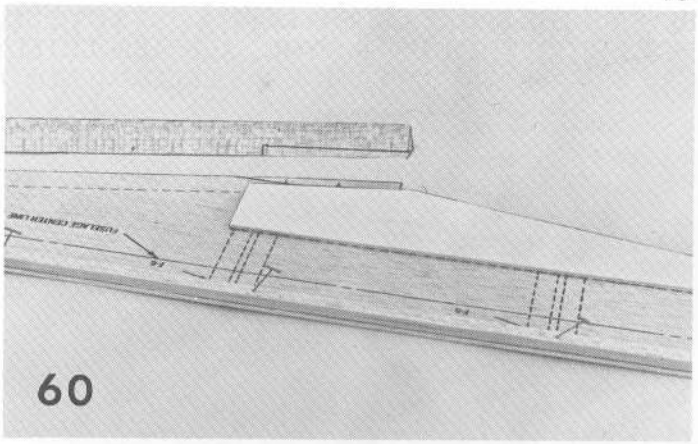
CAUTION!

Do not glue the plywood doublers on with Sig Bond, Tite Bond, Elmer's white glue or any other adhesive that has a water base. Water base glue will cause the doublers and sides to curl because of the large area being glued.

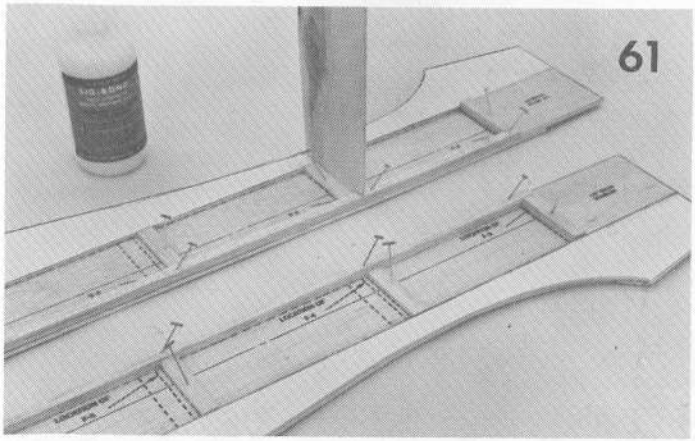
The doublers on the prototype were glued in place with Sig Kwik-Set five minute epoxy. Work quickly, spread a thin film of glue over the entire doubler, put in place and press down with your hands while it is setting up. Do not take it from the building board immediately after set-up. Five-minute epoxy sets up quickly but doesn't fully cure for some hours. During this time it can warp. Put some heavy weights on the doublers and leave them overnight if possible.



59. Glue the 1/8" lite-ply fuselage doublers onto the sides. They will extend beyond the front edge. Use epoxy glue. Then glue the 1/8" balsa doubler in place. This will also extend ahead of the 1/8" fuselage side. Glue it to the side and to the doubler at the same time.

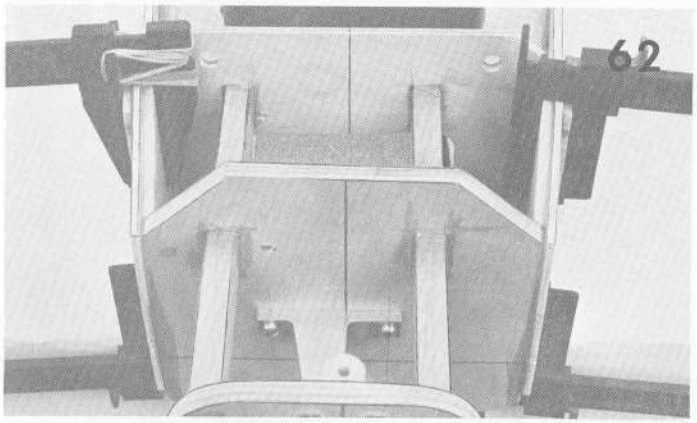


60. Glue and pin the 1/4" x 1/4" top fuselage stringer in place with Sig Bond and notch the 1/2" triangle stock to fit around the lite-ply doubler. Glue and pin the triangle to the side.

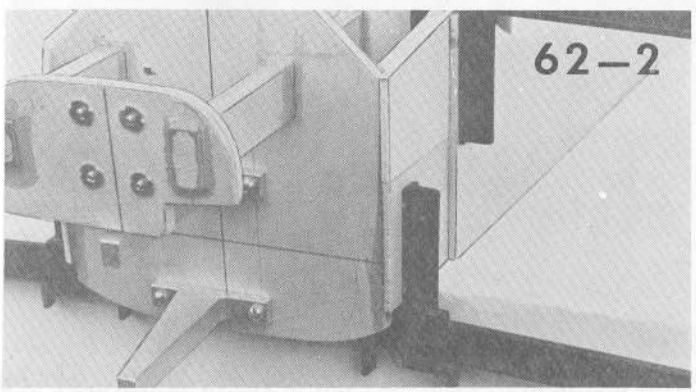


61. Cut the 1/4" x 3/8" balsa vertical fuselage brace and glue into place. Cut and glue one 1/8" x 3/8" brace at each location F-4 thru F-7. Then using the proper former as a spacer glue the second 1/8" x 3/8" against the former. Remove the former after inserting a pin.

JOINING FUSELAGE SIDES TO FRONT SECTION

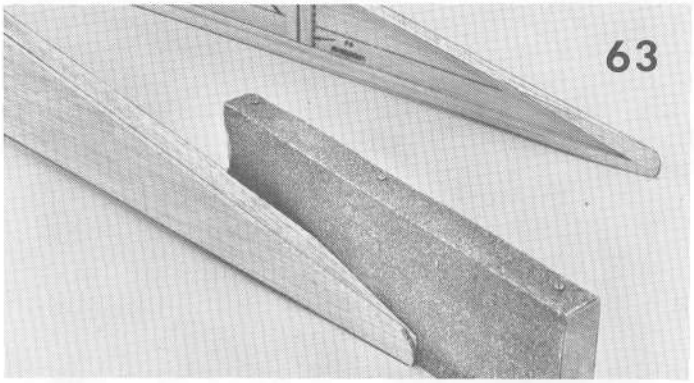


62. Place the front assembled section inverted on the edge of a flat table with a weight to hold position. Dry set up for checking.

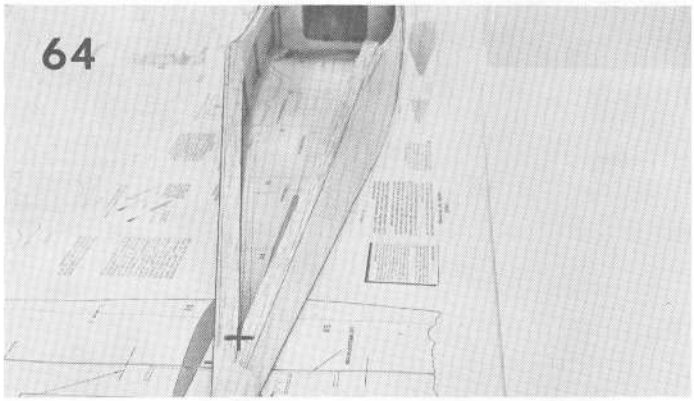


Check the front assembly with a 90• square former F-3 and the table top. Glue the two sides to the front assembly. Use epoxy. There will be a slight overlap of F-2 approximately 1/8". This is intentional and correct.

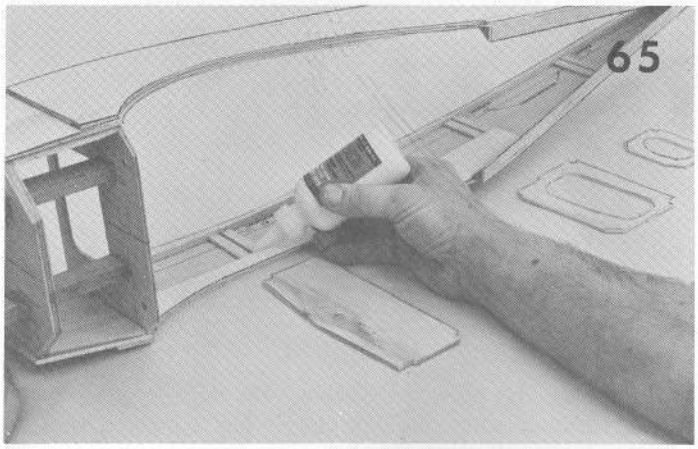
BE SURE THE EPOXY GLUE IS CURED - DO NOT PULL SIDES TOGETHER UNTIL YOU ARE ABSOLUTELY CERTAIN. DRYING OVERNIGHT IS RECOMMENDED.



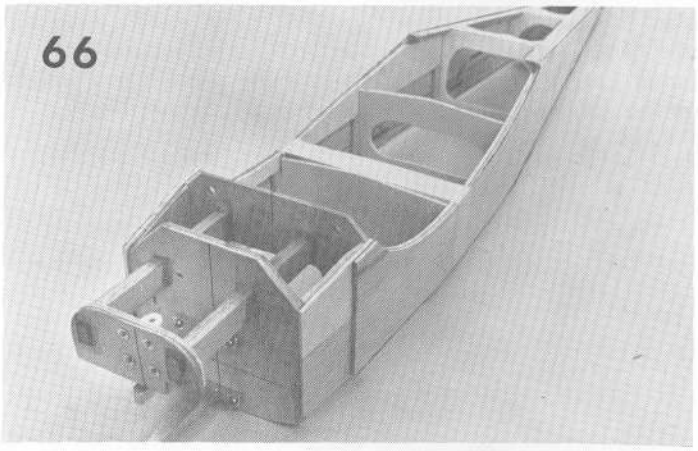
63. Taper cut and sand the tail parts of the fuselage sides and tape together, dry fit.



64. Pull sides together and tape with masking tape. Lay the fuse on the full size plans and check alignment along fuselage centerline. After proper alignment is made, tape F-4, F-5, F-6, and F-7 formers in place (dry fit), place a mark across the tail taped joint so that when glued realigning will be easy. Open up the tail part and glue with epoxy glue. Retape and let cure. Check the mark.

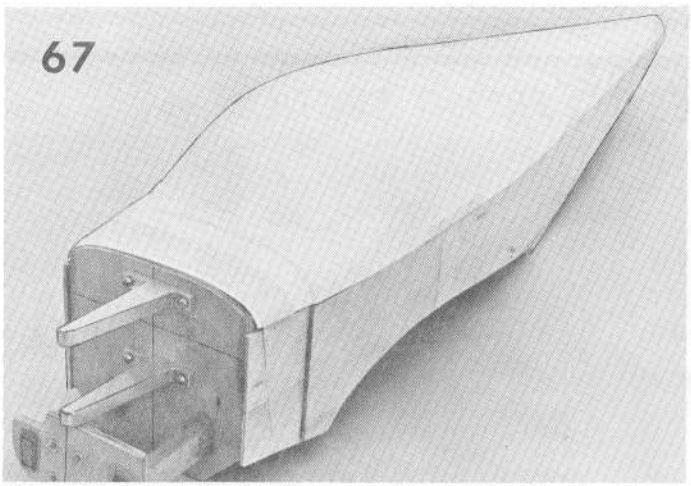


65. Formers F-4 thru F-7 can be glued after the tail part is cured. Put some Sig Bond in all former slots on the one fuselage side. Then apply some glue to the opposite side of the glued slots and slip formers into place. Check alignment and position.

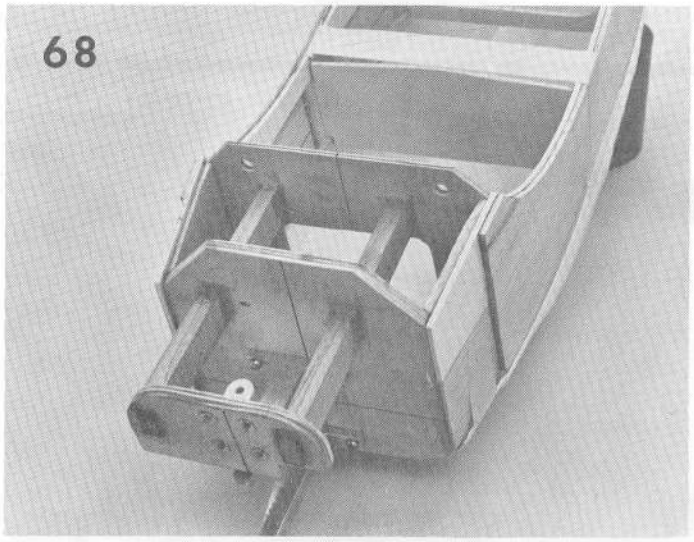


66. Tape ALL formers with several wrappings of masking tape to pull the fuselage sides snug against the formers. Wipe away excess glue. Lay fuse aside to dry.

ABS TOP / CHECKING FOR LOCATION



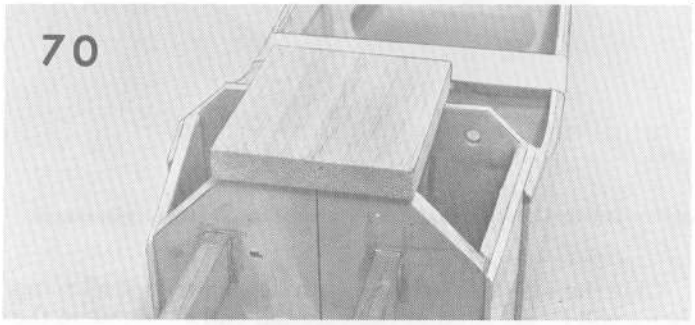
67. Trim the ABS fuselage top, front and tailend. The tail has a balsa block, and the front has a 1/4" balsa fuselage support. These balsa parts are added later. The top is taped in place as an early check for position. Cowl step should be the place to look and align with.



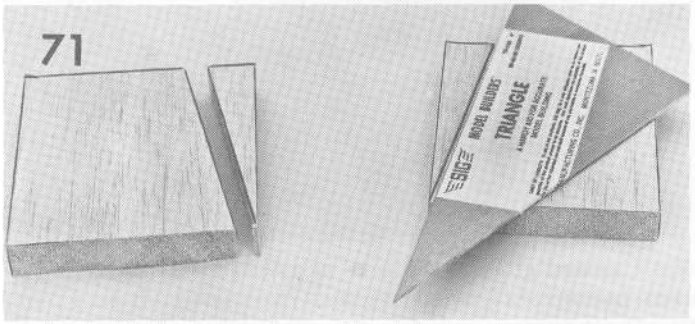
68. The fuel tank compartment is well exposed at this time and it is recommended that all tank area surfaces be coated with a sealer. Use epoxy glue and a throw-away brush.

FRONT COWL, BOTTOM

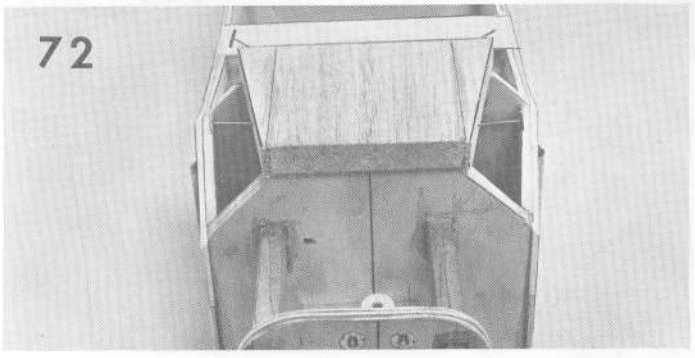
69. The front section has 3 pieces of 1/2" balsa glued to the bottom. Sand the 45• angle to a flat surface - both sides. Use a coarse sanding block - 80# production paper. Sand this surface till the 1/8" fuselage side, the 1/8" doubler, the 3/16" spacer and formers F-2 & F-3 are in a flat 45• plane. Sand the bottom for a flat surface prior to gluing the bottom 1/2" balsa block.



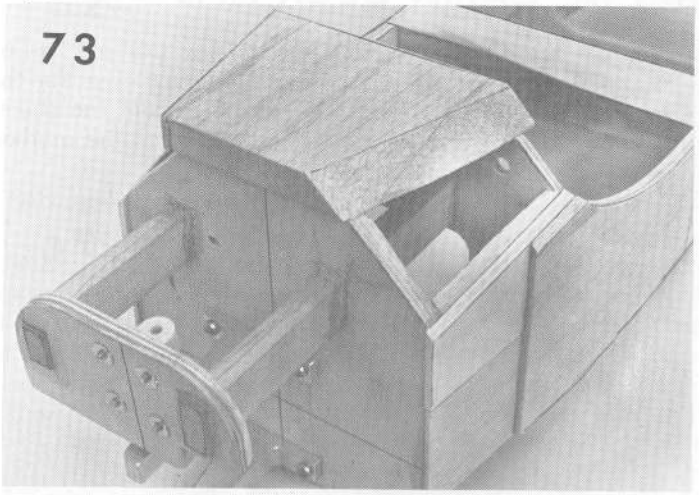
70. Glue one of the 1/2" x 3" x 3-1/2" blocks directly on the center bottom. Leave about 1/8" overhang towards the front and the excess over the back. Use Epoxy Glue.



