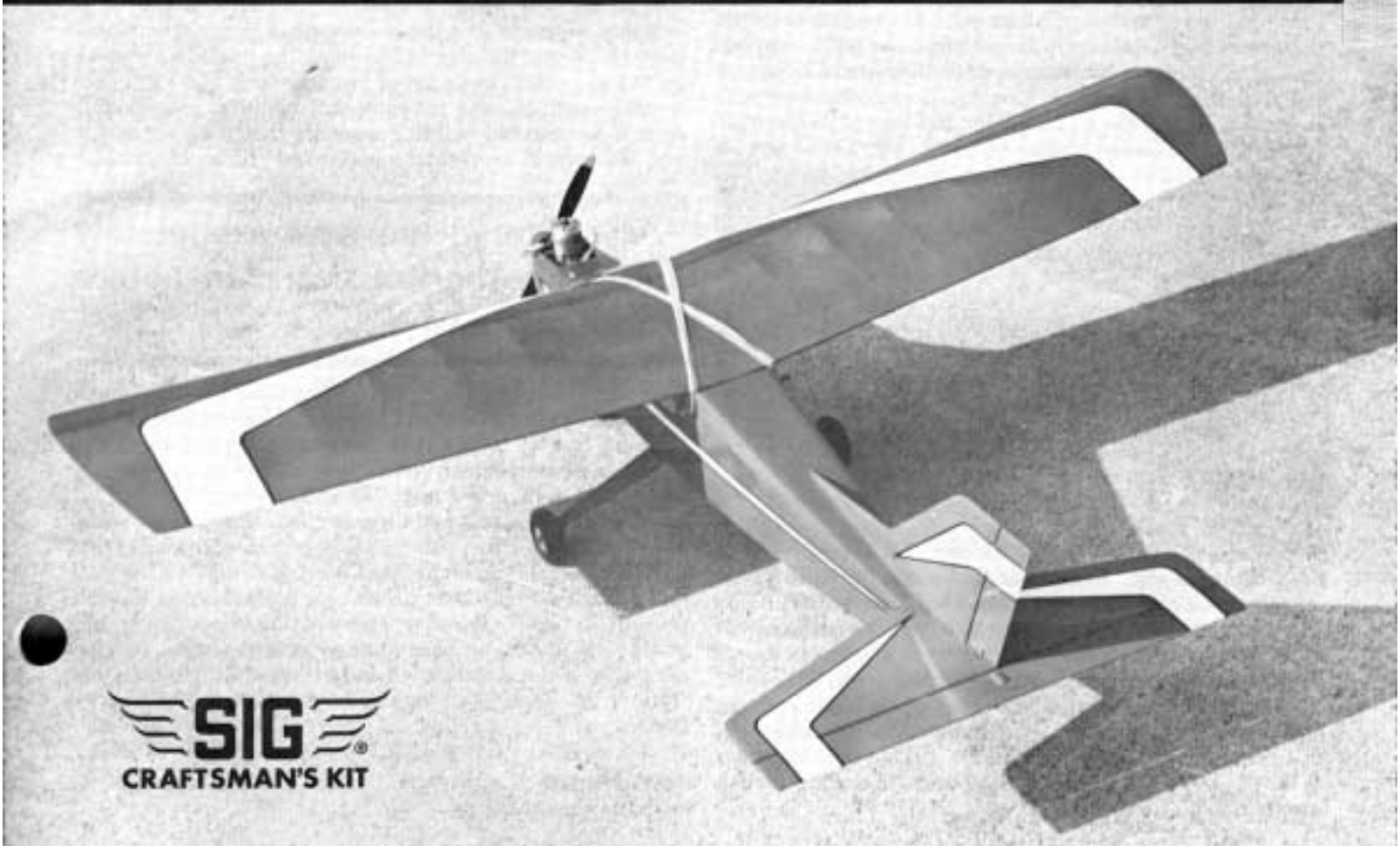
KADET JUNIOR

BUILDING AND FLYING INSTRUCTIONS



SIG
CRAFTSMAN'S KIT

The Kadet Junior is a reduced size version of the famed Kadet, designed specially for 2 and 3 channel flying. It has the same fine flying characteristics of its larger buddy and is intended for beginners learning to fly or for all round sport and fun flying. While the frame work may seem at first glance to be more complicated than some competing models, we believe this illustrated, step-by-step book will make it just as easy for novice builders. The model is strong and light because of this slightly more complex structural design and you will find the small extra assembly time well worth the improved performance and durability.

RADIO EQUIPMENT REQUIREMENTS

Selection of radio equipment should be based on the amount of money you wish to spend, the type of airplanes you intend to be flying and your future goals. If you plan to stay in the hobby and work up to larger airplanes with complete controls, it might be best to consider purchase of a four, or more, channel set in the beginning. It could be used with three servos to fly the Kadet Junior and later installed in an intermediate aileron trainer like the Sig Komander or Kavalier with the simple addition of another servo. This would eliminate the necessity of disposing of an initial investment in beginner's equipment of less than 4 channels and buying a new set when your flying skills are ready for an advanced model.

Use of 3 channels of control gives the best results with the Kadet Junior. One or two channel equipment can be used with less flexibility in control. On one channel, use rudder control only. For two channels use rudder and elevator.

ENGINE SIZE

The prototype Kadet Juniors were flown with the K & B .19, Fuji .19 and O.S. .25. A .15 cu. in. engine is adequate on less than 3 channels and, if the model is not overweight, on 3 channels also. Remember that a muffler will reduce engine power and allowance should be made for this. If you live at high altitude engines will not develop power equivalent to that delivered at sea level. Beginners should fly .19 and .25 powered Kadet Juniors with the engine throttled back after takeoff until they are familiar with the airplane and have some flying time. On two channels, throttle .19 and .25 engines back by locking the carburetor in the desired position. Size .15 engines on 2 channel models can be flown at full throttle.

A NOTE ON BALSA WOOD

Sometimes, depending on the raw wood supply and sawing schedules, we may put a larger piece of wood in the kit than called for. This "free" wood, cut off when fitting the larger piece to the model, can be saved for some other use. Some of this scrap can be used elsewhere on the model. In other cases, the wood may measure just 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.

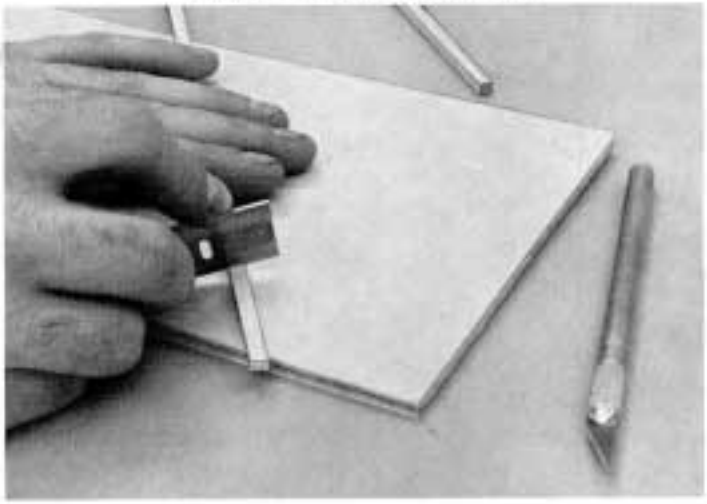
ABOUT THE BUILDING SEQUENCE

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.

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

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

SOME RULES TO FOLLOW



A common single edge razor blade is good for cutting sticks. For cutting sheet and curved parts, a modeling knife (right), will be found invaluable.

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.

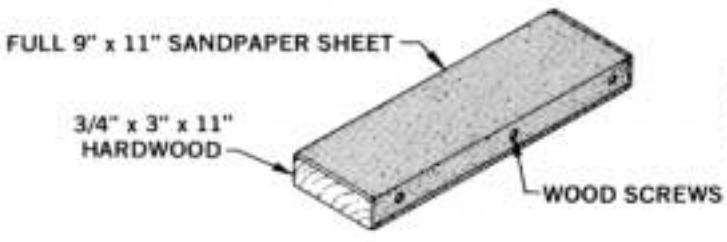
A piece of Celotex-type wallboard wakes a handy building board, into which pins can easily be pushed. Lay the building board on a table with a flat and untwisted top. Pins can be pushed through all pieces in the kit without any lasting damage. Don't be afraid to use plenty of pins when planking. The holes will fill up during sanding and doping.

Wax paper should be used to protect the plan during building when the glue used is epoxy or an alphatic resin glue such as Sig-Bond. If a model cement like Sig-Ment is preferred, use plastic wrap to protect the drawing. This type of glue can dissolve the wax in the wax paper, which will inhibit drying.

The plan paper can shrink and expand with temperature and humidity changes, as much as ¼" the long way. This can cause minor mismatching but will not seriously affect fit of the parts, patterns for which were taken from the original ink drawings. The finished assembly need not match the printed plan perfectly to a fraction of an inch. Small variations will not affect the model's flying characteristics in any way. 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.