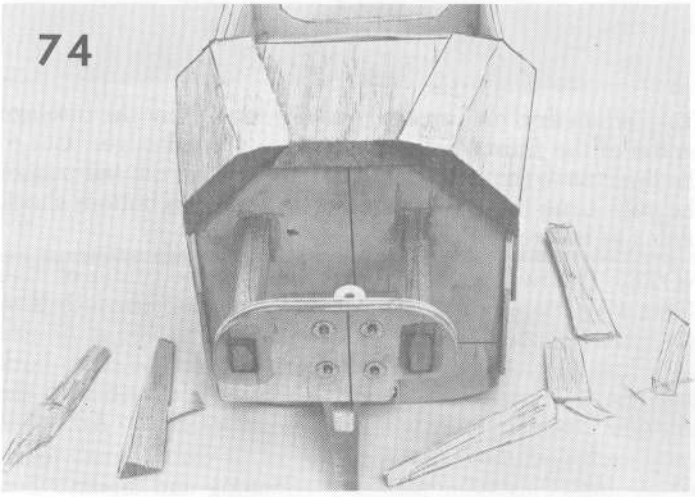
71. Mark and cut off a triangular piece from each of the two remaining 1/2" x 3" x 3-1/2" blocks.



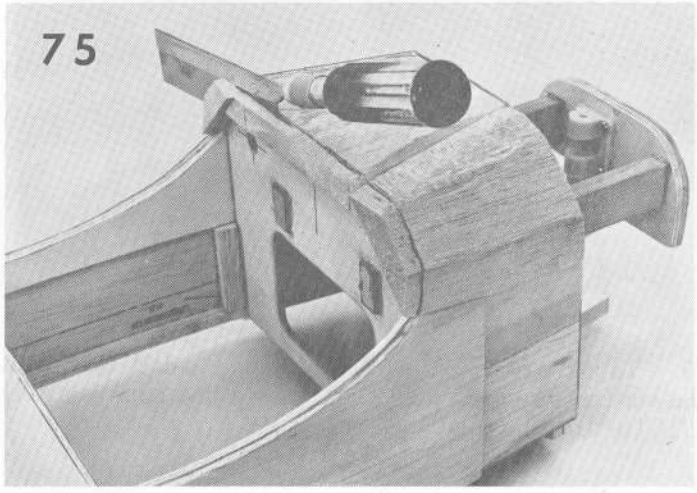
72. Glue the two triangular pieces in place — one on each side of the bottom block. Use Epoxy glue.



73. Once again sand off the excess of the center block to a flush surface, 45• angle.



74. Glue an angular block on each side, the large end towards the front with the angle cut on the bottom. Match the 1/8" front overlap of the bottom block and let the excess length go to the back. Carve and sand the vertical sides and bottom, but not the cowl step.

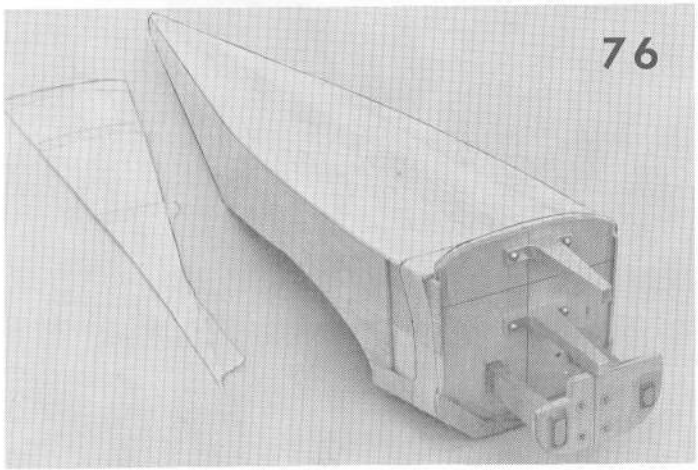


75. Trim off the excess of the 1/2" blocks - front and rear. Use a razor saw and coarse production paper on a sanding block.

Leave the rest of shaping until later.

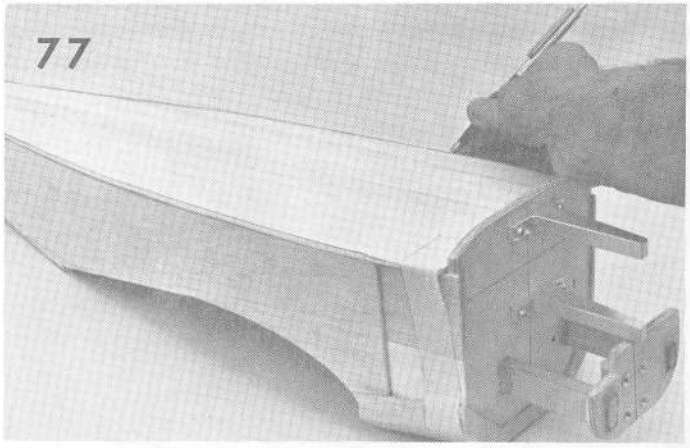
BALSA, CABIN DECK AND BOTTOM

Using the two 1/8" x 3" x 36" balsa and one 1/8" x 1" x 36" balsa, make the top deck and bottom fuselage pieces. See the drawing on the plan. Use masking tape to hold the sheets together. Apply Sig Bond Glue to the joints same method as when making wing skins.



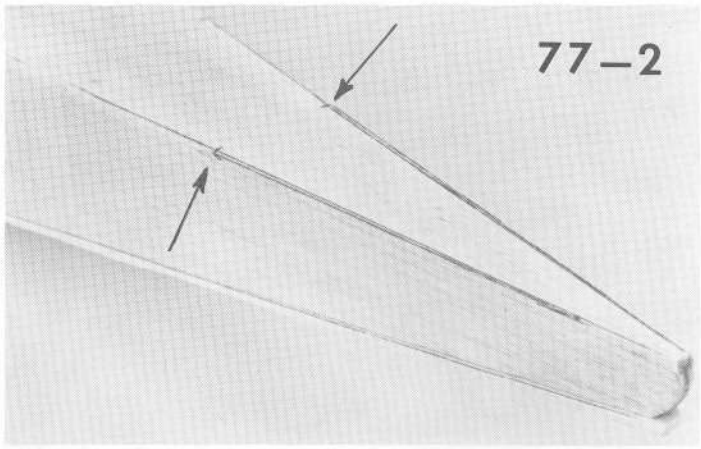
76. When dry, pull up the masking tape. Lay the fuselage on top of the finished sheet and trace around edge. Cut to the line. Save the two triangular pieces from the tail part of the cut. Glue these two together to form the bottom sheet, taping as before.

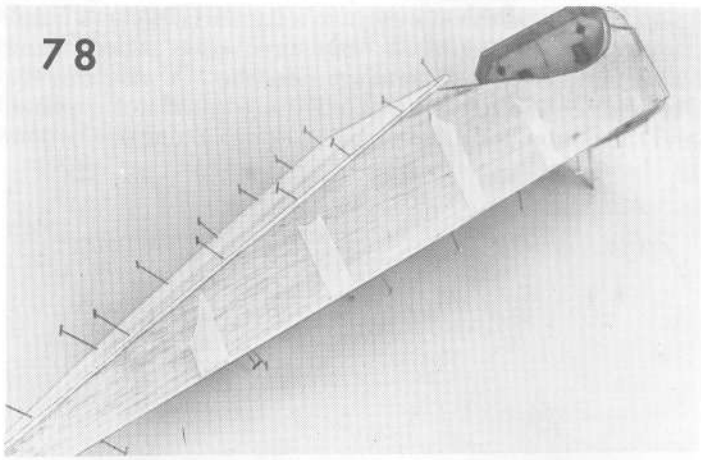
NOTE: The two cross section sketches in the center of Plan Sheet #1. Note how the top deck is smaller in width than the fuselage sides. At the front cabin part there is double thickness, the ABS top and the window, from the cabin back only one thickness, and the last 7-3/8" is left flush with the sides, no step/ledge. When fit to the fuselage the ABS plastic top with windows installed should fit with a small ledge all around. This ledge is used for pinning and taping when ABS top is glued to the wood fuselage section.



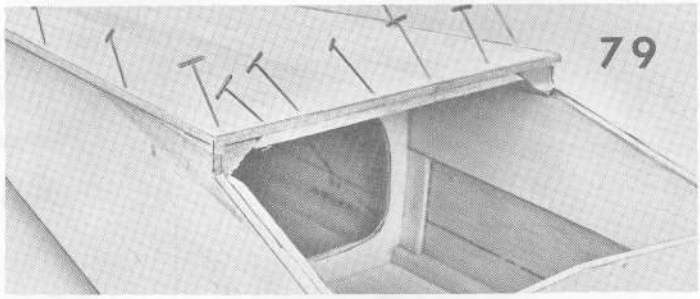
77. Tape the deck to the fuselage, sand the deck even with the vertical fuselage side. Then draw a line approximately 1/16" in from the edge.

Put mark at 7-3/8" from tail. Remove the deck and sand to the line. Remove a little more in the area of the cabin (double thickness area). Apply a coat of epoxy glue to the underside of the deck - front portion, in the area of the fuel tank compartment.

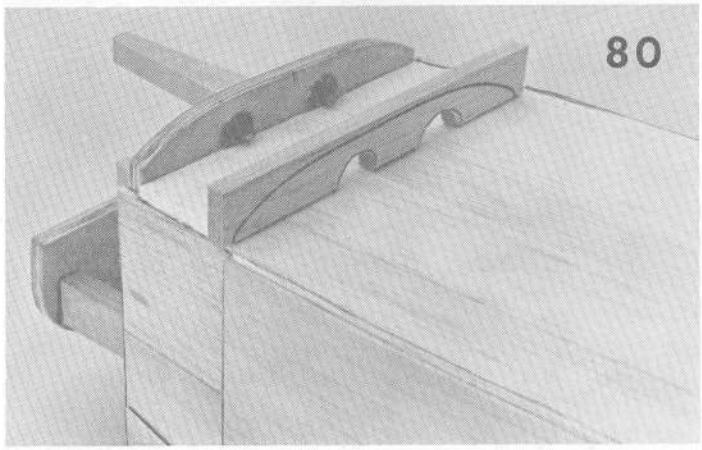




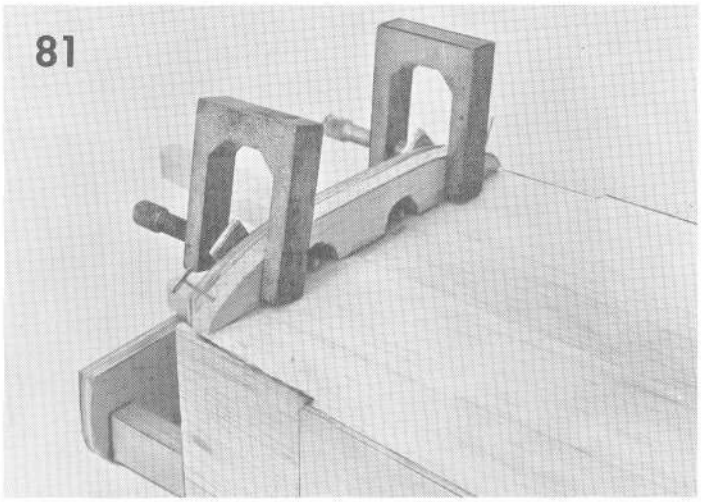
78. Glue the top deck in place with Sig Bond, a small scrap of balsa will be required at the very tail end to complete the deck. Fit and trim the bottom sheet of fuselage, glue with Sig Bond. Use pins and tape to hold in place till dry.



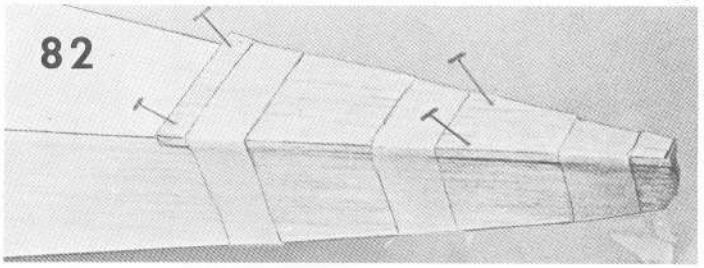
79. Cut and glue in the 1/8" x 1/2" balsa fuselage cross brace, bottom of fuselage.



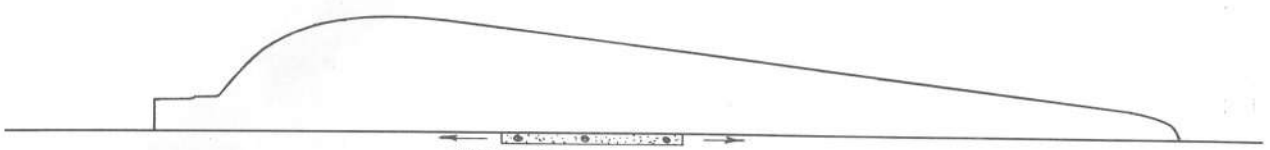
80. Cut and fit the 1/4" x 3/4" x 6" balsa molded fuselage support. Cut clearance holes for motor mount bolts.



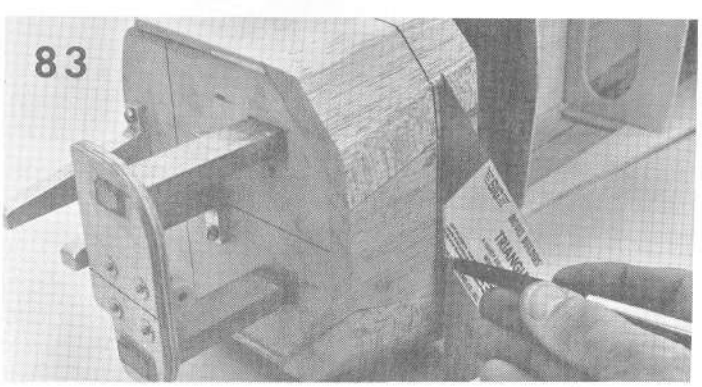
81. Glue in place, hold with clamps or pins.



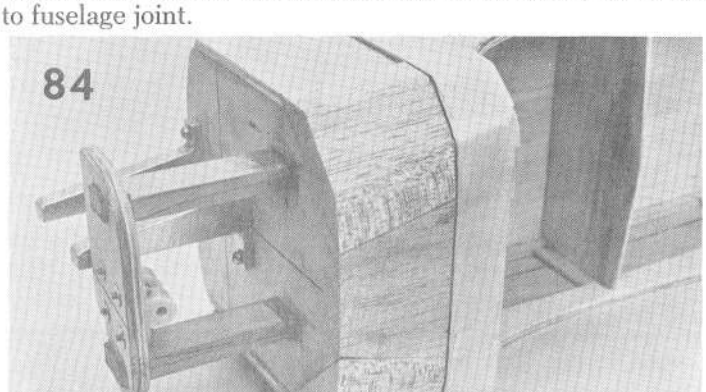
82. Cut and fit the 3/16" x 2" x 8" elevator stab. plate. Glue in place. Sand side flush when dry. Check fit - the ABS top to the fuselage. (Same as before) Sand over the top of F-2 and using masking tape set top in place. This fitting is done with tape only - NO GLUE. Sand the ABS to fit level in the step/ledge as required to fit snugly to fuselage. The last 8" of the tail will hang over at this time. This will be trimmed later when cut away for elevator stabilizer. The flat fit along the sides are of primary concern at this time. Sand in small amounts as required until the ABS settles in place. Sand level to fit fuselage.



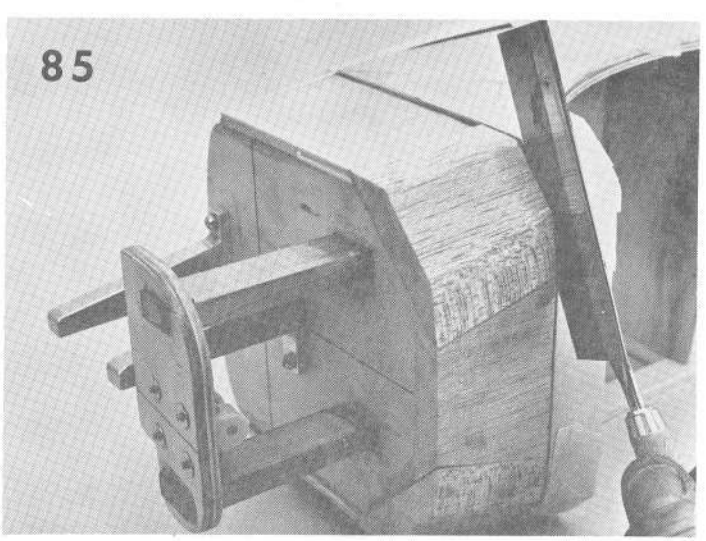
COWL FITTING



83. Using scrap pieces of 1/16" x 3/32" sheeting, cut, fit, and glue the balsa cowl shim in place. Draw a squared extension line around the bottom of the fuselage for the cowl to fuselage joint.



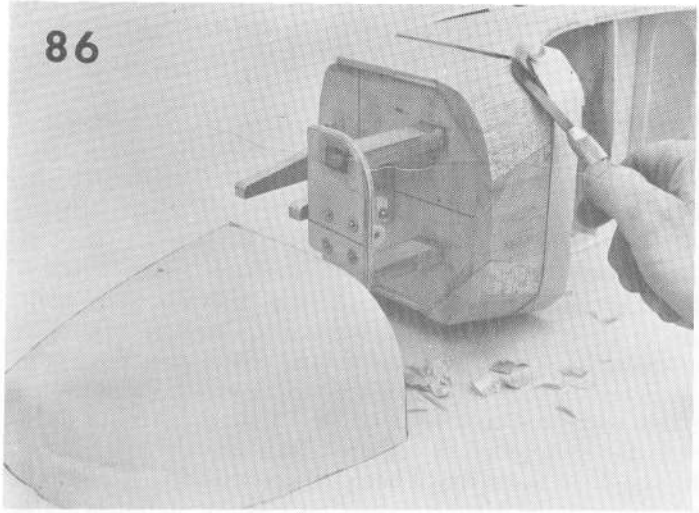
84. Using masking tape wrap several layers of tape up to the cowl joint line.