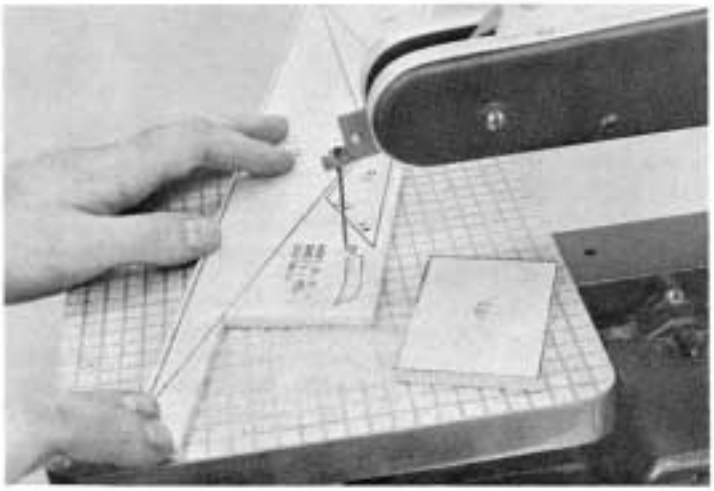
YOU CAN'T GET ALONG WITHOUT A GOOD SANDING BLOCK

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



In addition to the large block, there are places where a smaller one is handy. (See pictures farther along in the book.) Also, a sandpaper "file" can be made by gluing sandpaper to a flat spruce stick for working in tight places.

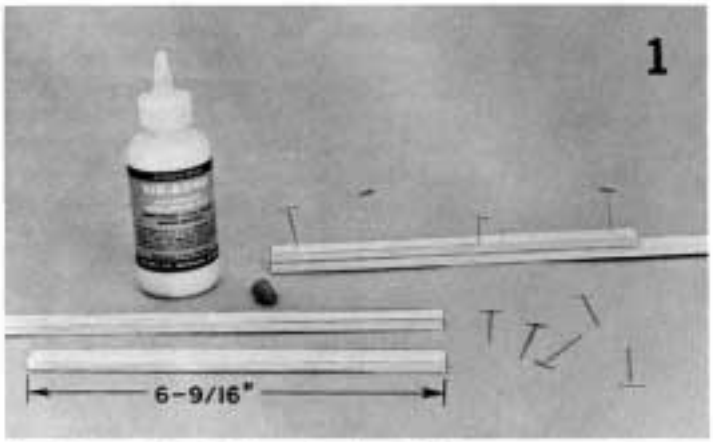
CUTTING OUT PRINTED PARTS



A jigsaw is handy, but not required. See picture 138 for use of a modeling knife in cutting out parts.

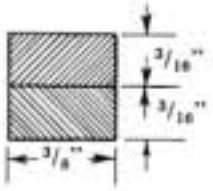
A jig saw is best for this job. Cut just outside the lines, leaving all of the black line on the part. When fitting the part into place in the model, use the sanding block to bring the edges to an exact fit. If a modeling knife is used to cut out the parts, don't cut too close to the lines - leave some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

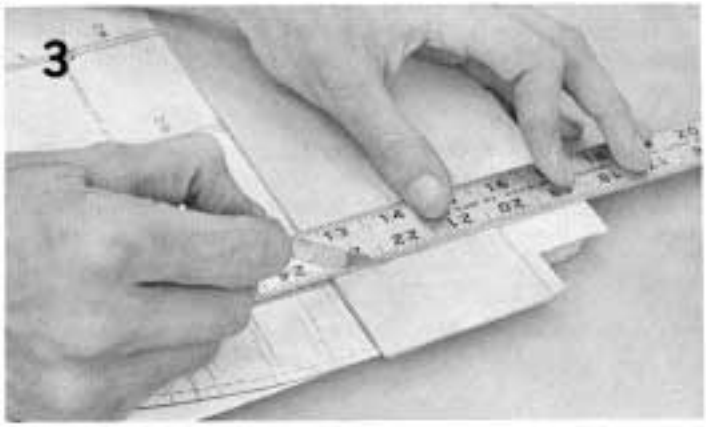
WING CONSTRUCTION



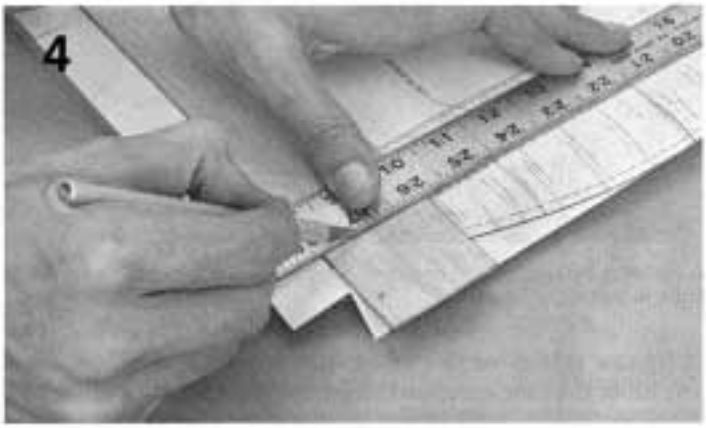
1. Cut 6 $^{9}/_{16}$" off the end of each of two pieces of $^{3}/_{16}$" x $^{3}/_{8}$" x 36" main spar stock. Glue these pieces to the remainder as center section spar doublers.

2. This cross-section drawing shows the placement of the doubler on the spar.





3. Place two of the $^{1}/_{16}$" x 3" x 24" pieces of wing sheeting wood on the plan with one end on the wing center line. Trim off the other end of the wood at the outer edge of the last wing rib. Save the scrap pieces.



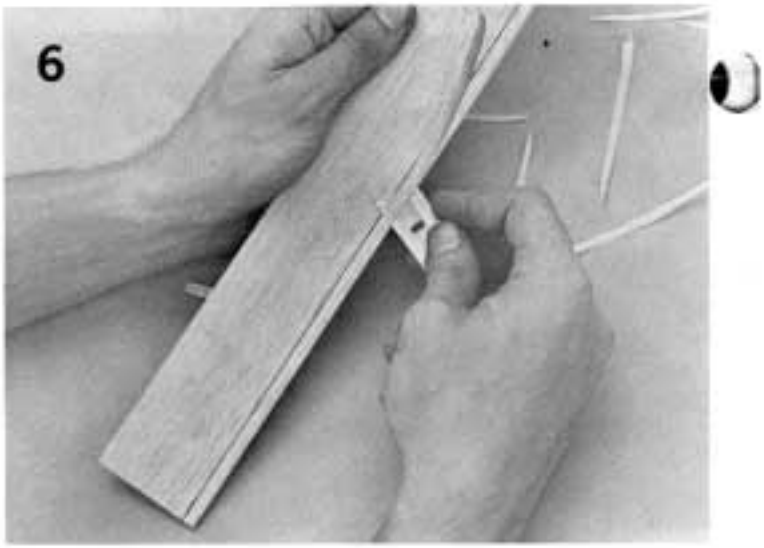
4. Place the two $^{1}/_{16}$" x 2" x 24" pieces of wing sheeting wood on the plan with one end on the wing center line. Trim off the other end of the wood at the outer edge of the last wing rib. Save the scrap pieces.

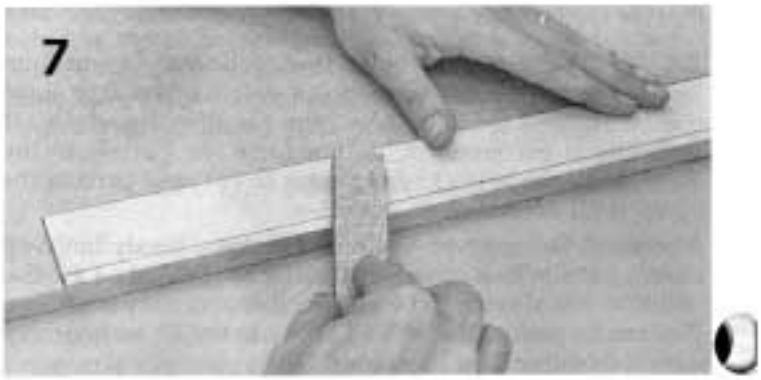
5. Draw a line ¼" from the edge of the two $^{1}/_{16}$" x 2" pieces.

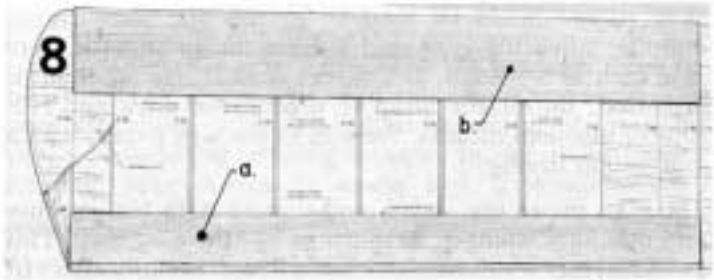
TRAILING EDGE BOTTOM PLANKING CROSS-SECTION

6. Trim off the edge as shown in the accompanying cross section drawing.

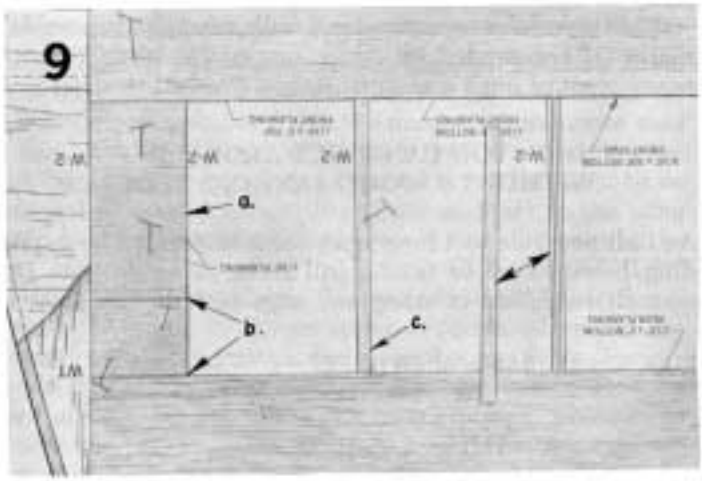
7. On the edge of the building board or table, sand the edge to a smooth, even bevel.