85. Use a razor saw and start a shallow cut around the sides towards the bottom.

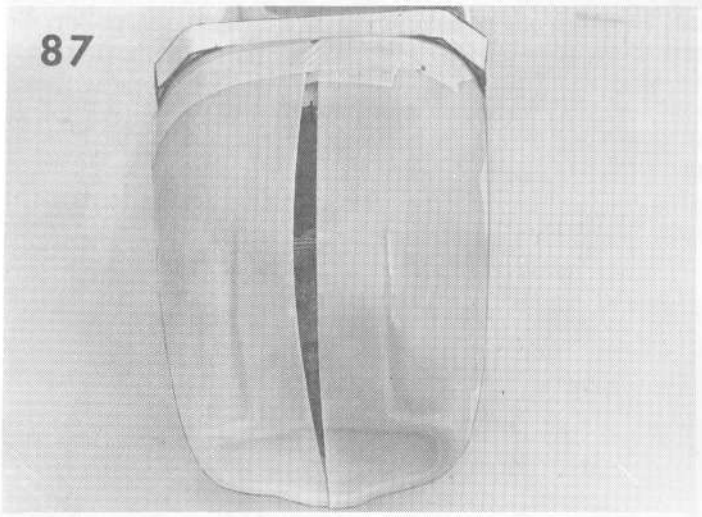
SIG®

In any conflict between the plan and the booklet, follow the booklet instructions. They are revised more frequently than the plan.



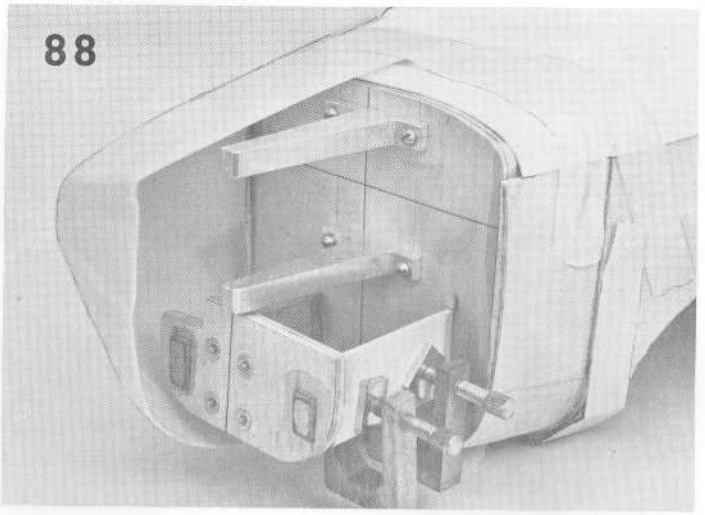
86. Carve the cowl radius, small amounts at a time, as the carving progresses a second or third cut a little deeper with the razor saw may be required. Fit the cowl halves one at a time. The cowls are factory cut a small amount oversize to allow for a final fit. Work each side using the centerlines marked on F-2. Lay the cowl in line with the top centerline then carve and sand the contour as required. Work to the bottom and with a slight taper angle towards the nose.

NOTE: Spend a little more time and make a good fit avoid hitting the masking tape while sanding.

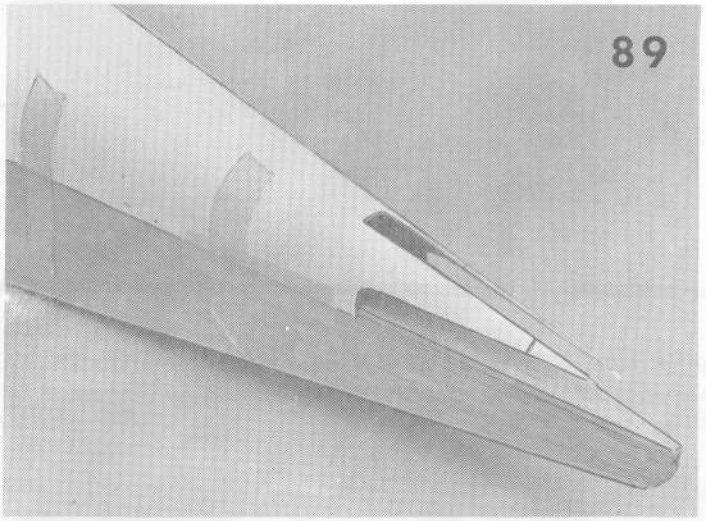


87. Do not shape or sand the sides or the other corners. These are shaped and sanded after wing construction is complete and the wing is fit to the fuselage.

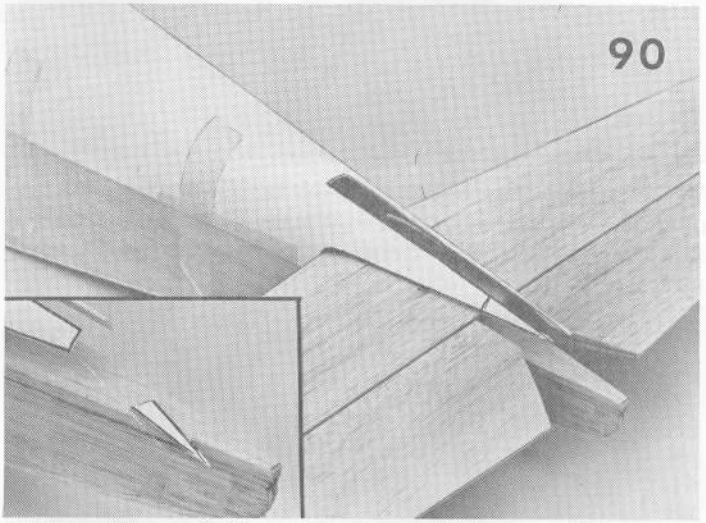
Dry fitting the cowl at this time is required to achieve a nice contour before applying any sealers and finishes to the area the cowl overlaps. As the two cowl halves are fit the bottom left corner of F-1 will need angular sanding and fitting to clear the inside of the cowl. Sand the radius until the cowl fits. The left side of F-1 will require sanding and fitting very close to the support rail.



88. An additional lite-ply support doubler is glued between F-1 and F-2. Cut this from the scrap of the fuselage doubler.



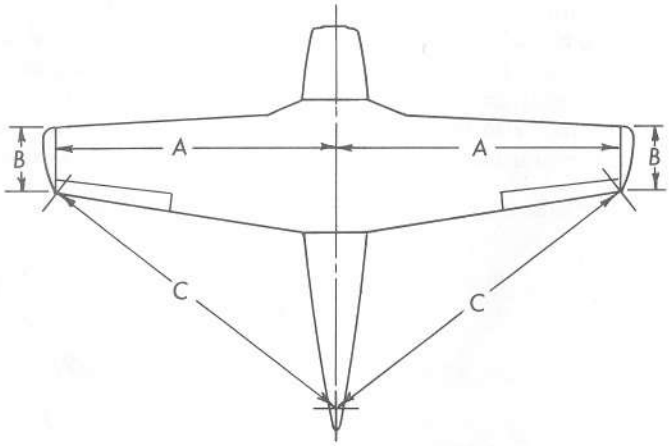
89. While the ABS top is taped in place lay out the elevator and vertical stabilizer lines, trim out the slots.

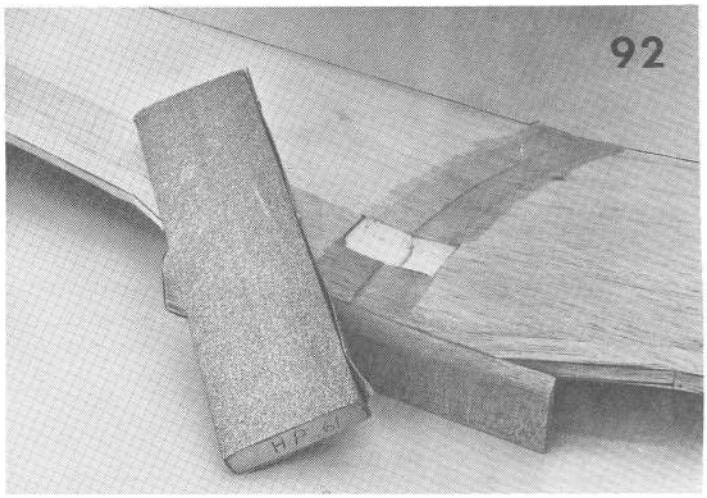


90. Fit the stabilizer and then the rudder. Trim off the small triangular ABS for fitting the tail cone block.

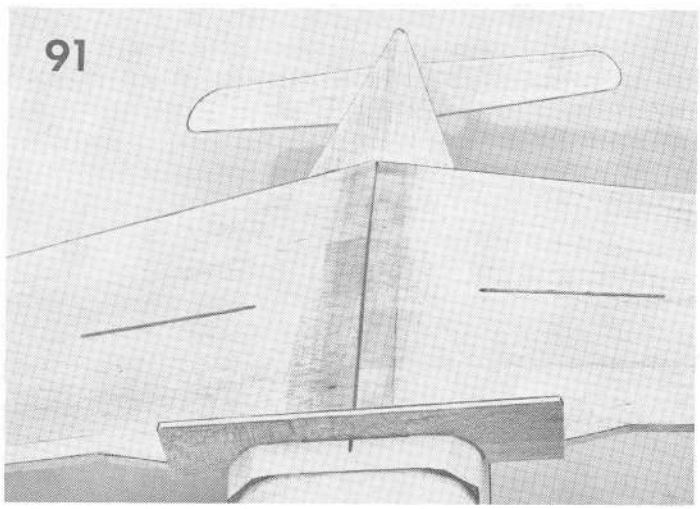
At this point major fuselage construction should have the wood frame built with the ABS cowl and fuse top fit and mock taped in place. Stabilizer/Elevator, Vertical/Rudder and Fin rough sanded to shape, not glued in place. Fuselage corners of bottom still in a square unfinished condition. Eyeball the fuselage to cowl, fusclage to ABS top, stabilizer should be level as the fuselage rests on the flat bottom. No glue at this time - just an eyeball check.

WING TO FUSELAGE FITTING AND ALIGNMENT





92. Glue the 1/4" fuselage to wing block on the leading edge of wing. Reshape top of 1/4" x 2" x 10" so wing drops into saddle. Do not shape the bottom at this time because as the wing is fitted into the saddle full depth of the 1/4" x 2" x 10" is required.



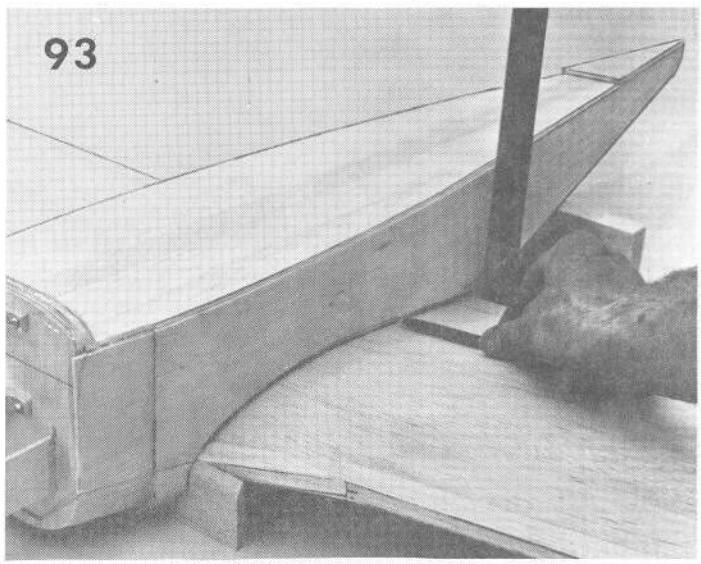
91. On the bottom of the wing check the width dimension and make the distance from leading edge to trailing edge the same (B-B). Next estabilish and mark the wing tip corner to centerline A-A, it should be the same. Shift your centerline mark if required, the joint may not necessarily be the correct center, tip to tip.

Lay the wing into the fuselage saddle, the trailing edge will lay on top of the fuselage. At this time leave an approximate 1/4" gap at the front, slip the fuselage to wing plate in place.

At the direct center of the fuselage tail, mark a cross and check from tip to tip. (C-C) It should be the same for proper alignment. When alignment is estabilished check the gap between wing and the fuselage. Sand the wing with a block to straighten any angle between fuse and wing. Slip the 1/4" x 2" x 10" piece of balsa into the gap for trial fit. Shape top edge where it meets the fuse until it fits. After the 1/4" block is dry fit, mark the trailing edge of the wing straight across. Trim the wing till wing drops into the saddle.

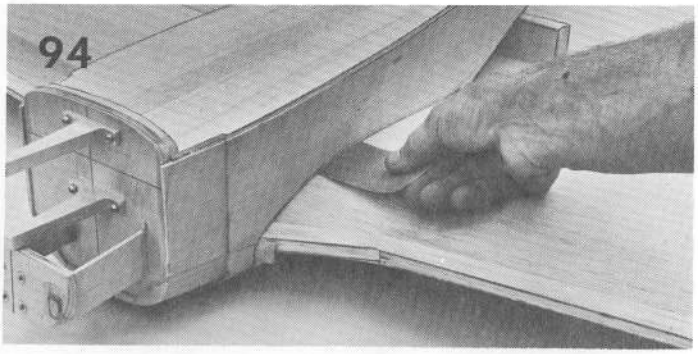
Once the wing drops into the saddle further fitting of the wing to saddle is done with wing and fuselage top side up.

NOTE: Shift the 1/4" upward so that 1/4" x 2" x 10" covers the entire front of wing.



93. With the wing loose in the saddle make a dry setup on a flat surface. Block the fuselage flat and level, use the centerline or top of fuselage to establish level. Set up with the same dimensions front and rear, and square the side. Put a mark on the lead edge airfoil centerline. Block the wing tips level, then O-O the wing airfoil in the saddle. Use a pencil and make a line along the fuselage side. Lay the pencil flat and pull along wing surface. The mark will follow wing contour. Put the mark by the same method on both sides. This is not a cut line but just a reference guide. Take a bit of time and do a good job. Check alignment of the wing for O-O. Remove enough material at the high points of contact to seat the wing.

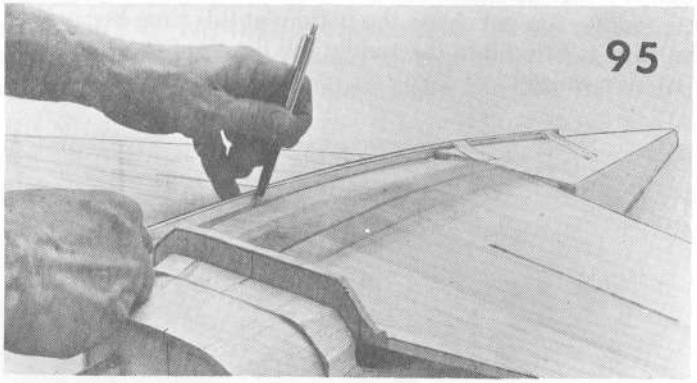
Several fittings are required on this setup. Go slow and remove only small amounts at any one time. The finish fit will end up very near the formers F-4 and F-5. A round dowel of about 3/4" diameter with sandpaper glued to it is a very handy tool for sanding the wing saddle fitting.



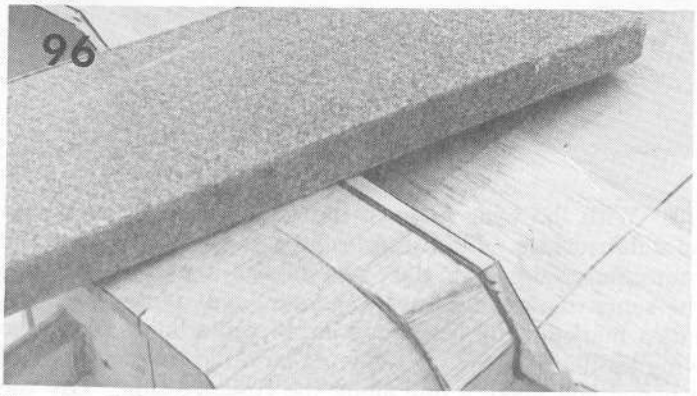
94. When the fit looks good take a piece of sandpaper about 2" wide and lay it on wing, sand side up, between fuselage and wing. Pull the paper out. Do this along the fuselage side until the drag between wing and saddle becomes equal i.e., high spots disappear.

CHECK DRY SETUP ONE MORE TIME

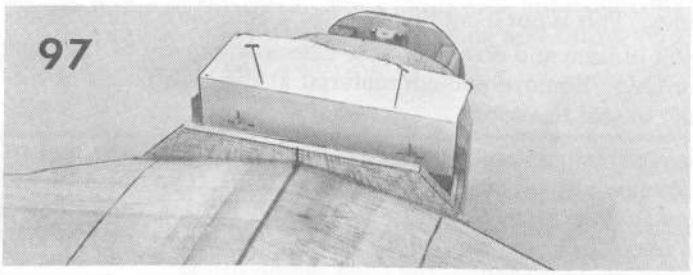
After the final check, mark the wing in several places so relocation can be re-established while fitting dowels and hold down bolts.



95. The height and width of the 1/4" x 2" x 10" has now been estabilished and can be trimmed close but not quite to the finish shape. Draw two lines from front to rear. Use a piece of balsa as a guide to draw the outline for the belly block.