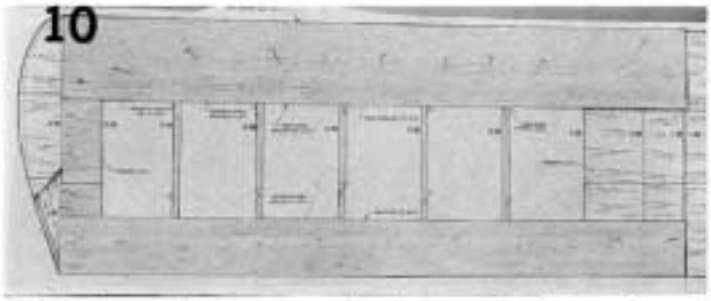
8. a. Pin one of the beveled 2" wide pieces on the plan.
b. Pin one of the 3" wide sheets on the plan.



9. a. Use the small pieces saved from the trimming to make the bottom tip planking.

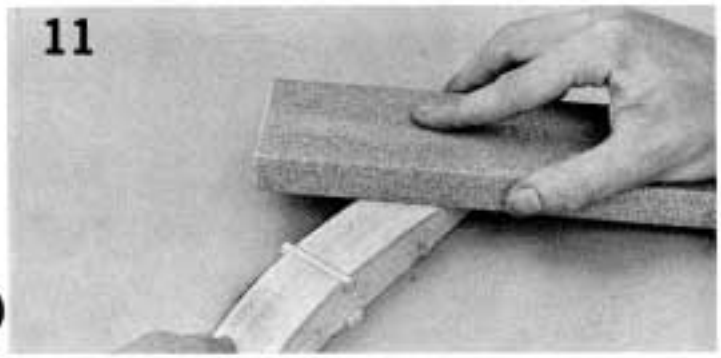
b. Glue the seams between these pieces when pinning them down to the plan.

c. Pin and glue the 1/16" x 3/16" balsa cap strips in place between the front 3" and the rear 2" planking sheets.

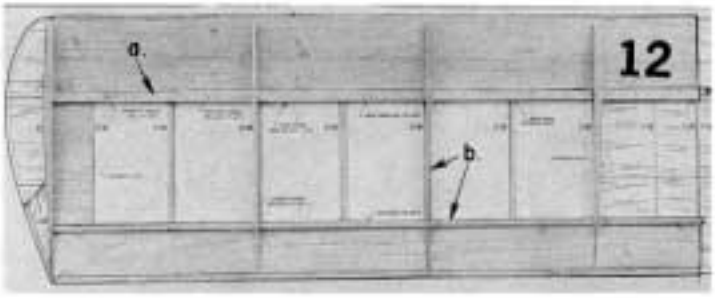


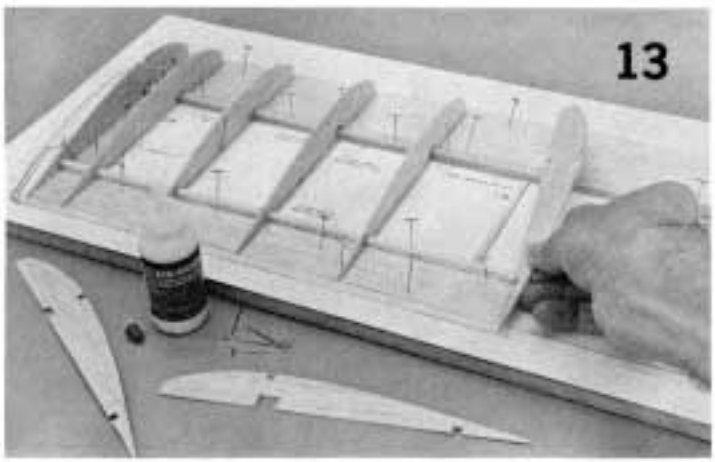
10. a. Leave the center section bottom planking off until later.

11. Stack all of the ribs and pin them together. Use scrap wood in the spar holes to align them. Sand the ribs even with the sanding block.



NOTE: The rib sanding process may reduce the height of the ribs slightly and thereby reduce the height of the spar slots. Before unpinning the rib stack, check the spar slots with a piece of spar wood. Deepen the slot, if necessary, so that the spar will go completely into the ribs. Do not oversize the slots, they should be exact fit on the spars.

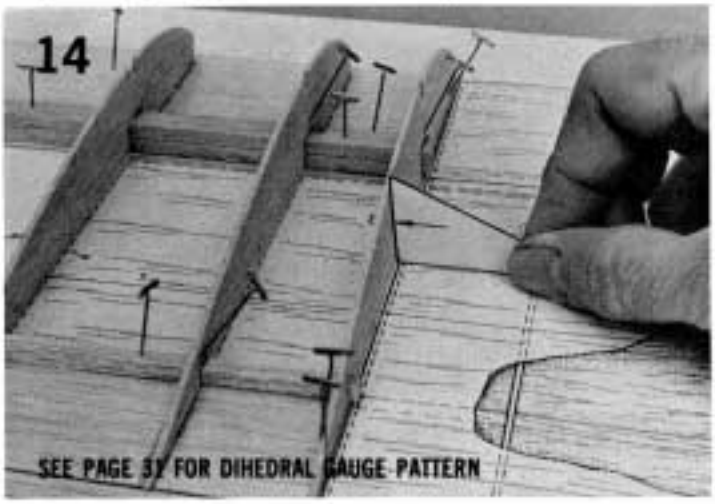




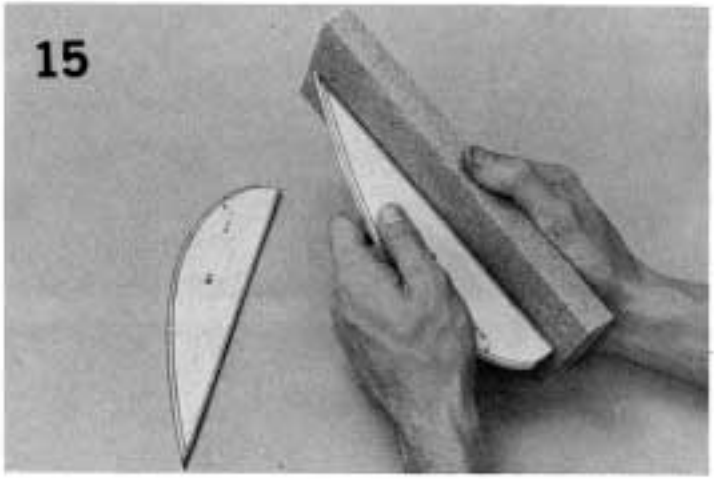
12. a. Pin and glue the front spar assembly previously done in Step 1. to the front bottom planking. Cut the spar to be the same length as the planking sheet.

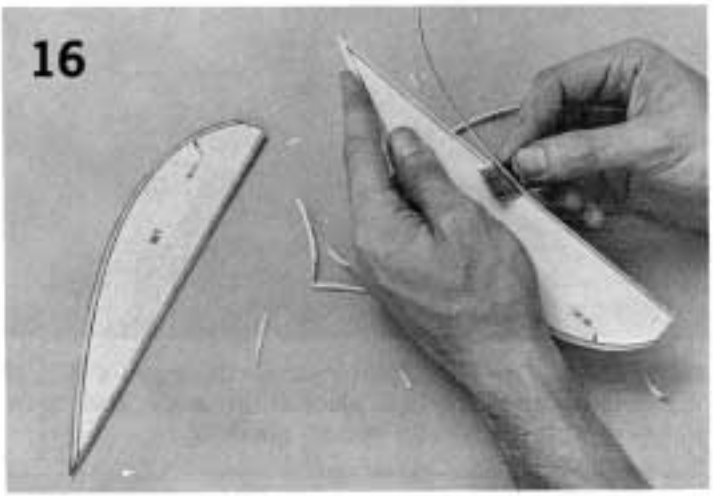
b. Using several ribs as a locating guide so that the rear spar is correctly spaced to accept all of the ribs easily, pin and glue the $^{3}/_{16}$" sq. rear spar on the rear bottom planking. Cut the spar to be the same length as the planking sheet.

13. Glue and pin the ribs in place. Glue them to the planking and cap strips as well as to the spars.



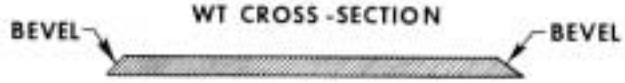
14. Using the dihedral gauge as a guide, glue the center W-1 rib to the spars and planking at a slight angle. Pin to hold it at this angle until the glue dries.

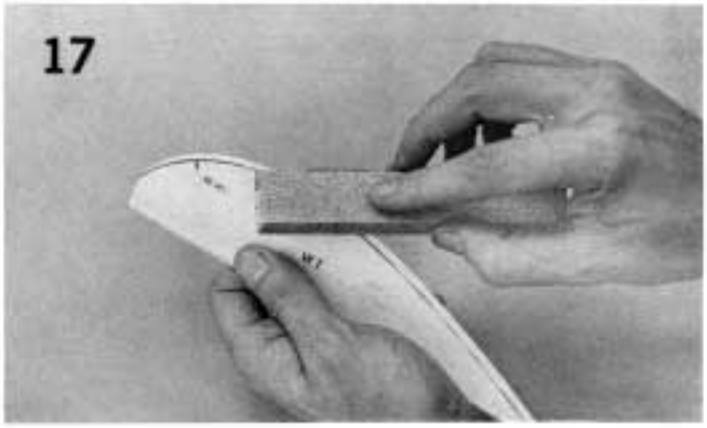




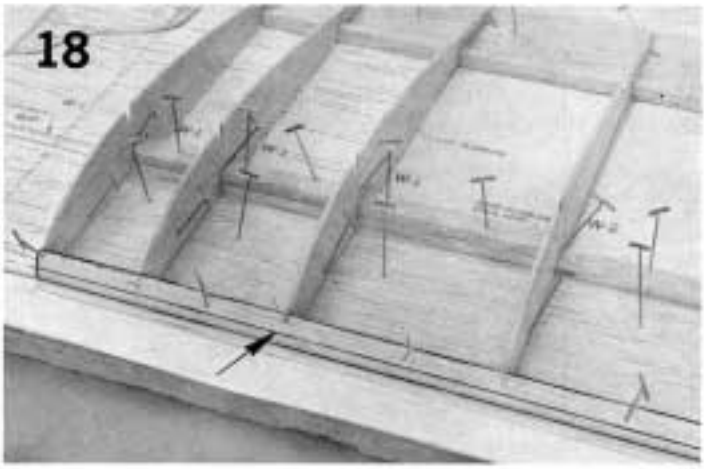
15. Cut out wing tip pieces WT from the fuselage sides. Finish evenly to the outside line with a sanding block.