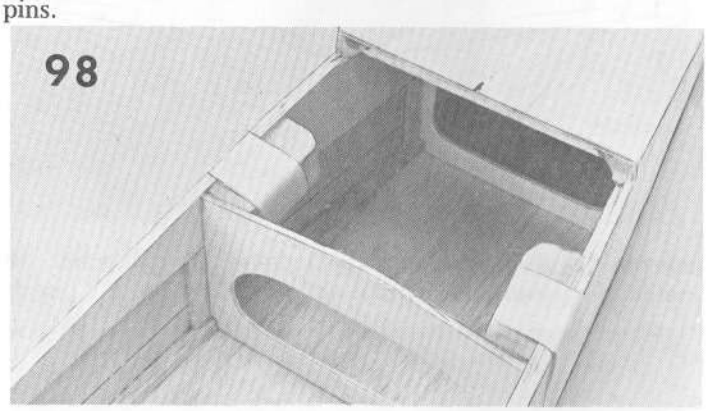


96. Sand the bottom surface of the 1/4" x 2" x 10" flush with bottom surface of fuselage.

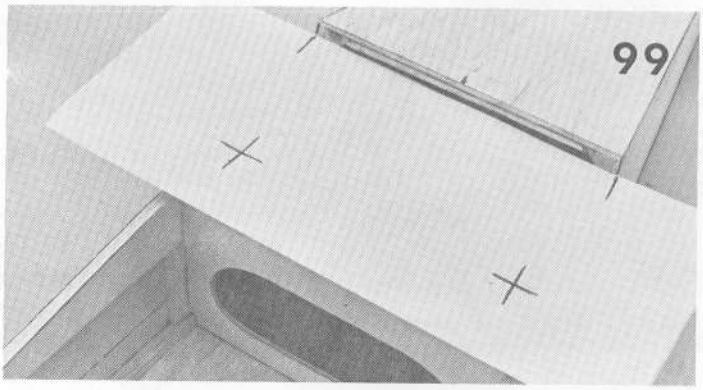


WING DOWEL AND HOLD DOWN BLOCKS

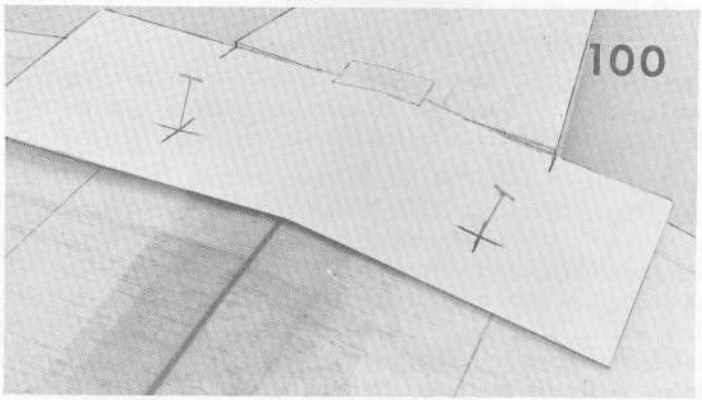
97. Insert a piece of paper with a bend in it and pin in place. With your finger press in the dowel hole locations by gently rubbing and twisting until a good indent shows. Mark the hole with cross marks and locate center. Make a pin hole in the center. Place wing in saddle and check side alignment. Remove pins and flip the folded paper towards the wing. Pin the paper to the wing, remove the wing and push a pin in each center location. Remove pins and drill for 1/4" dowel pins.



98. Wing hold down blocks are made from the 3/4" x 3/4" x 2" hard wood. Sand the front end edge at a bevel to fit snugly against fuselage side and F-5. Glue with epoxy and hold in place with tape.

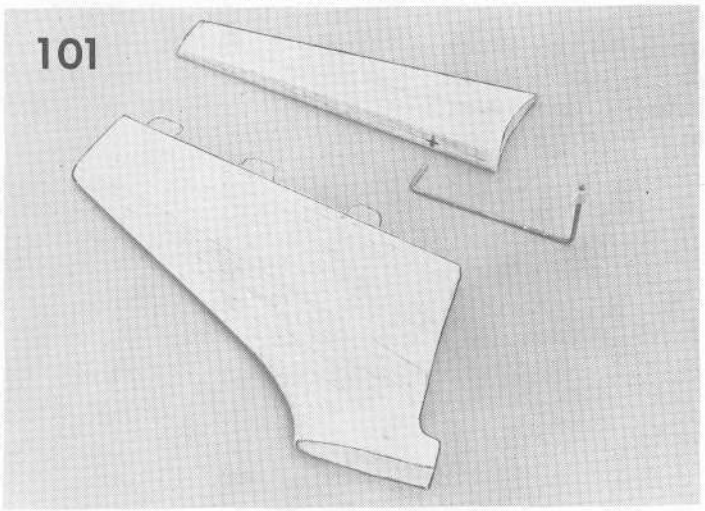


99. Using a piece of paper lay the paper against the trailing edge of the wing saddle (fuselage bottom). Mark the two sides and the cross marks same as block underneath paper. Remove paper and put wing in saddle.



100. Place the paper on the wing and push a pin through the cross marks. Drill a 1/8" pilot hole and check. Then drill through the wing and into the block with a #7 tap drill. Open up the wing hole with a 1/4" drill and thread the block with 1/4-20 tap. Bolt wing to fuselage with 1/4-20 nylon bolts.

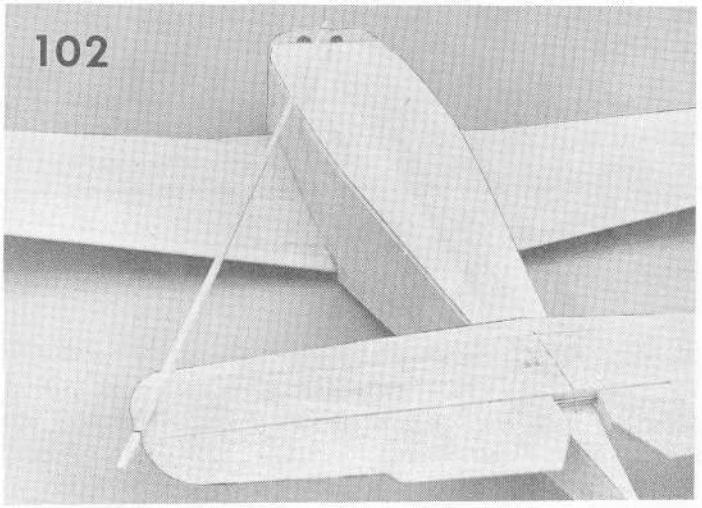
TAIL ASSEMBLY



101. All tail parts are finish-sanded to shape and airfoil, then given a coat of finishing resin except where glued to fuselage. Sand smooth with 80 grit using the sanding block. Locate and drill holes for the 3/32" elevator joiner wire.

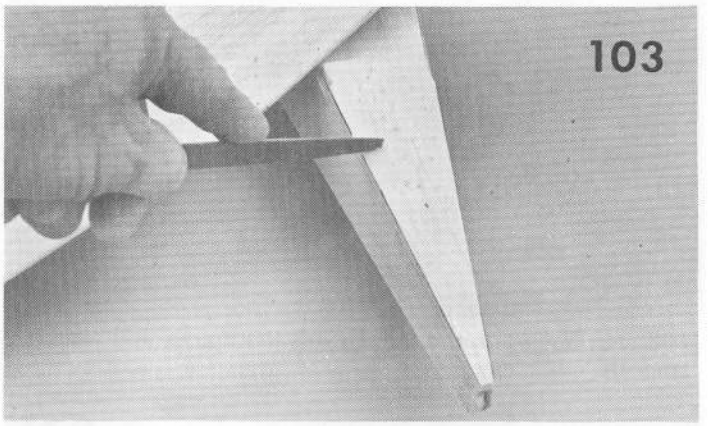
Groove the wood and drill holes a bit oversize so the wire will be embedded in the glue. Use Epoxy Glue or Kwik-Set. Tape in place using a piece of wax paper between stabilizer and elevator. Reopen the hinge slots and insert the hinges into the stabilizer using hinges supplied with kit or the alternate method as shown upper right hand corner plan sheet #2.

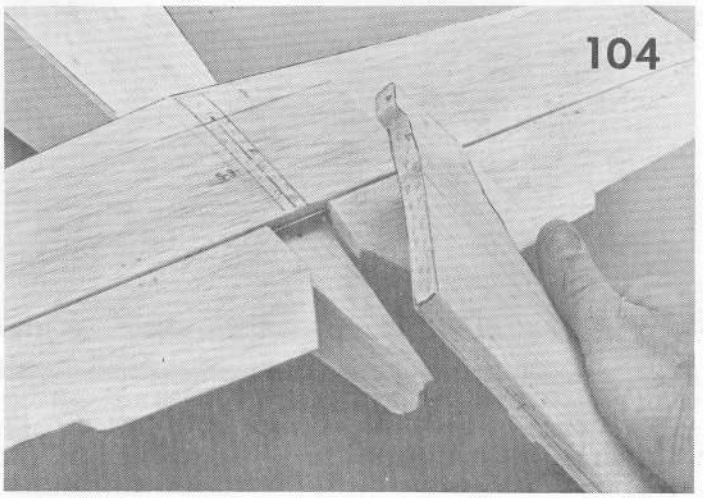
Rudder hinges are done the same way except 3/32" threaded wire horn must be bent for left or right hand fuselage exit. This is determined by the servo direction of travel. Proto type shows left side exit. Drill the hole in the rudder oversize to embed the wire completely in Epoxy Glue. DO NOT GLUE UNTIL LATER.



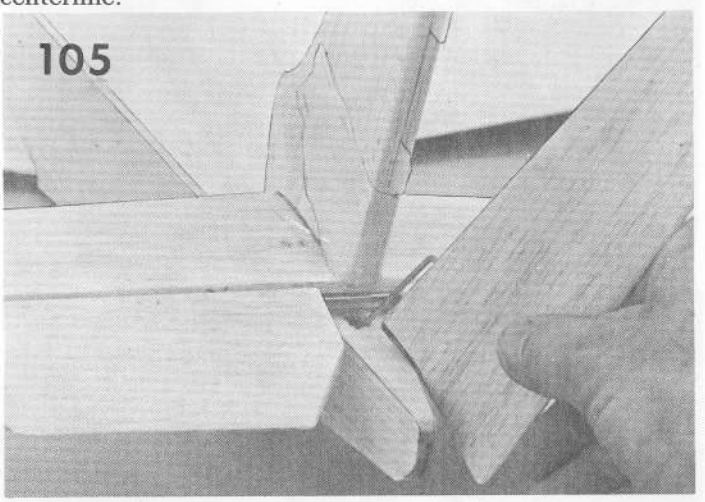
102. Make a dry set-up wing bolted to fuselage block up the wing level. Lay stabilizer in proper location. Make a mark using a stick pinned at the center line in front of fuselage. Swing the stick side to side and check at the hinge line for square. Be sure the elevator is centered side to side.

103. Use a 3-corner file or screwdriver and indent the wood in the area of the glue joint for the stabilizer. Glue with epoxy. Recheck the alignment for square and level.





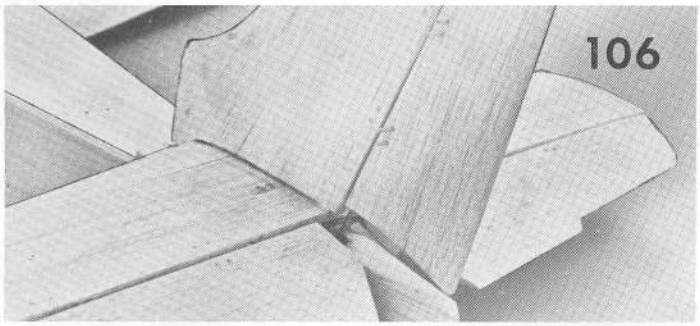
104. Vertical fin is set up dry and the area of the glue joint is again indented to help the glue hold. Apply Epoxy Glue, pin the fin in place, and check for square with a triangle or similar method. Be sure the fin is in alignment, vertical and centerline.



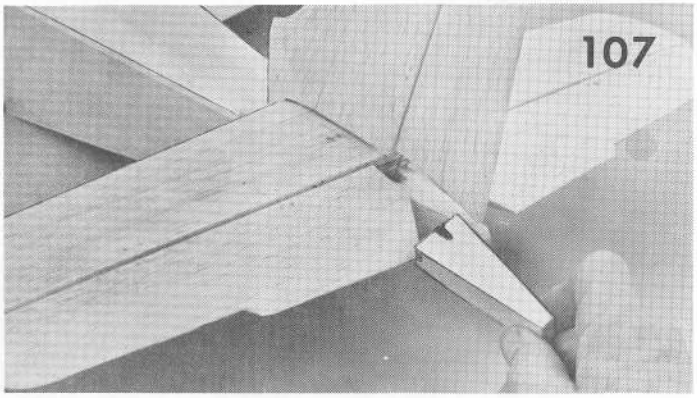
105. Cut a clearance hole in the deck for the rudder control horn wire. Locate and cut the side hole for the same wire.

Dry fit the horn wire to the rudder. The final assembly starts by pushing the wire through the hole and out the side hole. Tape a piece of waxpaper on the vertical fin. Mix up the Epoxy Glue. Wet the hole and slot in the rudder. Slip rudder into place on the hinges. Place a small piece of tape underneath rudder to keep oozing glue off of rudder.

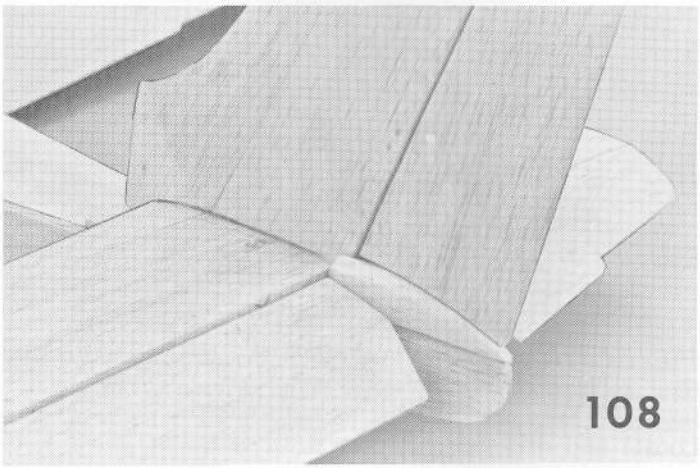
It may be beneficial to go through the gluing and setup procedure a few times to avoid a problem at final gluing. Sort of get used to the motions once or twice.



106. Pin hinges on the tail, cut off toothpicks and sand smooth.



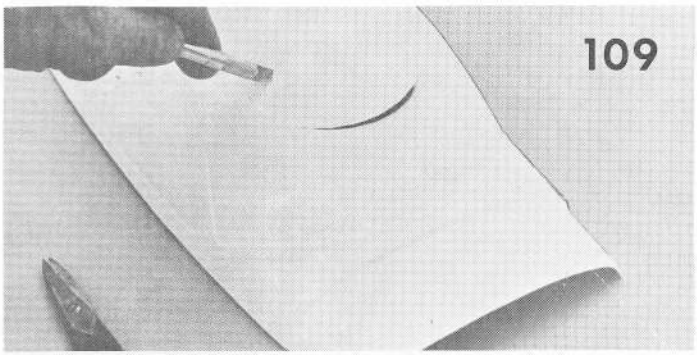
107. Tail cone top block. Carve a horizontal notch to give clearance for the elevator joiner wire and a vertical notch for the rudder wire. Round the top to the underside shape of the rudder. After rough carving dry fit in place by lifting elevator and pushing rudder to one side, slip block in from below elevator. After final fit coat the notches with epoxy to oil-proof the end grain.



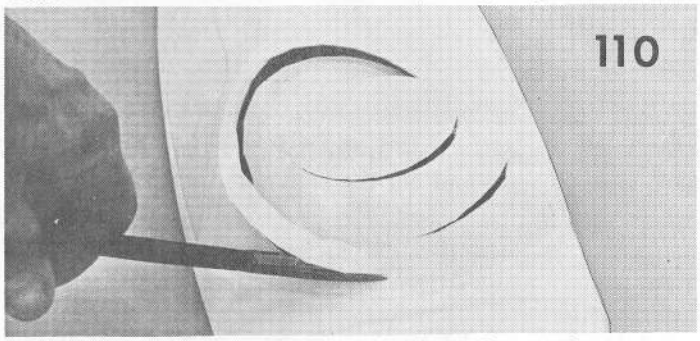
108. Glue block in place. Final sanding is done AFTER ABS cabin is glued on.

ABS FUSELAGE TOP / WINDOWS

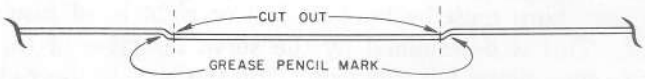
Sand the ABS top inside and outside to remove all shine. Use 220 - sanding prior to cutting out the windows. This light scuffing of both ABS and clear will aid in bonding these materials.