16. Trim a bevel on the top and bottom using the inside line of the gray shaded portion as a guide for cutting.

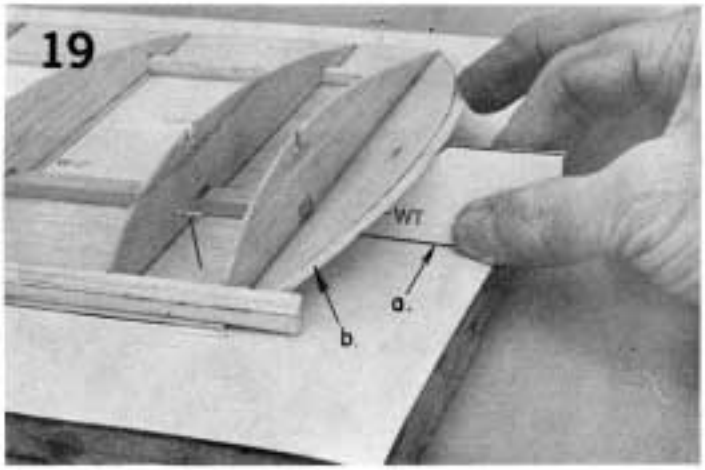




17. Finish the beveled edges with a small sanding block.



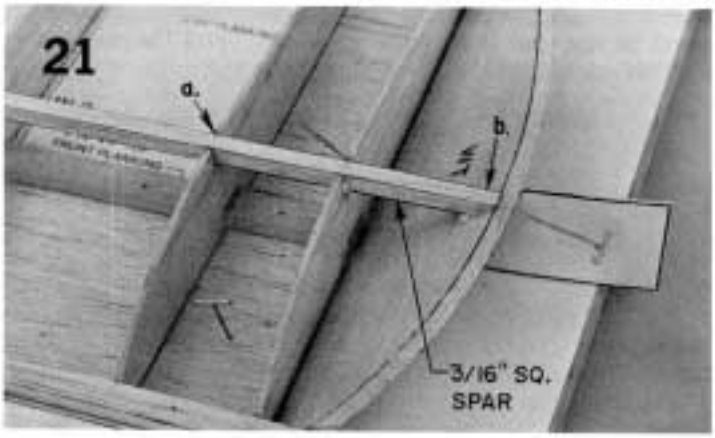
18. a. Pin and glue the $^{3}/_{16}$" x $^{3}/_{8}$" shaped leading edge stock in place on the front of the ribs.



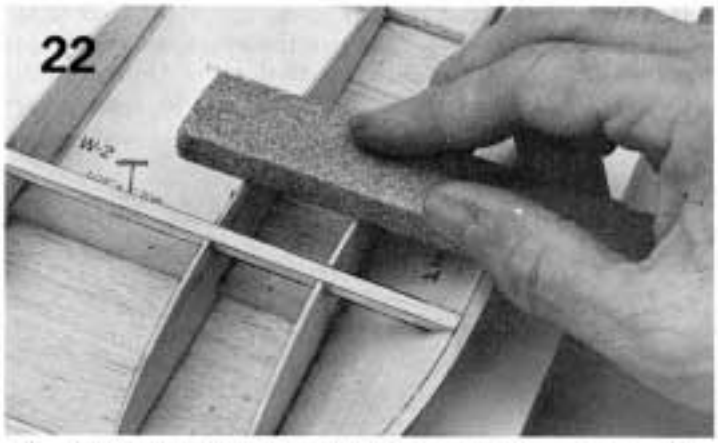
19. a. Use the Tip Guide pattern to set the angle of WT. If WT does not sit properly in place at this angle, sand to fit snugly against the rib and bottom planking.

b. Glue WT onto the wing.

20. a. Cut a piece of $^{3}/_{16}$" spar stock at an angle to fit against WT. (The Tip Guide can be used for this angle also.)

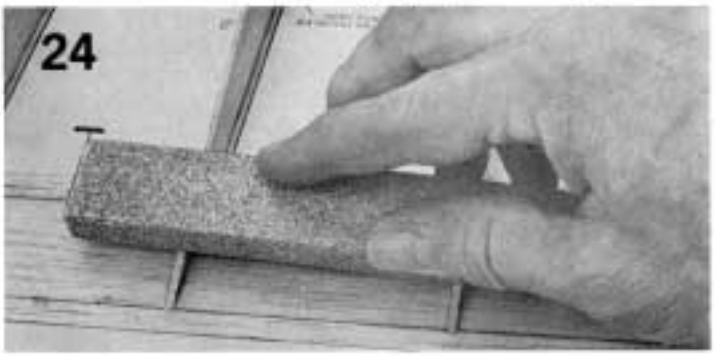


21. a. Glue the spar into the rib notches.
b. Glue the angled end against WT.

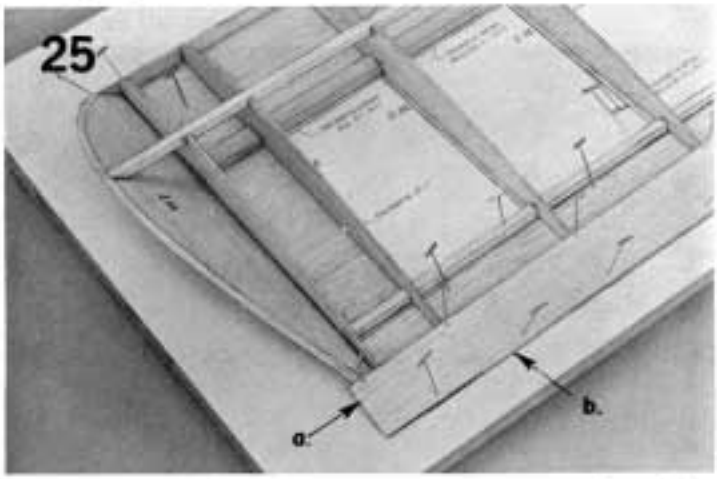


22. Sand the ribs and the bevel on WT to a good match.

23. Sand the rest of the wing lightly with a large block.



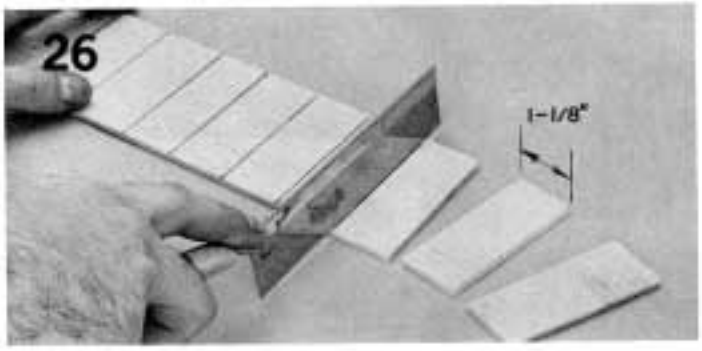
24. A small sanding block is handy to touch up the ribs and trailing edge bevel. Use the block for touch up on the leading edge also.



25. a. Pin and glue the $^{1}/_{16}$" x 1" x 24" top trailing edge sheeting in place.

b. Epoxy glue is recommended for the bevel seam to stiffen it and make it warp resistant. Water base glue in this seam may cause it to curl unless a lot of pins are used.

NOTE: The spar webs are not shown on the full size plan. Follow the picture sequence 26. to 30. for installation.

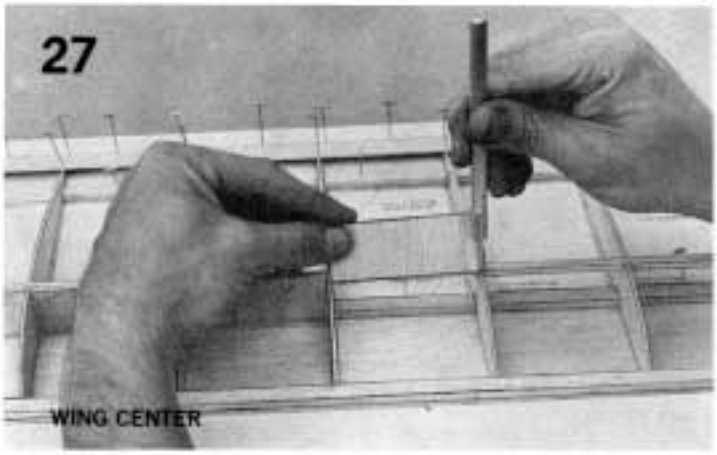


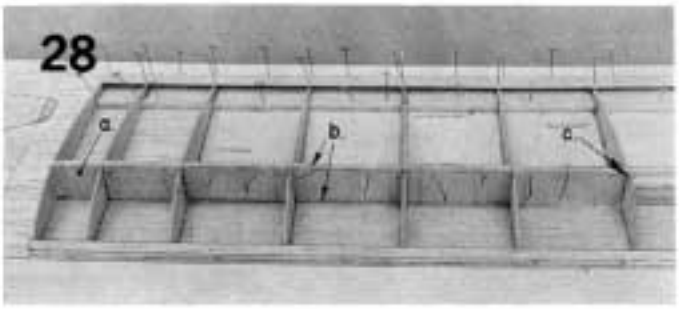
26. Cut ten 1 $^{1}/_{8}$" wide strips from the $^{3}/_{32}$" x 3" x 12" sheet provided for the spar webs.