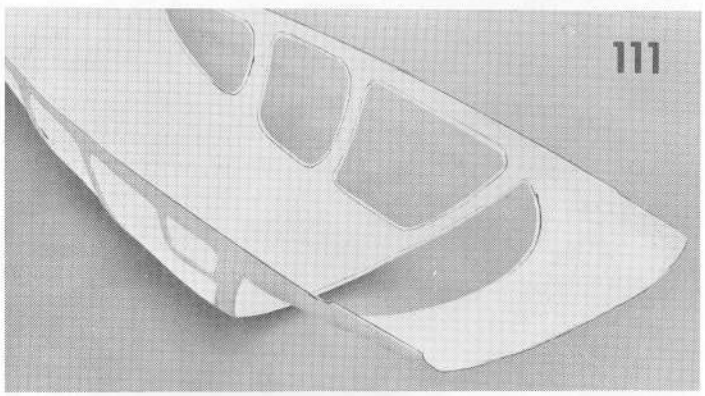


109. Cut a slit in each window to open up a space.



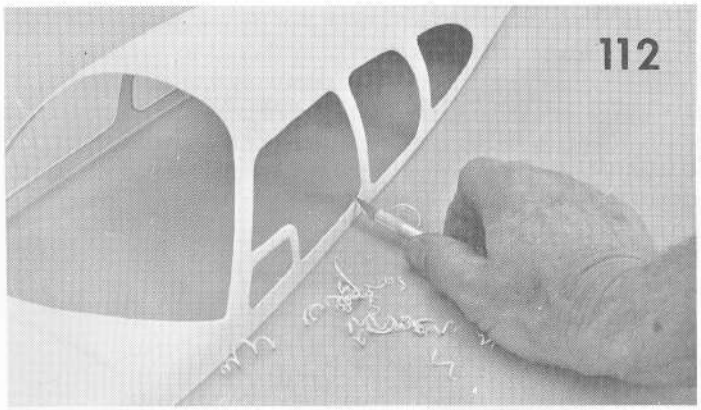
110. Then use a scissors to complete the window cutouts. Cut large window. Then the small one on the side. Then all others. Use sharp tools. Dull ones require excessive pressure and could cause slippage of the tool or knife and cut into an undesirable area.



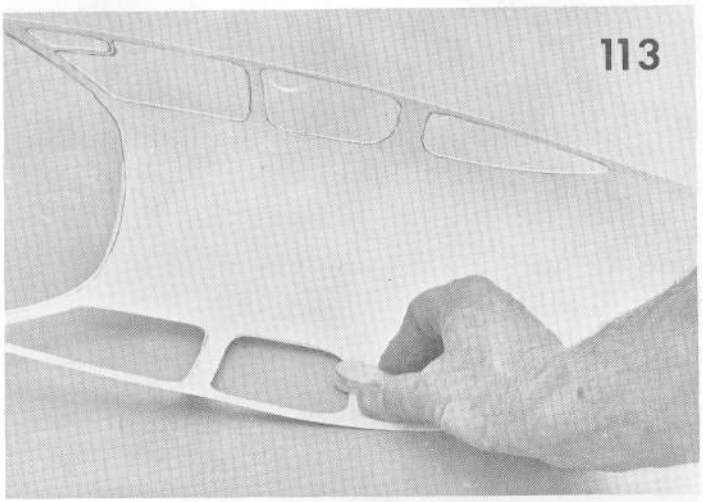


111. After window holes are rough cut to size, mark around the inside with a grease pencil. Final trim of corners are done with a modelers knife.

CYANOACRYLATE GLUE CAUTIONS:
A few tips when using Hot Stuff or similar glues: It is best to tape or clamp the mating surfaces which are to be glued. Taping and clamping should be done in a manner so that the glue cannot make contact with the clamps and tape. Capillary action will occur and the cyanocrylate will flow along the adjacent unwanted areas. Holding the parts with your fingers will invite such action.

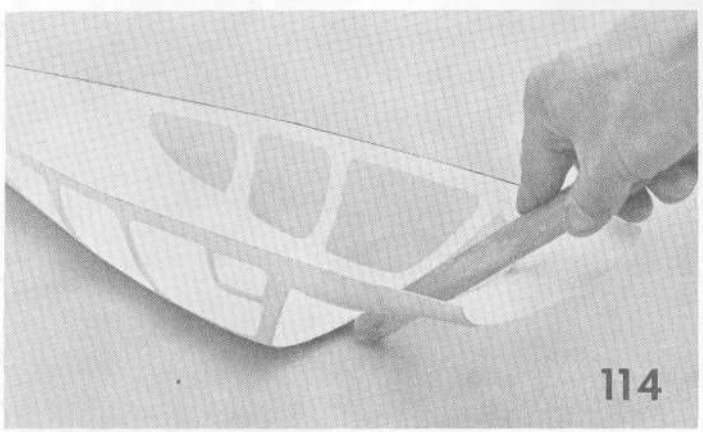


112. Final trim of corners are done with a modelers knife.

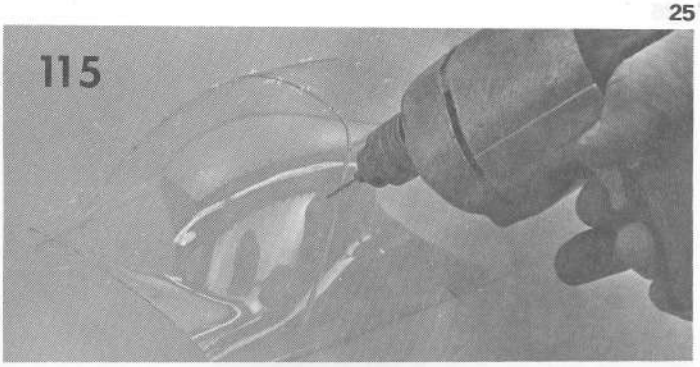


113. Sand flush on inside with a small sanding block. (Make a sanding block from hardwood and glue #100 Grit Production Paper to both sides). Sand the window openings to shape.

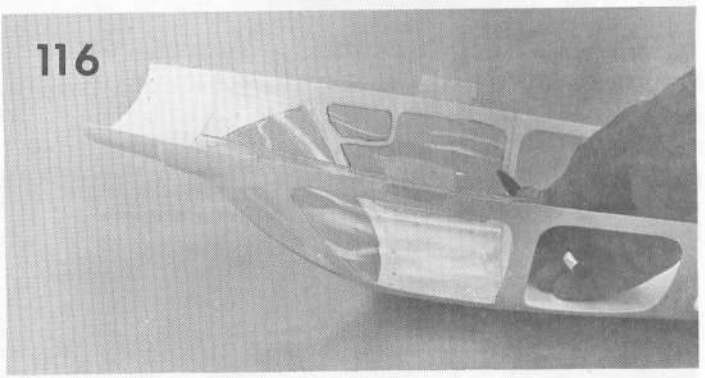
Take your time, fitting carefully. Location is important. Good fitting makes the gluing much easier.



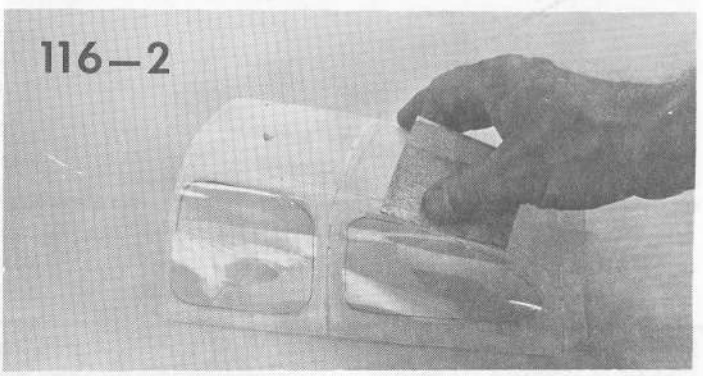
114. Use a round sanding stick in the front windshield. Trim marks are molded onto the clear Butyrate windows. Cut along these marks so the front and rear half of the canopy will rough fit into the cabin shell.

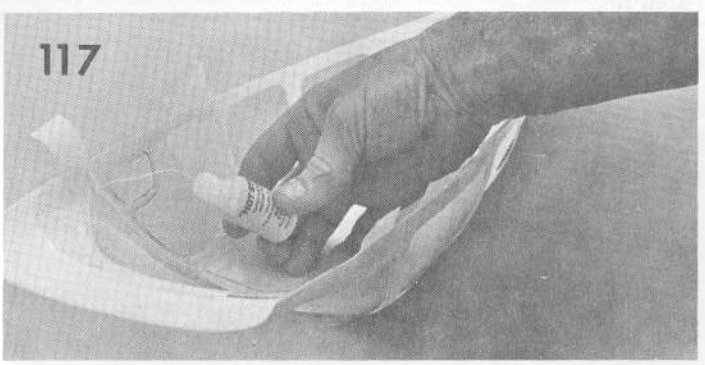


115. Drill the glue holes in the molded channels.

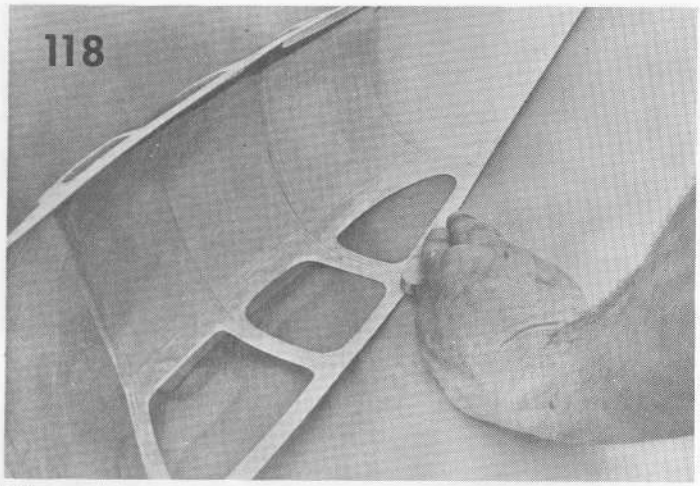


116. Tape in position and mark the exact window outline with a grease pencil. Do both front and back sections of the clear windows. Remove the clear window section from the ABS cabin and sand all of the area that will contact the ABS. Practice with scraps.

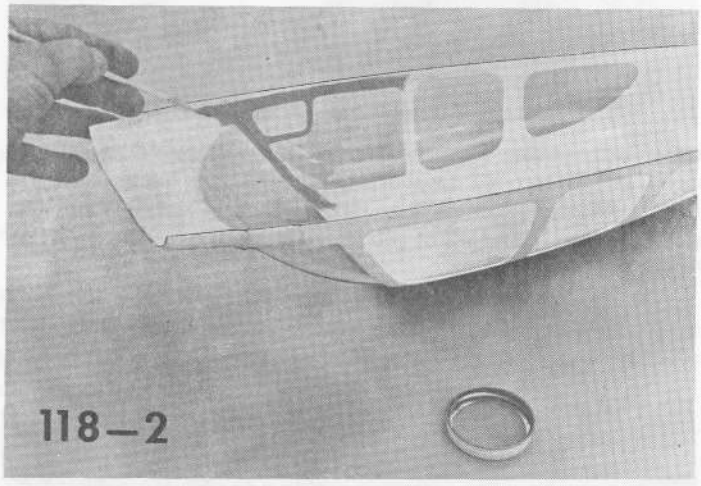




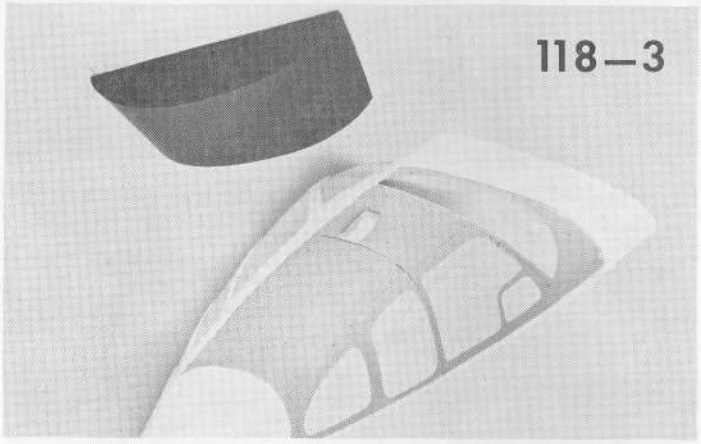
117. Position windows and put masking tape on the outside to hold the window in position. Start spot gluing with Hot Stuff or similar cyanoacrylate glue, front and top of front windshield, work towards the back, be careful not to distort the shell, tack glue just a few places and try a check fit on fuselage before continuing.

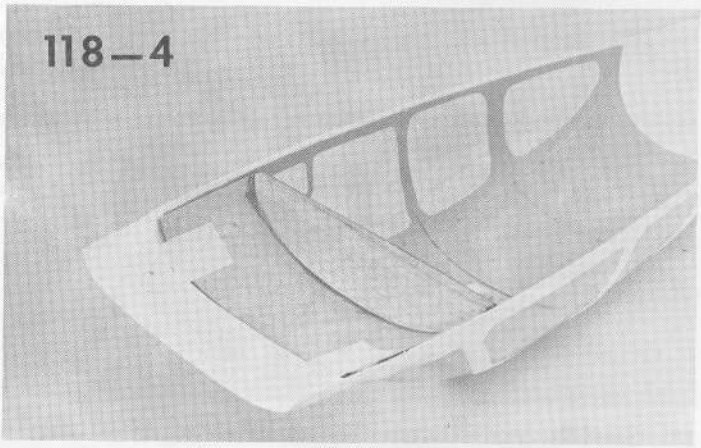


118. Before painting interior, sand off the shine from the inside of clear windows, and the 1/8" at the bottom of the molded channels. The molded channels would keep the completed window and ABS shell assembly from fitting snug against the fuselage deck if the bottom 1/8" is not removed by sanding flush.



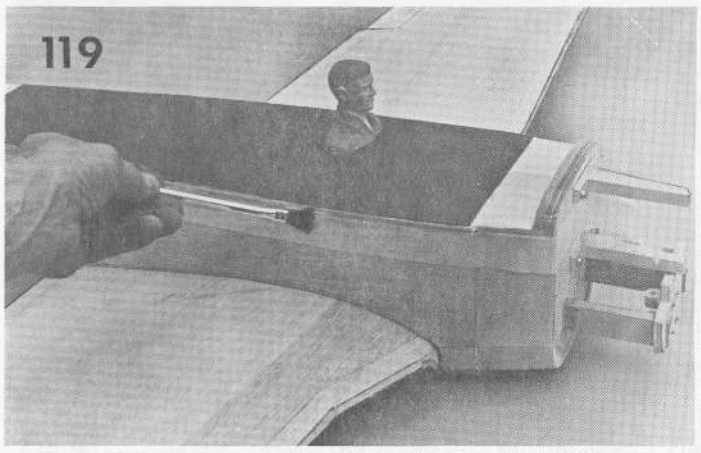
SCALE FINISH DETAILS (For the better dressed aircraft as competition) The inside of cabin should be prepared and finished before top assembly is done. Bolting on antennas, provisions for air scoops, rotating beacon, and pilot should be done before cabin top is installed. The top should also be painted and top half of instrument panel should be painted and then installed. These items are not supplied in the kit.



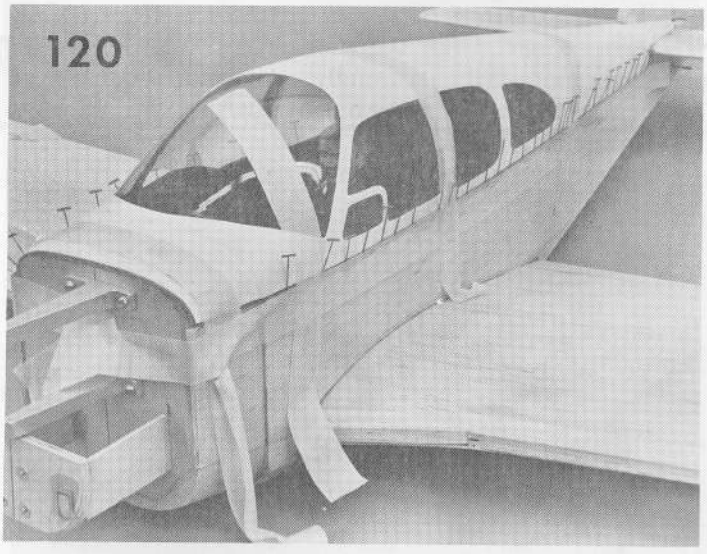


BONDING CABIN TO FUSELAGE

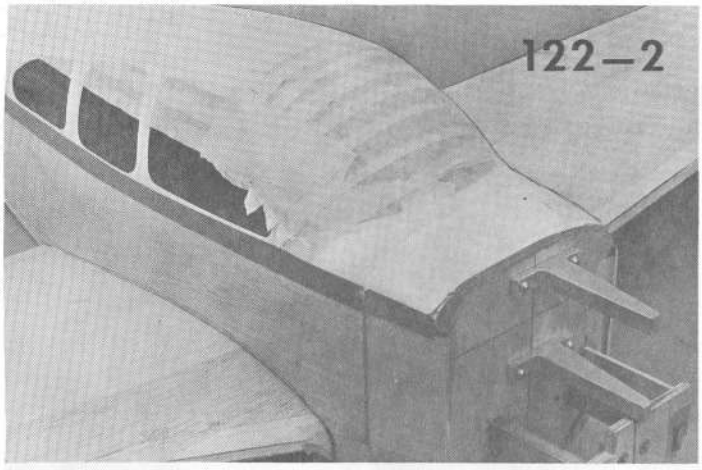
Make a dry setup taping the cabin shell in place, making a good check and straightening any problems. Be sure the cabin fits.

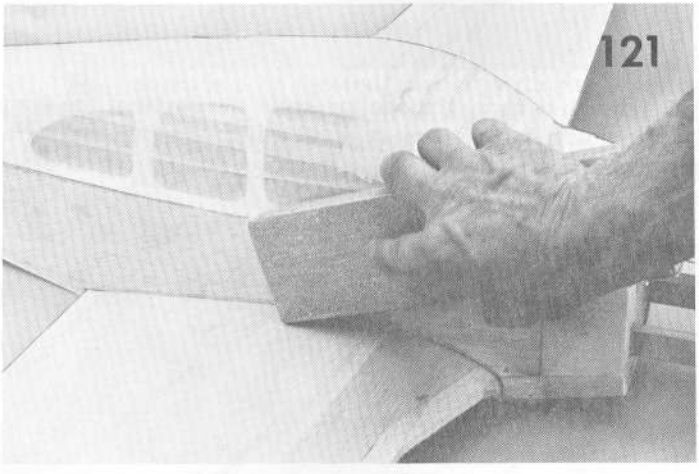


119. Lay a piece of tape along each side of the fuselage next to the step, and apply Epoxy Glue.



120. Place top in position (cowl indent line) and using masking tape and pins, carefully pin and tape the cabin in place. Make sure the cabin to cowl line remains in place. Check along the side for waves in the plastic top. Move pins accordingly, in or out as needed by angle of the pins.

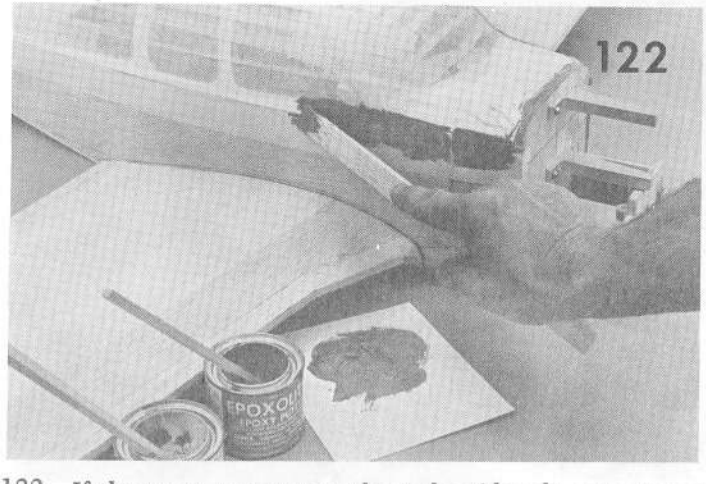




121. Remove pins & tape when epoxy is cured. Before doing any sanding cover the clear windows to protect them from scuffing.

Should masking tape be used to cover up, do not leave it on for too long a period as it will most likely mark the plastic or leave the unwanted sticky adhesive on the clear window.

Sand the joint between ABS and the balsa side. The small step should allow for most of the sanding to be done on the wood. Stay off the plastic as much as possible to avoid cutting it. This sanding is done rather gently, just enough to straighten out the side and the wood to the plastic.



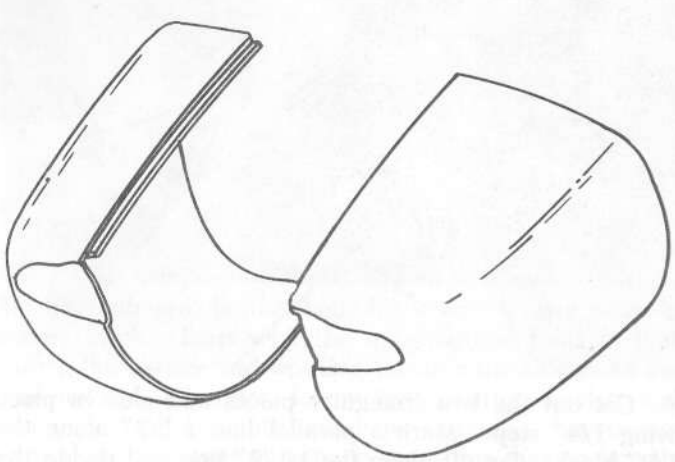
122. If there are any waves along the sides do not attempt to sand them out. Put two pieces of masking tape along the seam, and use a thin layer of epoxolite to fill in depressions and gaps.

123. Scrape with a razor blade when cured. Shape and finish sanding the top tail cone block. Use only a minimum of epoxolite in the tail fillet area. Wipe away all excess.

After cabin is permanently mounted and the epoxolite is sanded to shape, final assembly and fitting of the engine cowl is next.

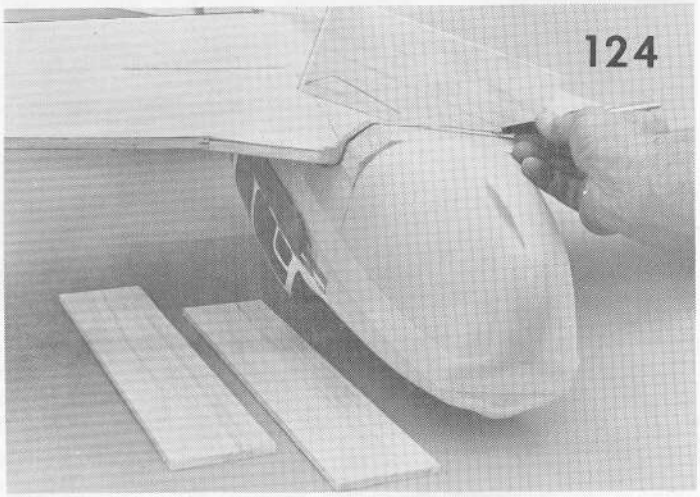
Fit the two halves checking for a good fit. Look down the side and check the alignment, etc., distance from firewall to front of cowl.

Use MEK, Butyrate thinner or Hot Stuff for bonding the cowl halves and joiner strips. Sand both surfaces with 220 wet/dry to scuff the surfaces prior to gluing joiner strips to cowl.

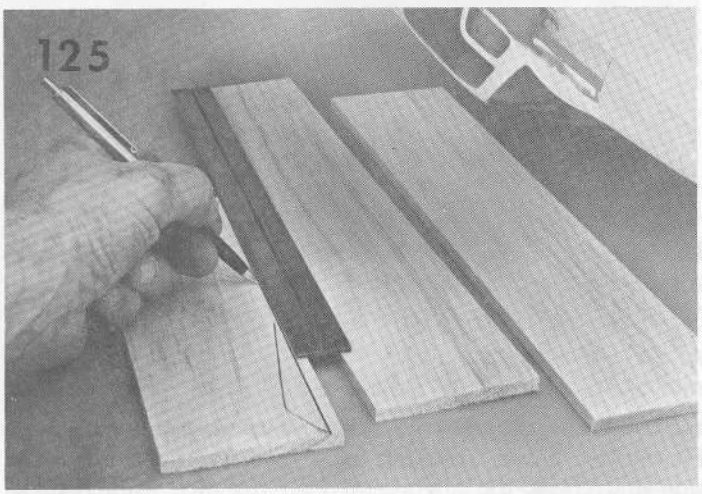


WING BELLY BLOCK CONSTRUCTION

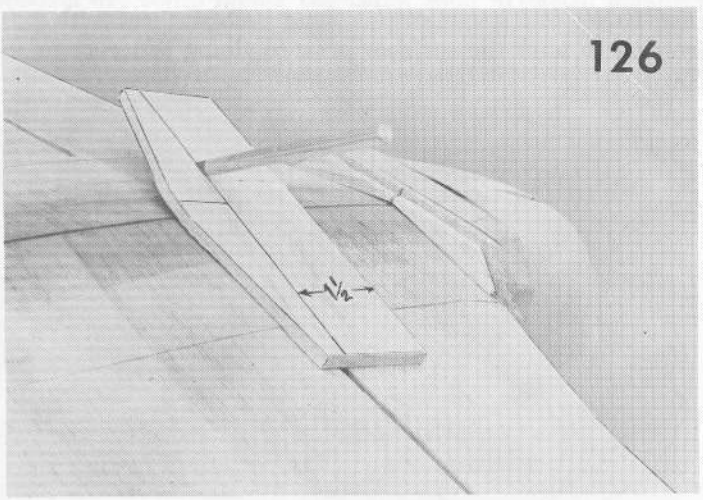
Belly block of wing is made from 1/4" x 3" x 36" balsa cut in pieces to fit contour of wing and to the outline of fuselage.



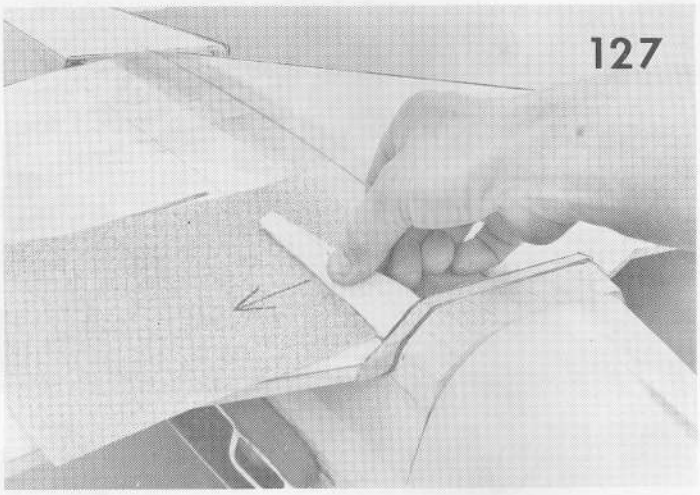
124. Cut 2 pieces 1/4" x 3" x 13-3/4". Use the remaining piece and trace around both left and right side of block.



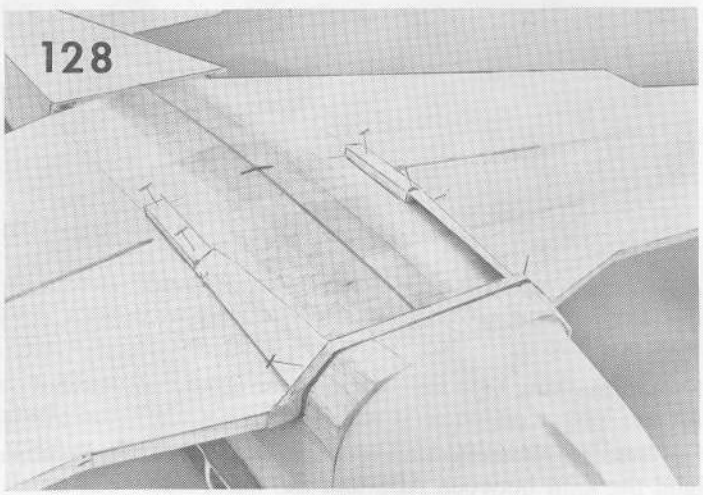
125. Draw a line 1/4" from bottom edge of the triangular pieces.



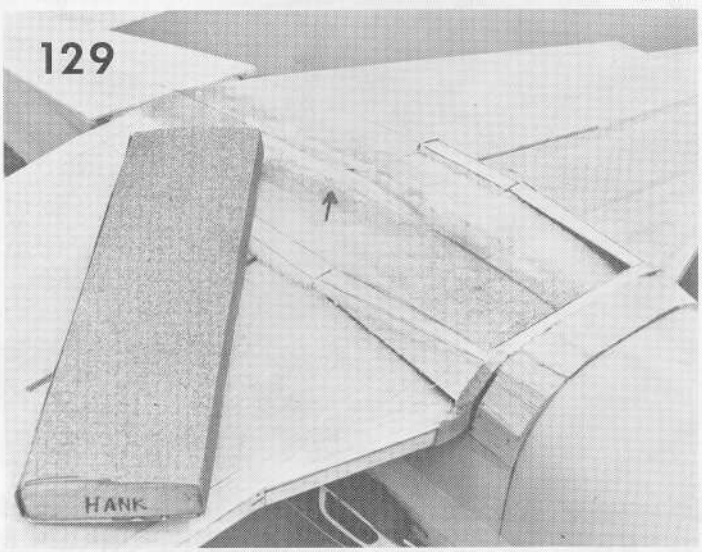
126. Cut out the two triangular pieces and glue in place leaving 1/4" step. Mark a parallel line 1-1/2" along the 8-1/2" block. Cut off along the 1-1/2" line and divide the triangles in half.



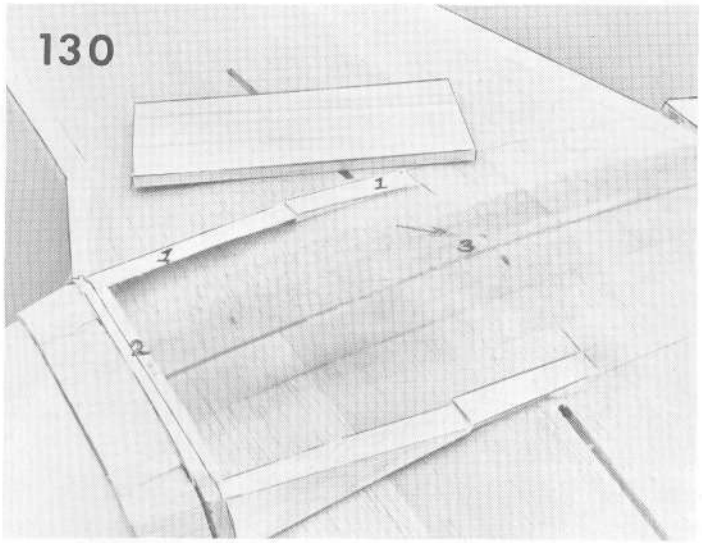
127. Rough cut with a modeling knife the curve of the wing bottom and then drag a piece of 80 grit sandpaper under the piece to make a good fit. Glue in place, and repeat on other side.



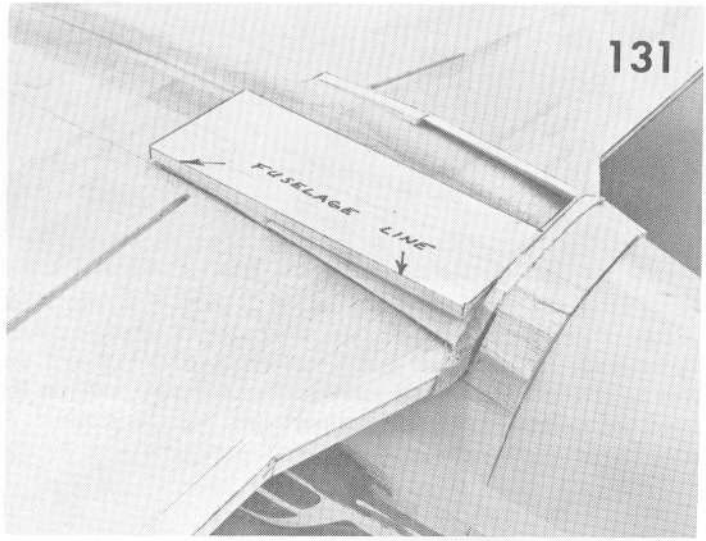
128. Make a mark in center of wing and glue two 1/4" x 1/2" strips butt glued to the front triangles.



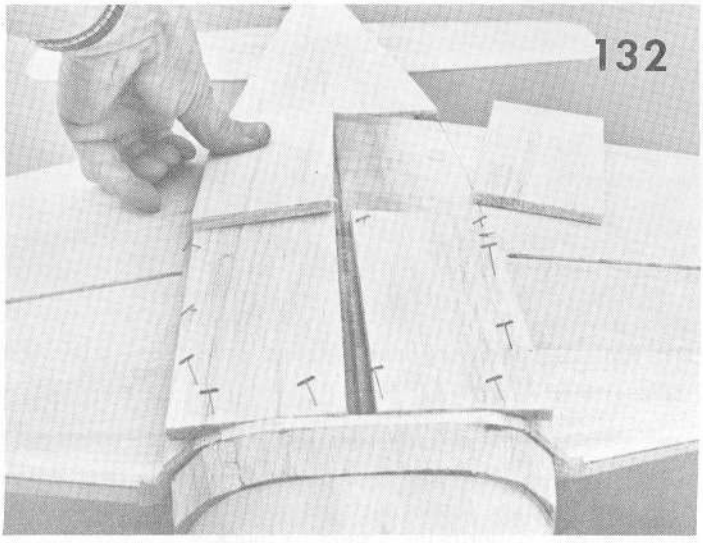
129. When cured, sand flat just barely touching the center glass tape. Do not cut through the glass tape. If you do, glue on another piece of glass tape before proceeding.



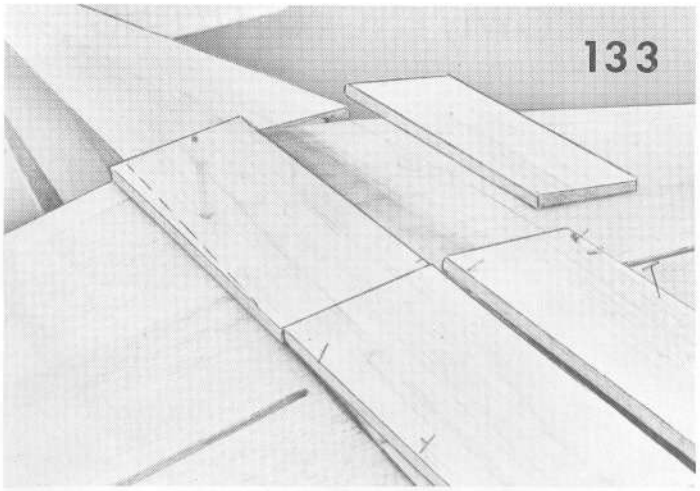
130. The bottom is now sheeted, starting with the 2 pieces of 1/4" x 3" x 13-1/2". Cut them off at center cross mark. Contact should be on three points along #1 and at 2 and 3.