27. Trim each piece of spar web to fit snugly between the ribs.

28. a. The end piece of web is cut from scrap off of the printed fuselage side sheet.

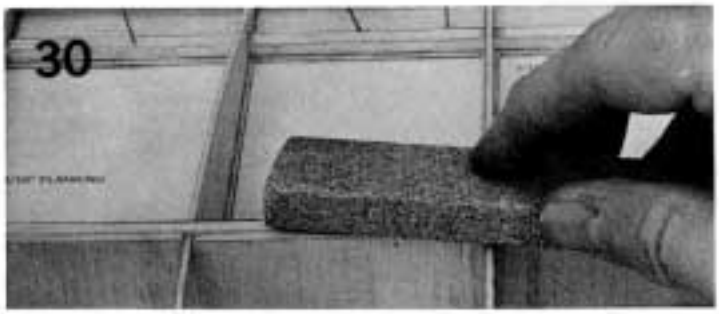
b. Glue the web pieces to the spars and to the bottom planking.



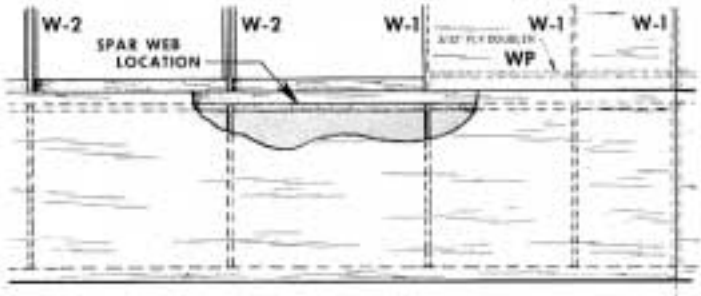


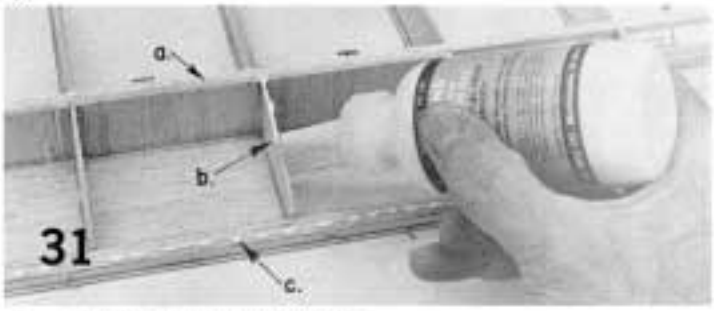
c. Webbing ends here at the 7th rib from the center.

29. Trim the tops of the web pieces so that they are even with the top of the main spar.



30. Sand the tops of the web pieces smooth.

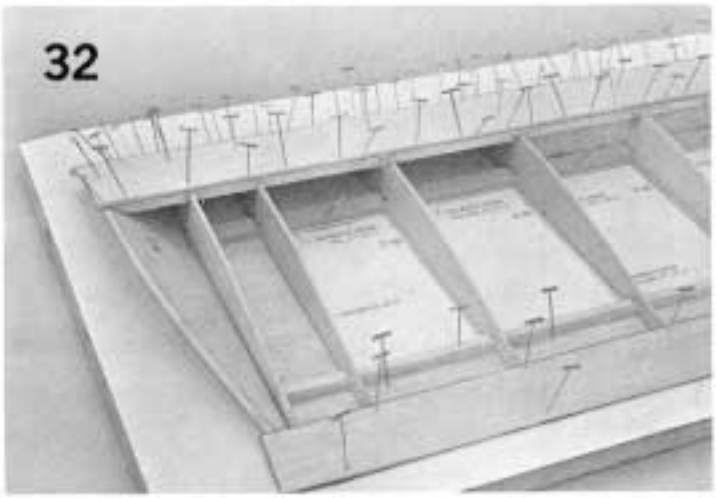




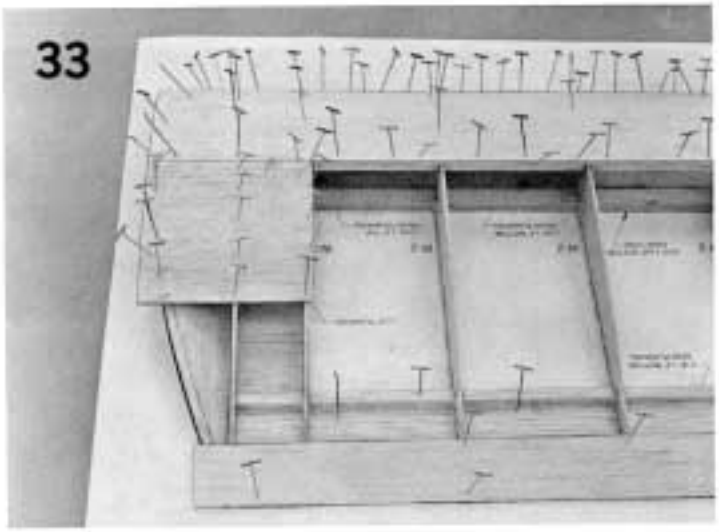
31. a. Glue the spar and web.

b. Put glue on each rib between the spar and the leading edge.

c. Glue the leading edge.

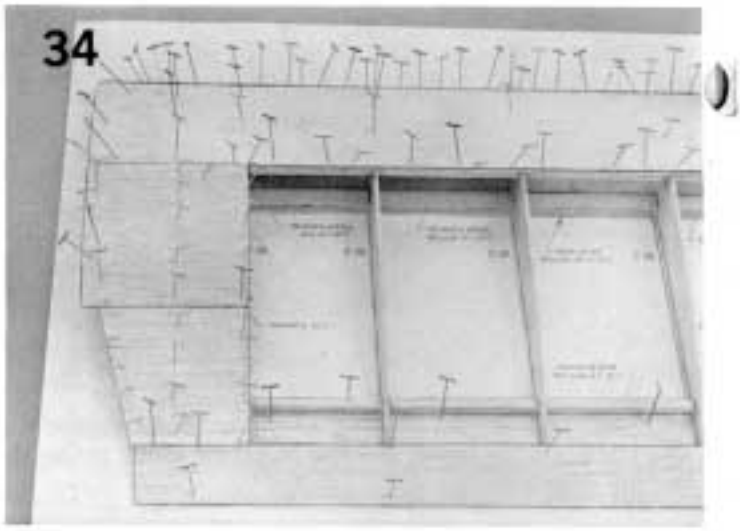


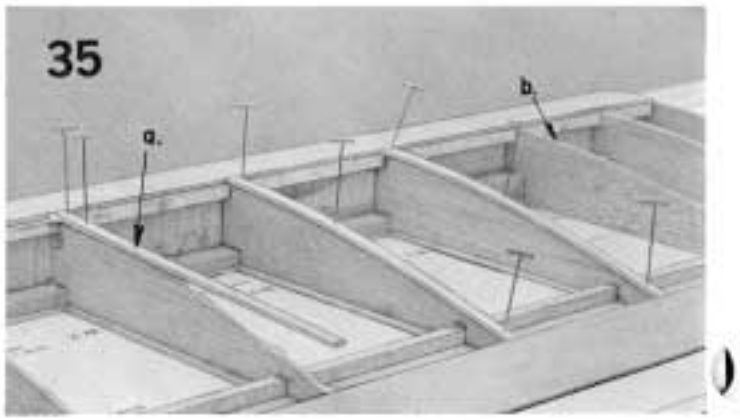
32. Pin the leading edge $^{1}/_{16}$" x 3" x 24" top planking sheet in place starting at the leading edge. Use plenty of pins to hold it to the ribs, the tip and the spar. If it will not easily bend in place from the leading edge to the spar, wet the top of the sheet with a cottom swab to make it more pliable and curl it into place.



33. Add a piece of $^{1}/_{16}$" x 3" planking sheet to the top of the wing tip.

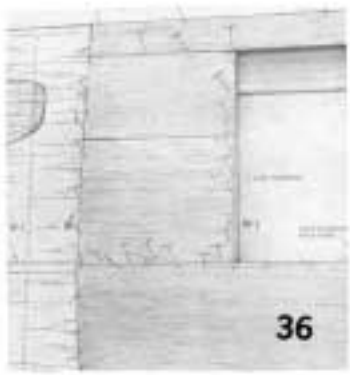
34. Complete the wing tip top planking by fitting a piece of $^{1}/_{16}$" planking sheet into the remaining opening.





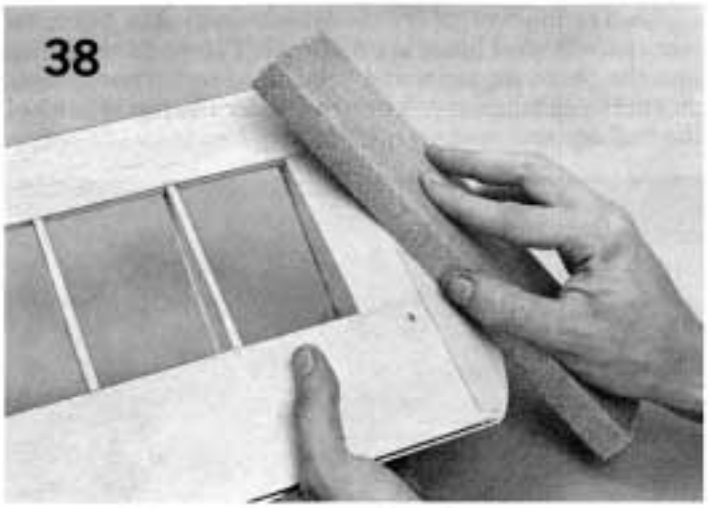
35. a. Pin and glue the $^{1}/_{16}$" x $^{3}/_{16}$" cap strip onto the top of each rib.

b. The three center section ribs are not cap stripped.