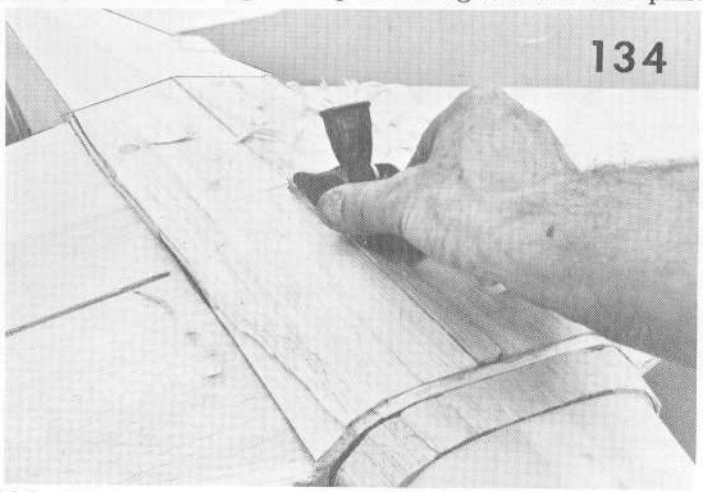
131. Lay along the fuselage line, gluing them on one at a time. Glue in place and pin.



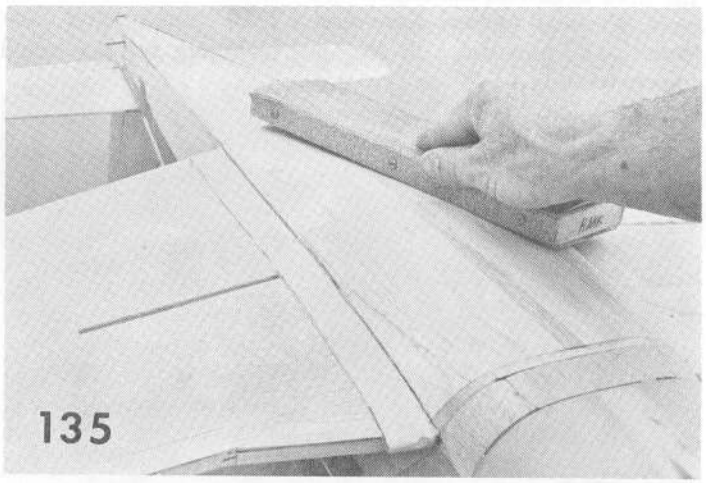
132. Put the rear sheet in place along the fuselage line, and press down to mark location of bolt head. Remove the bolt and drill a 1/4" hole in the sheet.



133. Place a piece of waxpaper between trailing edge of wing and fuselage. Draw a trim line along the fuselage line, trim off excess and glue in place using the bolt and pins.

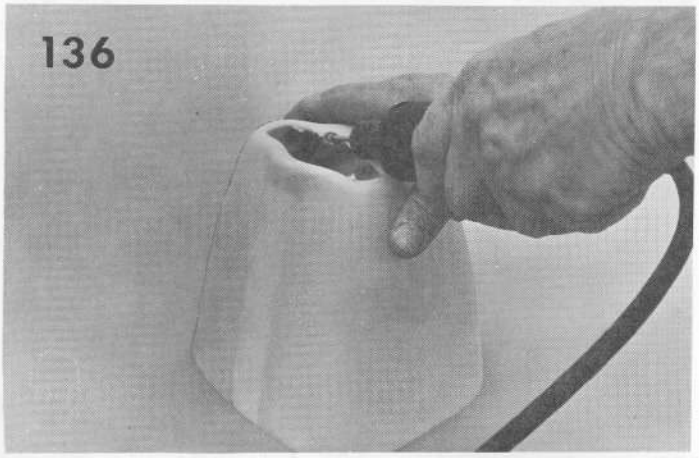


134. Fill in center gap with a piece of scrap balsa and use epoxy glue. Use an 17/32" piece of tubing (not furnished) to countersink the heads of the nylon wing bolts to a depth of 1/8". Sharpen the end of tube with a rotating motion slip cut into the wood.

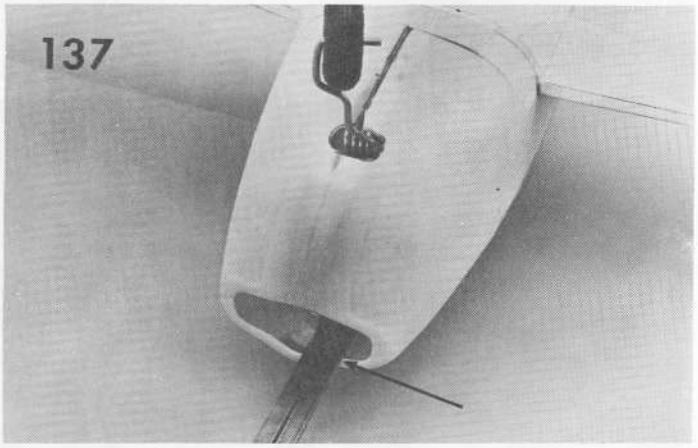


135. Start shaping bottom belly block with a razor plane or sanding block. Start with the main outline front to rear, shaping the bottom and working towards the sides. As you come towards the sides, follow contour from cowl to tail. Take only small amounts and shape carefully. Lay several layers of masking tape on wing to keep from digging into the wing skin.

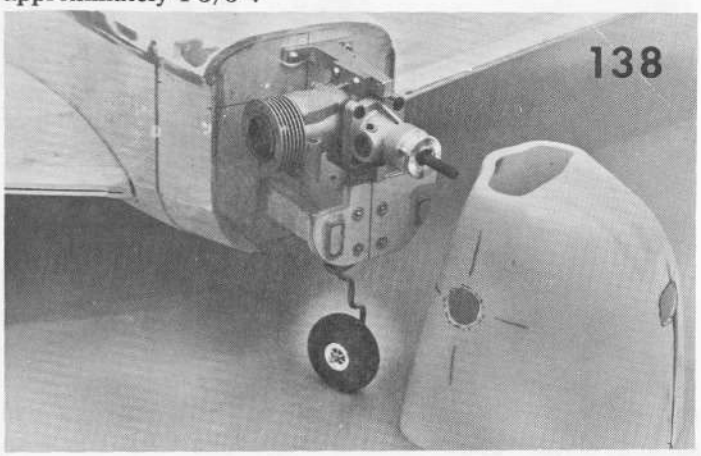
COWL, ENGINE FITTING



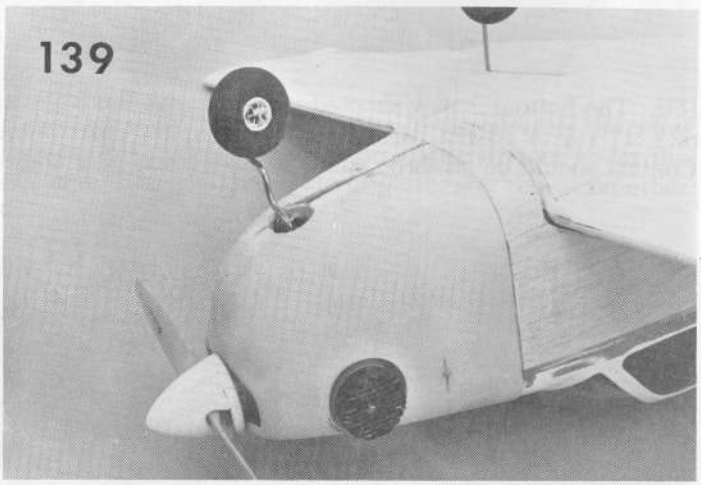
136. Open the cowl front end, cutting the opening to the indented surface. Smooth the edges of opening with a round dowel and sandpaper. Cut a slit in cowl bottom and a hole for fixed nose coil strut.



137. Install the nose gear, coiled strut and wheel. Measure from the firewall to the front end. Write down this dimension and use it to locate the forward position of the engine drive washer. When using the Carl Goldberg spinner, remember to extend the engine 1/8" more than for other spinners. Firewall to cowl dimension 4-7/16" plus spinner clearance 1/16" plus the 1/8" for Carl Goldberg spinner equals approximately 4-5/8".



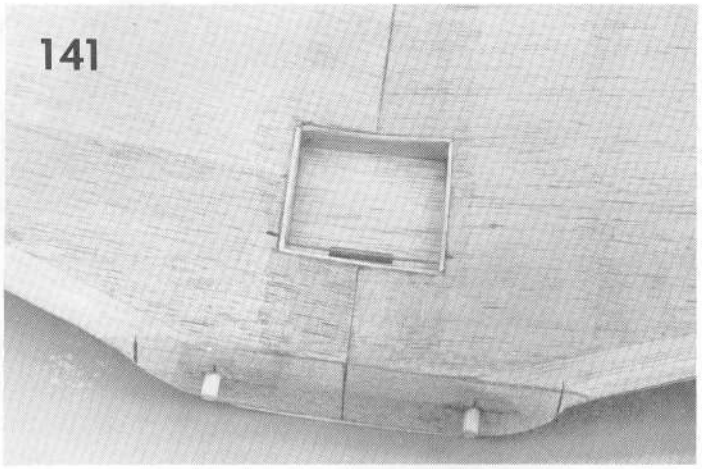
138. Mount engine, according to the dimension required. Remove the carbuerator and head and use a grease pencil to locate and mark head clearance hole. Open up a little at a time and fit cowl till hole clears the cylinder and head. Work carefully.



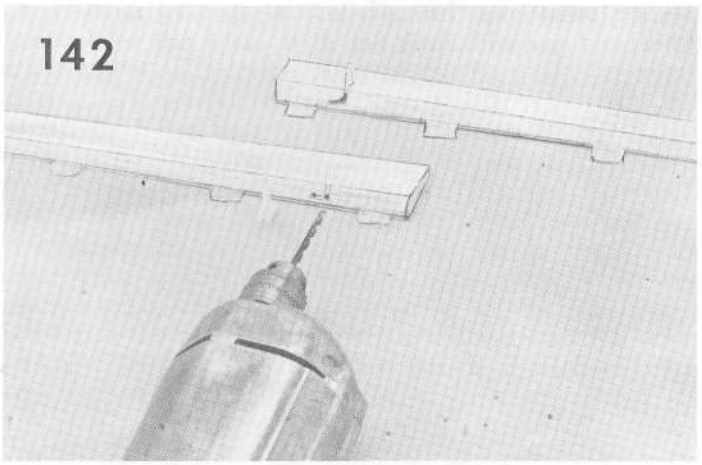
139. Final fitting of cowl is done with prop and spinner in place. Use four #2 x 1/2" pan head screws to secure cowl to firewall, 2 on the side and 2 on the bottom. Do not distort cowl while tightening screws. Put support pads on the cowl or fuselage to properly support cowl with no strain.

140. Finish off the wing leading edge and trailing edge, use 80 grit paper on sanding block.

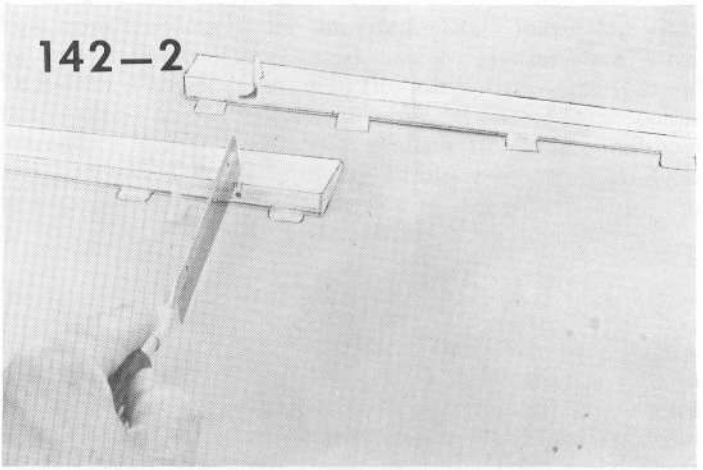
Proto-type was given one coat of finishing resin over entire wing and fuselage (balsa surfaces only). Well sanded with 80 grit garnet paper using a sanding block.

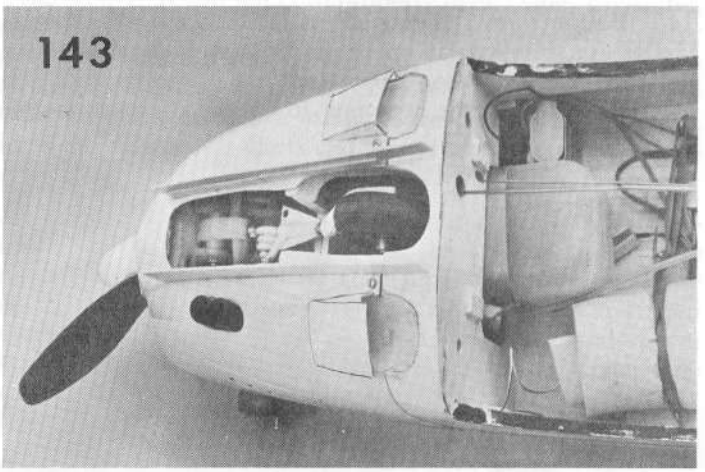


141. Line the aileron box with scrap sheet balsa. The aileron wire goes through in one piece, left to right. Push wire through the nylon tube, and as it passes the box, slip the brass connector tube on.

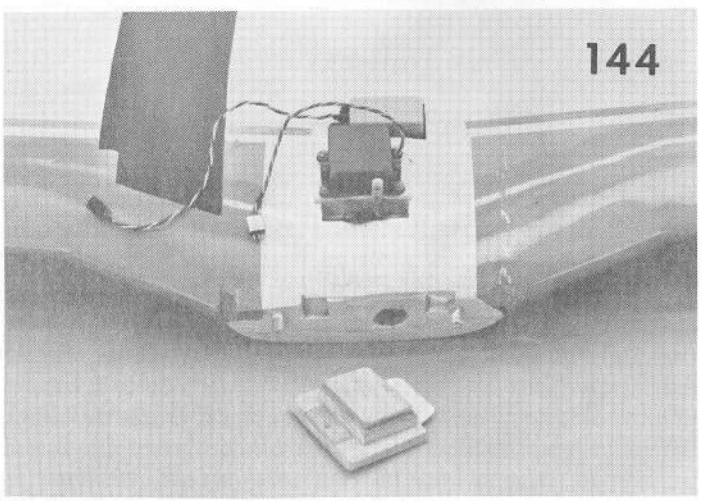


142. Drill the openings in the ailerons for the nylon horns. Saw the slot and cut an opening for the nylon horn. Make these openings larger than required to allow for plenty of glue for embedding the horn.





143. Cowl flaps exhaust and exhaust stacks – not furnished. Cowl flaps are cut and bent to the open position. Use Celastic to reinforce from the inside.



144. Hooking up the aileron servo can be done by your favorite method or as shown by using the brass connector tube. Bend a piece of scrap 1/16" wire so that it lays inside the tube and hooks up to the servo arm. Solder the wire, brass tube and aileron cable when position is determined.

The retract servo is mounted inverted, the hatch cover has a plywood floor which acts as a keeper when in the closed position. Make a good installation for this hatch. The nylon tab slips into a slot and the single bolt screws into a plywood section. A 4-40 blind nut and 4-40 bolt makes a nice set-up. When putting the wing in place slip the retract wire through the hole in the front edge of the wing, the right angle bend drops into the servo arm and the hatch cover retains the retract wire.

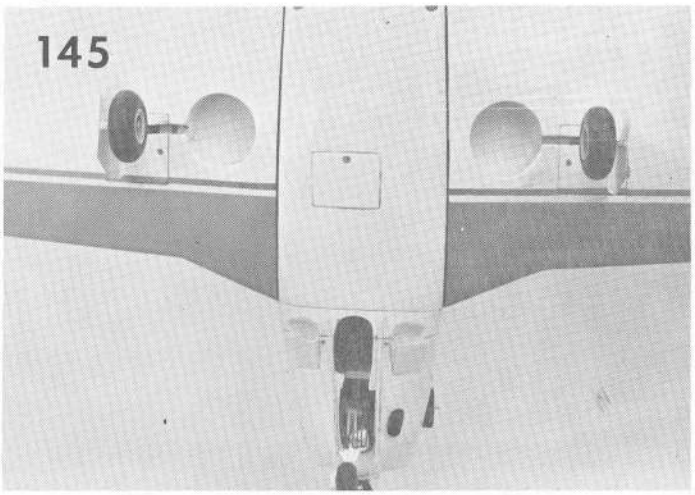
Dear Bonanza Builder:

We want to have the instructions for building this model as clear as possible. The real test is whether you can understand them easily. If you do not, write and tell us what parts were difficult to interpret. Any suggestions or comments about how the model builds and flies will be greatly appreciated.