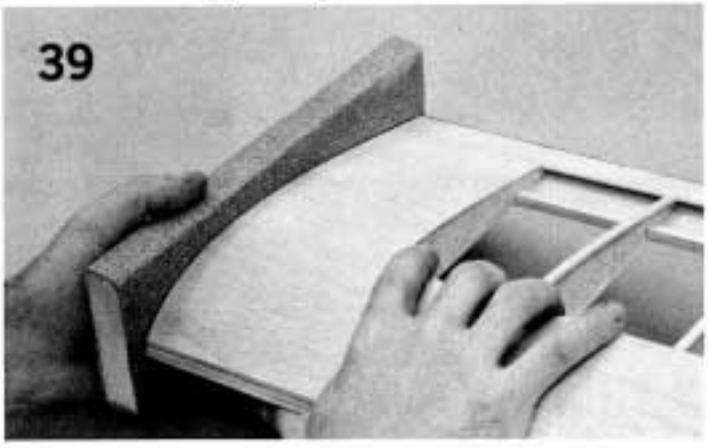


36. Plank the center in the same way as the tip with $^{1}/_{16}$" sheet.

37. Remove the wing from the board and trim off the planking scrap.

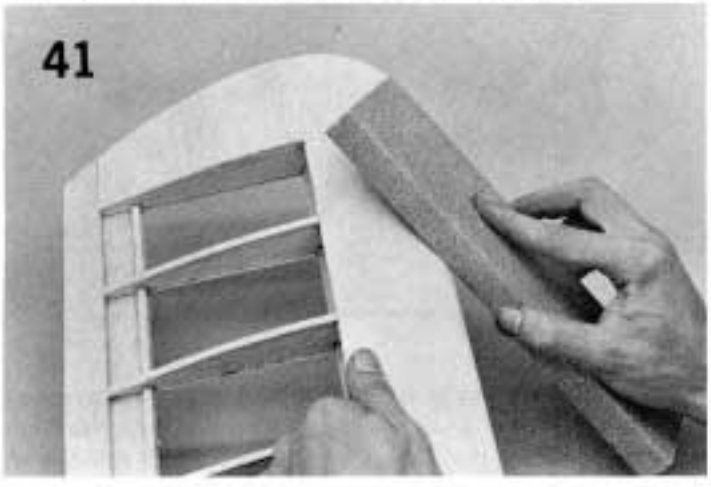


38. Sand the tip planking flush with WT.

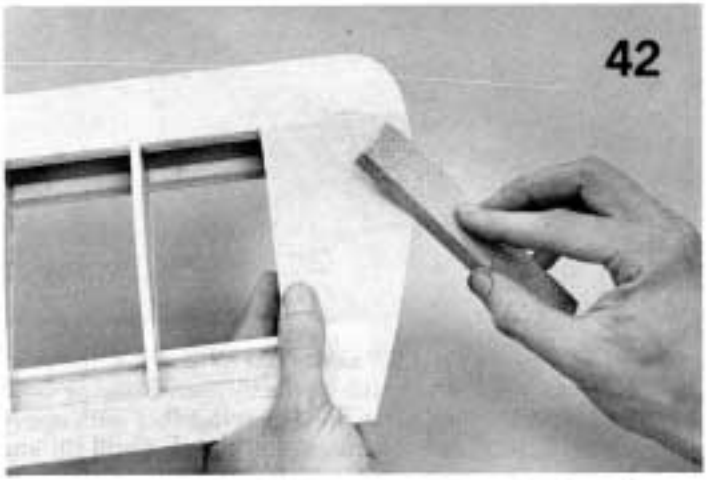


39. Sand the center rib smooth.

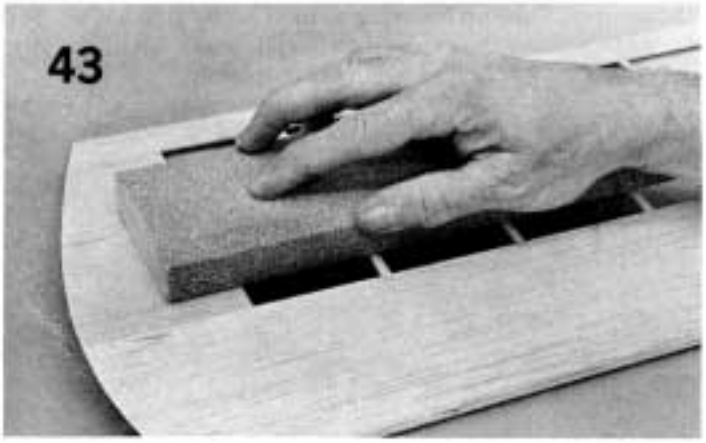
40. Carve the leading edge to airfoil contour.



41. Sand the leading edge smooth with the sanding block.

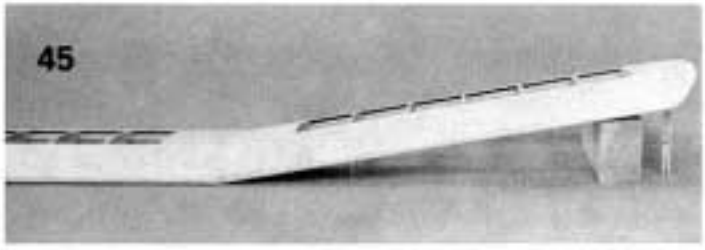


42. Round the edge of the tip so it will not be knife sharp.

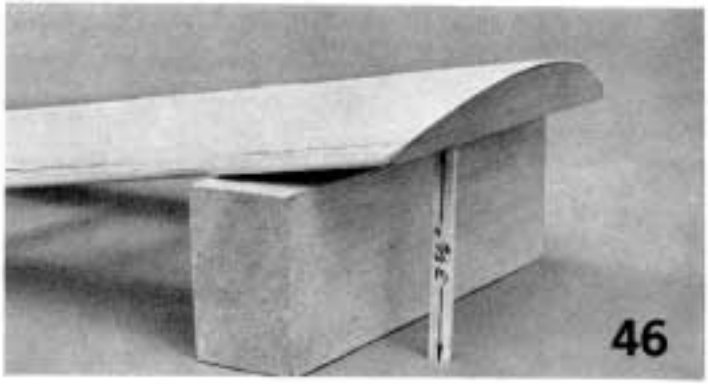


43. Sand the top of the cap strips and tip planking even.

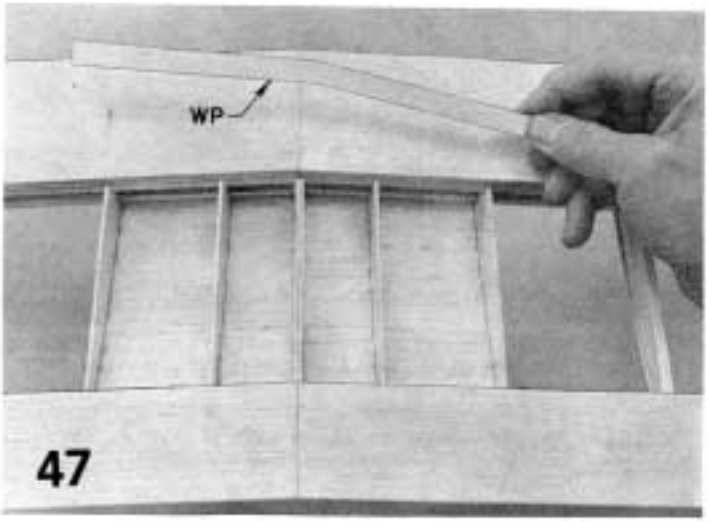
44. Sand the center section planking and cap strips even.



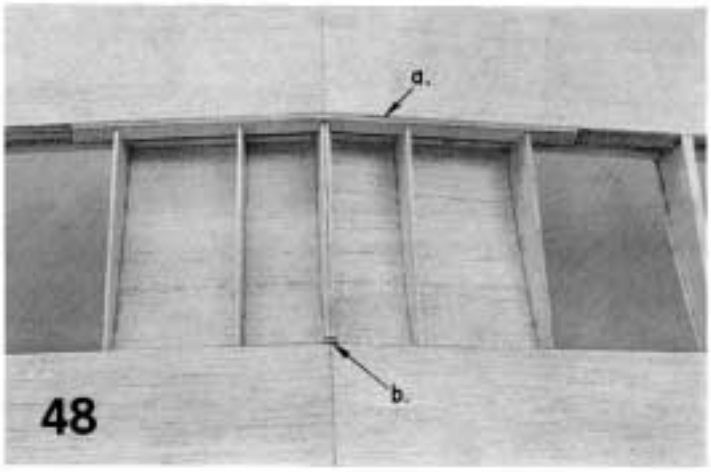
45. Set the wing halves on a flat surface with one tip block up and the other half flat on the table.



46. Raise the one tip 3 ⅝" at the last W-2 rib. If the joint in the center does not match perfectly, sand one or both center ribs until it does. Glue the halves together with epoxy glue. Have a "wet" joint to insure that the glue will fill any gaps in the seam. It is particularly necessary that the planking sheets, the spars and the leading and trailing edges are thoroughly glued to each other rather than the W-1 ribs themselves. Take up the wing as soon as the glue has set. It is easier to remove the excess that has squeezed out of the joint if it is peeled off before it cures completely.

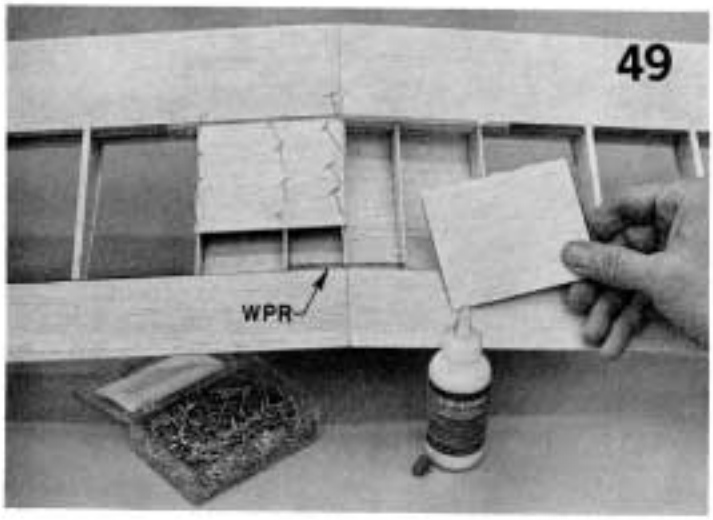


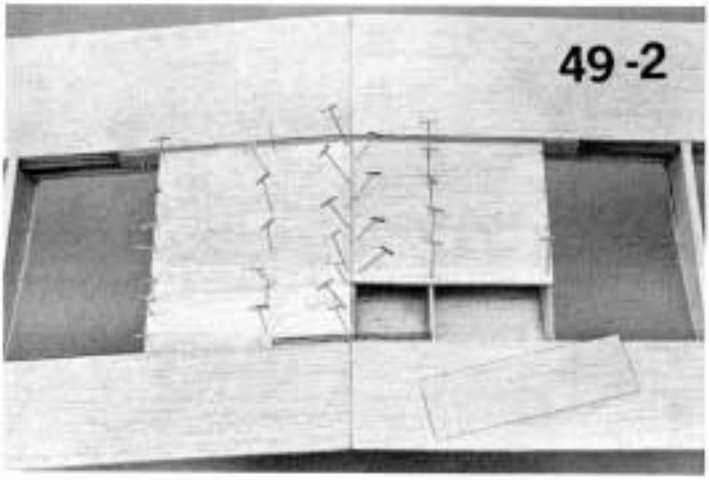
47. Turn the wing over and fit the plywood dihedral brace WP into the notches in the center section ribs. The bottom of the ply brace should be flush with the outside surface of the bottom wing planking.



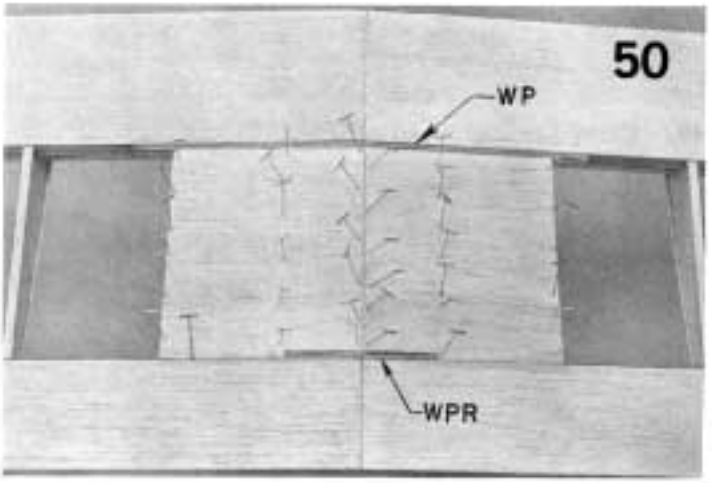
48. a. Glue the brace to the spars, planking sheet and ribs with epoxy glue.

b. During tooling for the kit we decided to include a rear spar dihedral brace WPR as well. This has been drawn into the photo sequence and is installed in the position indicated by cutting a notch into the center ribs just in front of the 3/16" sq. rear spar.





49. Cut, pin and glue pieces of 1/10" planking sheet to the bottom of the center section of the wing.

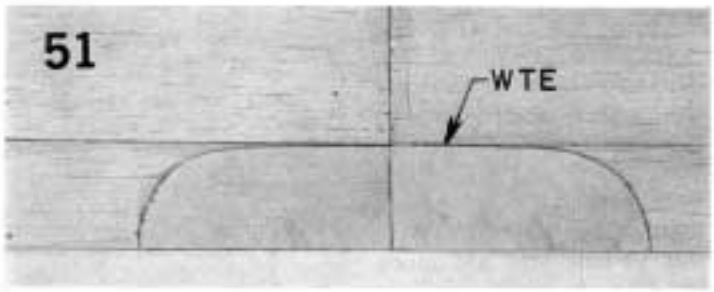


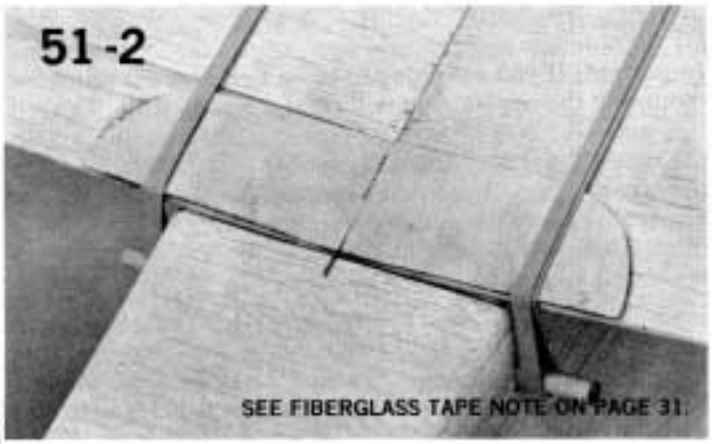
50. a. Complete the planking.

b. Sand the center section bottom planking smooth.

51. Rubber bands have a tendency to cut into the trailing edge. To reinforce the edge, glue on piece WTE, which are

cut from scrap left over from the 1/32" plywood fuselage doublers. These WTE pieces should not be glued on until after the wing is covered. In the case of plastic film covering, cut out a piece of covering slightly smaller than WTE to expose the wing and glue WTE directly to the wood.



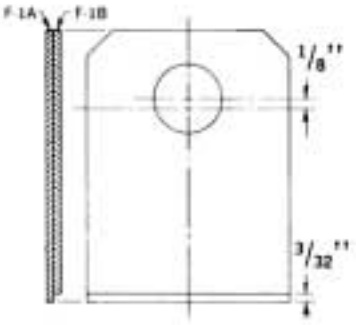


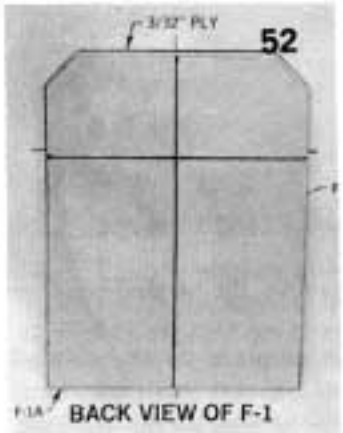
FUSELAGE CONSTRUCTION

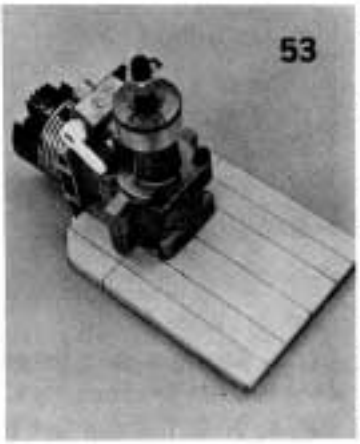
52. a. Smooth and even F-1A and F-1B with the sandpaper block.

b. Glue them together with epoxy glue as shown in the accompany drawing to make the firewall. If they should be warped, clamp them together with "C" clamps or put the assembly in a vise while the glue is setting.

c. Mark the vertical and horizontal center lines on the firewall.

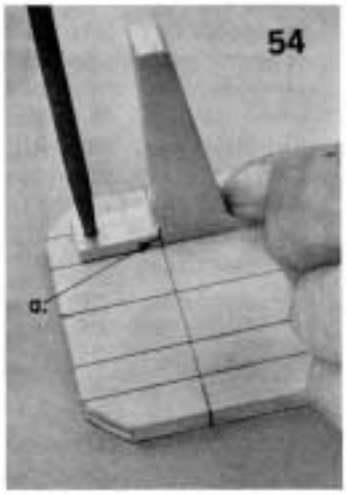






53. Place the motor you will use on the firewall and draw lines as a guide for positioning the aluminum motor mounts. (Different motors have different mounting dimensions.)

54. a. Put a mark on the sides of the mounts so that the top of the mounts can be located on the firewall horizontal line.

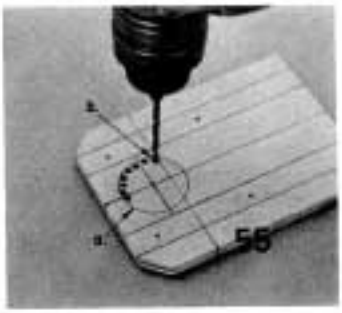


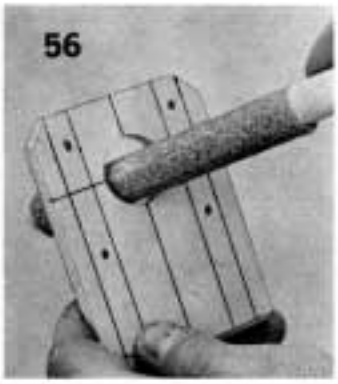
NOTE: READ "TIPS ON TANKS" IN THIS BOOK BEFORE CUTTING OUT A TANK HOLE.