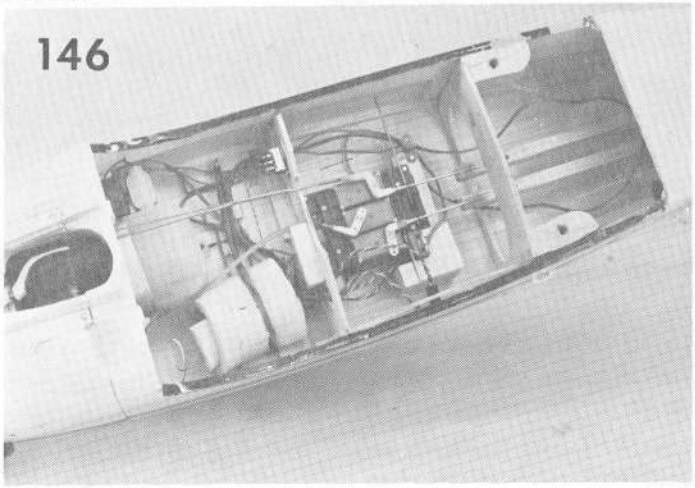
Sincerely,

Hank

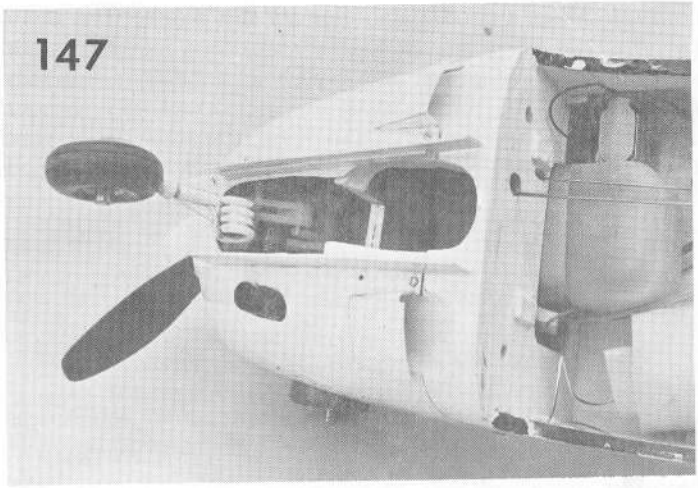
Hank Pohlmann, Product Engineer
Sig Manufacturing Co.



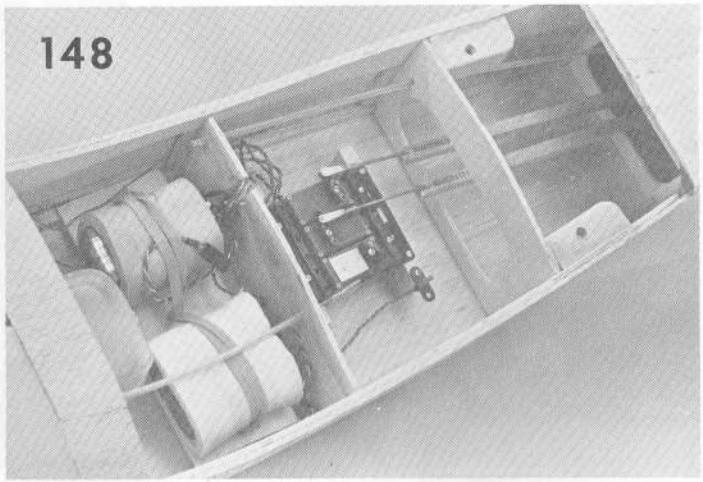
145. Bottom view showing access hatches and retract wheel wells. For simplicity in operation front well doors are permanently glued in place. Cowl flaps are in the open position (permanent) however are open to engine compartment for cooling.



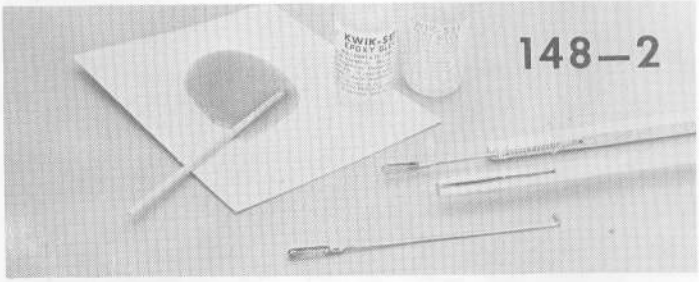
146. Retract version showing nose wheel in the up position. Extra wires seen are the hook-up wires, switch, and 9-volt battery for the anti-collision lights system. Note fuel tank has a wrapping of tape to protect it from former #3.



147. Exhaust stacks from the Tatone manifold are shown. With fixed gear it is a easy job to route the exhaust tubes to the left and right cowl flaps for a more scale-like appearance.



148. Radio installation for the non-retract version. Note antenna tube, this nylon tube extends out the tail of fuselage. A strong method of pushrod construction is shown, the rods are bent at a 90• bend and embedded in a groove the 90• bend goes thru a hole. Wrap with heavy nylon thread and coat with Kwik-Set.



SCALE FINISH DETAILS

Cowl grill with headlight — furnished in kit, ABS plastic. Cooling slots on side of cowl — furnished in kit, ABS plastic.

Anti-collision lights, antennas, flaps (aileron and elevator detail) – not furnished in kit. Use the photographs for placement of these details. Antennas on the proto-type are made from scrap ABS, wire, and Epoxolite.

Elevator and aileron dimples/grooves are layed out using full size drawings. Groove very carefully with a curved round file. To aid front cutting into unwanted areas lay pieces of Sig Stripe-Rite tape on each side of groove location. Coat the depression with primer or resin to seal the wood. The best time to groove the surfaces are after primer painting and just prior to finish painting.

COVERING AND FINISH

IMPORTANT: Don't skip covering the fuselage and tail just because they are solid wood. They will be much more resistant to splitting and breaking on hard impacts if they are covered with something — silk, silkspan or iron-on covering material---or if a resin shell is applied. (For resin surfacing directions, see the next section of the book.)

A good finish begins at the framework. Sand carefully with fine sandpaper.

Brush a coat of clear Sig Supercoat or Sig Lite-Coat Dope over all parts of the framework that will contact the covering. When dry, re-sand with fine sandpaper. Brush on a second coat of clear and allow to dry and again sand to remove any raised grain or fuzz.

Silk (either light weight or heavy weight) is hard to beat as a model covering material. The bottom of the wing is a good place to start. Cut a piece of silk about 1" larger than half of the wing, with the grain running lengthwise (grain of the silk runs parallel to the finished bias edge).

Dip in water and apply. Work around the edges, pulling out all of the wrinkles and stretching it smooth. Brush around the outside edge with clear dope. It will soak through the silk and adhere to the dope already dried on the framework. Let dry and trim off the edges with a sharp razor blade. Go over any areas that have not completely adhered with more dope. The top half is done in identical fashion except that the silk should be brought down over the edges and lapped over the silk on the bottom at the leading edge and over the back at the trailing edge.

Use the same process on the tail section and fuselage. Silkspan could be substituted for silk on the tail and fuselage if desired but they should be covered with some material to avoid splitting and cracking. The first coat of clear dope over the entire silk surface must be brushed on sparingly. The solid wood fuselage and tail can have Sig Lite-Coat from the beginning if desired. Sig Supercoat Color Dope has low shrink qualities.

A third coat of clear should provide a good base for color dope. Sand lightly, when dry with 220 grit 3-M Tri-M-Ite no-load paper. The color dope may be brushed or sprayed.

Supercoat Color Dope should be thinned with 10% or more Supercoat Thinner for brushing. This helps prevent brush marks and gives smoother coats. Flow on wet coats and avoid rebrushing back over an area already painted. For spraying, thin dope about 50-50. Add more thinner if the dope does not go on evenly.

If high humidity causes the dope to "blush" or turn white, the best way to handle this problem is to wait until the humidity situation improves and apply another coat of dope. This will eliminate the blush. If it is necessary to dope during high humidity, Sig Retarder may be used in place of part of the Supercoat thinner (amount depends on the humidity) to reduce the tendency to blush.

Painting the entire model white is recommended for a good color base, particularly when white is part of the color scheme. Color coats can be sanded 360 Tri-M-Ite or 400 or finer wet paper. When using masking tape for trimming, seal the edge with a coat of clear dope to prevent the color dope from bleeding under the edge. Don't leave the masking tape on any longer than necessary. The longer it is on, the harder it sticks. Complete the job with several sprayed coats of clear over the color scheme. This seals the colors and adds gloss. For a smooth, realistic finish the final coat may be rubbed down with Sig Rubbing Compound. For best results, it is not a good idea to try to mix different brands of paint. Use Sig products from the start.

ALTERNATE RESIN BASE FINISH

A 2-coat Polyester Glass Resin based finish was used on the fuselage and tail of the prototypes. This provides a smooth surface for color application with a minimum amount of work. Carefully read instructions on the SIG Finishing Resin can. The resin is applied only over the bare wood areas of the model. It will not cure properly over Dope, Epoxolite, Celastic, Epoxy or any other type of resin-based glue or putty. To insure a good glue bond, leave the areas on the tail surfaces which must be cemented to the fuselage unresined. These areas are usually covered by fuselage sides, fillets etc. Epoxolite fillets can be put over the cured, sanded resin.

Mix a small amount of Glass Resin according to the directions on the can to check coverage and set-up time. The tendency is to mix too large a quantity at a time. A large batch of resin sets up faster than a small batch. If the resin sets up too rapidly, reduce the amount of hardener used. Another method of slowing the set up time is to place the mixing container in a shallow pan filled with ice water. The lower temperature will slow the set up time.

Apply the first coat of resin sparingly, well brushed out application. After the first coat cures, sand with 80 or 100 garnet paper. Use a sanding block, try not to cut into the wood. Any low spots should be hand sanded to remove resin gloss. Brush on second coat, brushed out thin, let cure and sand with 220 to 320 Wet-or-Dry Paper, preferably use wet. All resin gloss should be sanded to a dull satin looking surface. Remember to sand and remove as much resin as possible without cutting through to the wood, this keeps the added weight at a minimum.

Epoxy primer was used on top of the resin base, preferably sprayed.

The prototype models were spray painted with white epoxy primer (K&B) sanded with 220 till about 80% of the primer is removed. A second light coat may be required should sanded areas show through to the resin base. Lightly sand the second prime coat to smooth out over-spray. Use 360/400 and wipe dust from the surfaces with a tack rag or dampened rag with Butyrate Thinner.

The prototype models were then spray painted with one coat of white epoxy paint. The trim colors were added with enamel. A Badger Spray Gun #250 was used for all primer and finish coats, including the trim colors.

Silk covered wings should be doped as recommended, (see COVERING & FINISHING) up to the point of final color. Lightly sand to remove dope gloss and spray entire wing with K&B primer. One light coat is sufficient. Epoxies or enamels may now be applied. Use a low-tack masking tape such as drafting tape for trim colors. Remember—don't leave the tape on any longer than necessary.

ALIGNMENT

The Bonanza is set-up 0-0-0. The wing incidence is zero degrees, the stabilizer is set at zero degrees and no down thrust or side thrust was used in the engine.

BALANCING

The recommended Center of Gravity location is at the main wing spar. For the first test flight, balance the Bonanza by suspending it on finger tips at a point extended out from the main wing spar. Balance with an empty fuel tank, but with all other equipment installed and the model completely finished and painted. Add lead to the nose, if necessary, to get the model to hang level. Be sure and fasten the weight securely. Do not attempt flight tail heavy. When slightly nose heavy, the model is more stable and less likely to stall or snap roll from over-elevating. It also cuts down reaction of the model to control movements and this is good during test and practice flights, to help prevent overcontrolling. After the model has been test flown and initial trimming accomplished you may want a little quicker response.

CONTROL MOVEMENTS

Various brands of servos can give different control movement direction and amounts of travel. For this reason, follow the measurements below when setting up for flight rather than any particular horn hole drawn on the full-size plan or visible in a picture. Shift the RC link to whatever horn hole will produce the required amount of movement.

The control measurements are suggested as a beginning Test flights may indicate a need for more or less movement, depending on individual model differences, C.G. location, your personal preferences, etc.

Full Up Elevator 7/16"
Full Down Elevator 7/16"
Full Left Rudder 1/2"
Full Right Rudder 1/2"
Ailerons Up 1/4" Down 1/4"

FLYING

IMPORTANT: If you have no previous RC flying experience you cannot successfully fly a responsive design like the Bonanza, particularly on the test flights.

It is recommended that novice fliers should not attempt to fly the Bonanza without the assistance of an experienced pilot. Contact the local model club or ask your hobby dealer for the names of good fliers and a suitable location for flying. (Or, send a self-addressed, stamped envelope to Hank Pohlmann at Sig Mfg. Co. requesting a copy of the latest list of Academy of Model Aeronautics chartered clubs .)

Many hours of work are involved in the construction of a model and it can all be lost in a moment of beginner's indecision. A skilled flier can help you get past the first critical test and trimming flights without damage to the model and give instruction in proper control.

Be certain to carefully range check your radio equipment and see how it operates with the engine running before attempting test flights. A lot of problems can be avoided if the engine has been well broken-in and idle adjustment perfected on a test block or in another airplane before installation in the model.

Takeoffs with the Bonanza from grass fields are easily made if the grass is not too long or the ground too rough. Some elevator application is required for liftoff. Be prepared to relax control pressure partially after becoming airborne so the climbout will not be too steep. On surfaced or smooth dirt runways less application of elevator will be needed.

RADIO EQUIPMENT INSTALLATION

The most convenient method of installing servos is on the plastic mounts which most radio equipment makers offer with their outfits or as an accessory. These are screwed to hardwood mounting rails for fuselage servos or to hardwood blocks for mounting in the wings. Instructions for the use of these mounts are included with them.

The pushrods for the fuselage are pieces of firm 3/8" sq. balsa. The 1/16" wire ends are wrapped with thread and coated with epoxy glue. Use the R/C links at the tail end so that trimming adjustments can be made quickly.

A flexible cable pushrod with nylon outer tubing (not furnished) is recommended for hookup of the throttle to the motor control servo. Use silicone seal to fasten the outer nylon tubing to the scrap support and to the fuselage inner wall. (This also applies to the nose gear pushrod.) The seal is better than glue since it doesn't make a hard spot in the tubing that may restrict movement of the cable inside.

The switch may be mounted wherever convenient on the side of the model, preferably the side away from the engine oil.

The receiver battery pack should be wrapped in foam rubber sheet, held on with rubber bands. Place it as far forward as possible, under the tank. It is a good idea to put the package in a small plastic bag, taped shut around the battery cable to protect the battery from accidental fuel leakage.

The receiver should be similarly wrapped up in foam rubber to protect it from engine vibration. Cover it with a plastic bag also. Stow this package in front of the servos. Make certain that the receiver will stay in place during aerobatic maneuvers.

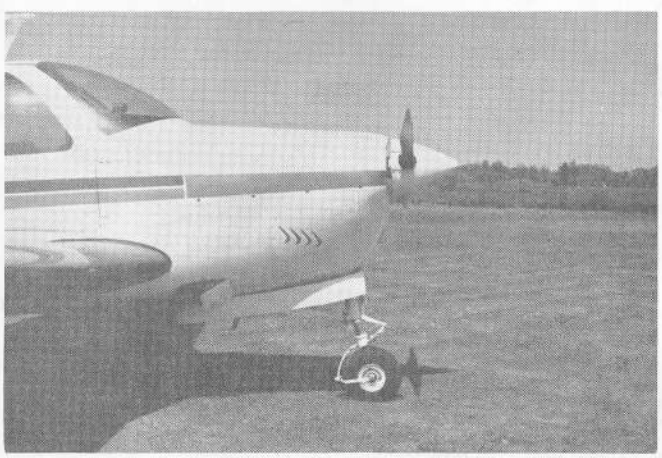
TIPS ON TANKS

Modern plastic tanks are virtually indestructable under normal use and bursting or cracking is almost unknown. If you use Sig Heat Proof Silicone tubing (which will not harden or deteriorate in fuel) in the plastic tank, the tank will seldom have to be removed. We have models in which the tank has been installed for three or four years without ever needing removal. So it is quite practical to put the tank in semi permanently.

The tank in the Bonanza proto-type has 3 tubes coming thru the firewall for easy fill and over flow without taking fuel line off the carburetor. (See full size plan for tank assembly drawing.)


N15RJ


N15RJ




N15RJ


N15RJ


N15RJ

A COLOR PHOTO PAK (SIG CATALOG #PP-241) CONTAINING 12 PICTURES OF THE FULL SIZE BONANZA AVAILABLE DIRECTLY FROM SIG FOR [redacted] POSTAGE PAID.

IN ADDITION TO THE KIT CONTENTS YOU WILL NEED THESE ITEMS TO COMPLETE THIS MODEL

.60 cu. in. Engine

2" Spinner (Goldberg on proto-type)

6-32 Engine Mounting Bolts
(Can be bolts and nuts used in untapped motor mounts or (recommended) 3/4" socket head bolts used in tapped motor mount holes. (4)

Propeller: 11" - 7" for .60 Engine

Tank: 10 oz. Rectangular Plastic Clunk Tank

Large Sig Heat Proof Fuel Line

2 - 2-1/2" Diameter Main Wheels

1 - 2" Diameter Nose Wheel

3 - 5/32" Wheel Collars For Wheels

Tatone #EM-SS Inverted Exhaust Manifold

Radio Equipment - 4 Channels Minimum

Servo Mounting Materials

(Refer to radio equipment manual for specific instructions.)

3 Solder Clevises (SIG SH-527)

1/4" Foam Rubber Sheet for Wrapping Receiver and Battery Pack.

Throttle Pushrod (SIG SH-559)

Sig Bond Glue for General Construction

Sig Epoxy or Kwik-Set Glue for Firewall and Other Areas Described in the Instructions.

Cyanoacrylate Glue - Hot Stuff

Basic Modeling Tools - Pins, Modeling Knife, Saw, Drill, Sandpaper, etc.

Sig Core-Bond Wing Skin Adhesive (Pint)

Covering and Finishing Materials

A. Silk and Dope

3 yds. light weight silk; 1 qt. Sig Lite-Coat Clear Dope; 1 pint Sig Sanding Sealer; 1 quart white base color; 8 oz. orange trim color; 4 oz. gold trim color; 1 quart dope thinner.

B. Alternate Method Using Finishing Resin

1 pint Sig Finishing Resin; 8 oz. K & B Primer; 1 pint K & B white base color; 8 oz. K & B orange trim color; 4 oz. K & B gold trim color and 1 quart thinner.

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