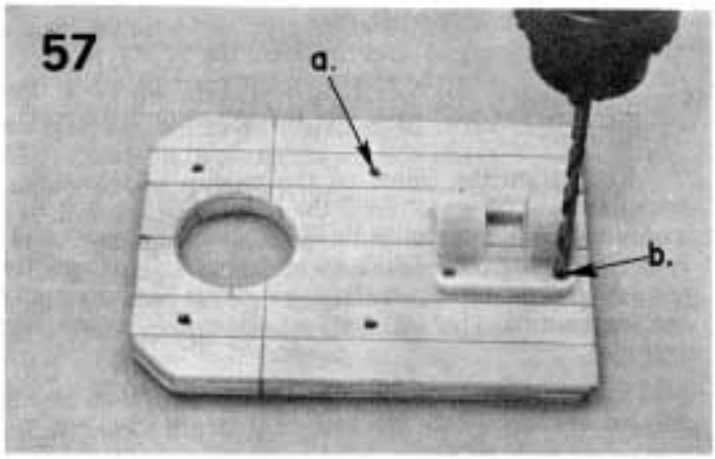
55. a. Locate the center of the tank cap hole and draw a 7/8" circle on the wood.

b. Drill a series of holes on the inside of the circle.

56. Break out the wood and sand the edges smooth with sandpaper wrapped around a dowel.





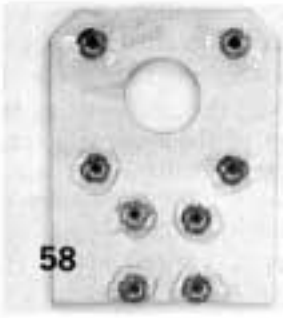


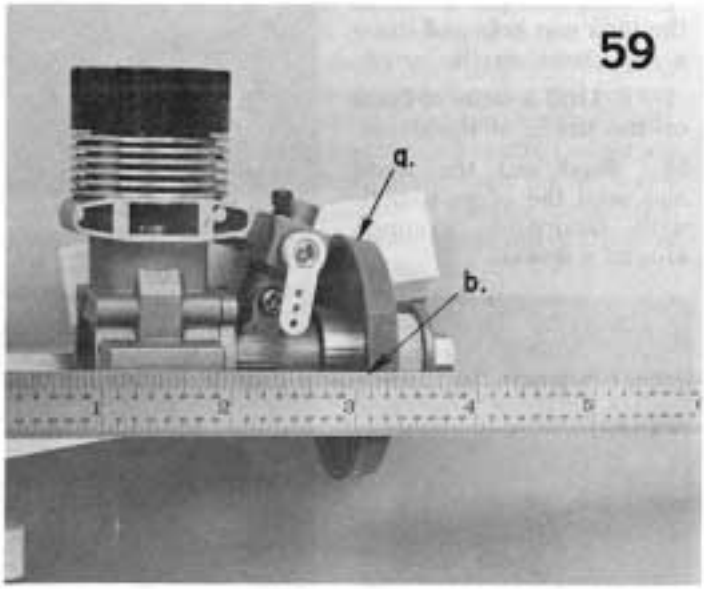
57. a. Drill out the motor mount holes with a 7/64" bit.

b. Position the nylon nose gear bearing on the firewall, punch the holes with an ice pick or awl and drill out with a 7/64" bit.

c. Turn the firewall over and drill out the backs of the 7/64" holes with a 5/32" bit to take the shank of the 4-40 blind nuts. Try to drill only deep enough to accommodate the blind nuts, leaving a 7/64" hole on the front for more perfect location of the mounts. If you should happen to goof and go all the way through, it will not be serious, the mounting will still be in the ballpark. To complete the holes, take a modeling knife and round off the edges on the back of the firewall so that the rounded off part of the blind nut will fit down into the hole when it is pulled tight against the firewall.

58. Be sure and epoxy the blind nuts to the back of the firewall so they will not come out later when it may be necessary to take off the mounts. I try to get a little glue under the flange of the blind nut as well as put a film of it over the outside. Don't get epoxy into the threads of the bolts. Pull the blind nut points tight into the wood with the bolts before the glue sets up.

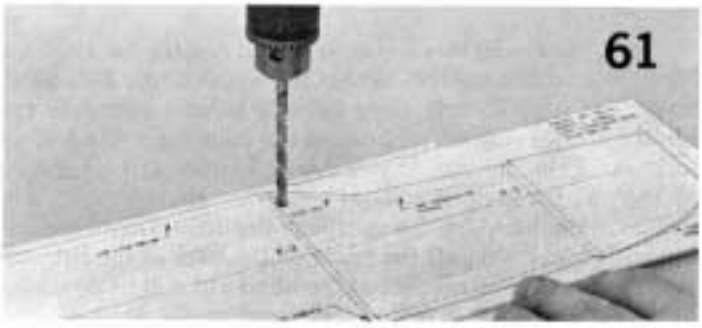




59. a. Put the spinner backplate that will be used on the motor. (Note: Some backplates have a recess, in the back as does this Goldberg spinner used on the prototype Kadet Junior. This is why the measurement must be taken from the spinner backplate itself and not the prop drive washer on the motor.

b. Position the motor on the mounts so the spinner backplate will be 3 3/32" from the face of the firewall. It is handy to tack the motor in the position with some spots of epoxy, brought up over the edge of engine to grip it good or put a strip of double-faced masking tape between the engine and the mounts. This will keep it from slipping during the next step.

NOTE: If an extra long or bulky engine is used, such as O.S. .25, use as much of the extra fuselage length shown on the printed fuselage side as required and add the extra dimension to the 3/32". You need enough room between the firewall and the engine for easy exit of the tank cap and fuel lines.

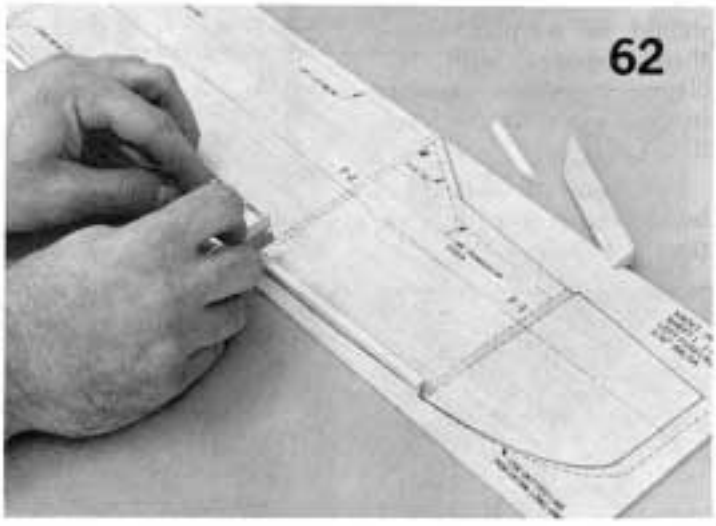


60. With a punch or sharpened piece of 3/32" wire, center punch the motor mounting holes. (Hint: If you are not used to doing this sort of job, don't try to punch and drill all 4 holes at once. Punch and drill only one hole. Then put the motor back on the mounts, secured by the first bolt. Punch and drill a 2nd hole, repeat the procedure, then a third hole, etc. With this process you are much less likely to make a drilling mistake that will ruin the mounts.)

Important: If you are going to tap a hole in the mounts for mounting the engine, you will need a No. 43 drill. Tap out this hole with a 4-40 tap. Be very careful, aluminum galls the tap easily, it may jam and break the tap. Back it out frequently and clean the fragments out of the tap threads. Use a special aluminum tapping fluid or kerosene to lubricate during thread cutting in the mount. Fasten the motor on with socket head bolts.

If you do not have access to a tap, then drill out a hole large enough to pass a 4-40 bolt (7/64") and use bolts long enough to go completely through the mount (1" long or longer). Fasten them with nuts and lock washers. It helps with this method to file a flat place on the tapered bottom of the mount so that the nut and lock washer will seat squarely.

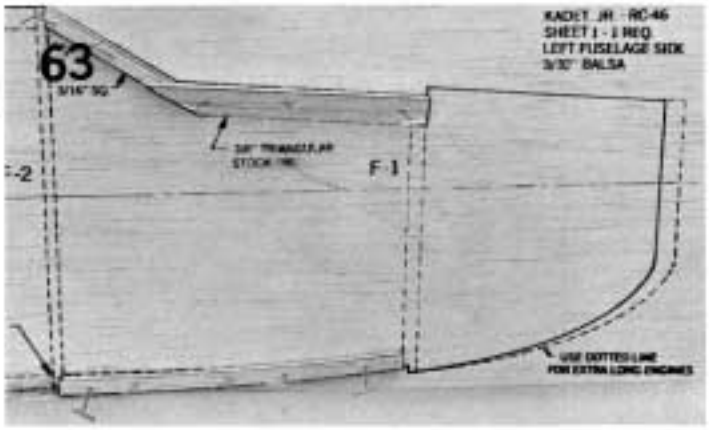
61. Drill or cut out the dowel holes in the fuselage sides so that they will be located after the inner plywood doubler is installed. The builder of the model shown in the pictures (who wishes to remain anonymous) forgot to do this, so in the following sequence of pictures you will not see the hole. But you do it as we say, not as we did, and it will work out better!



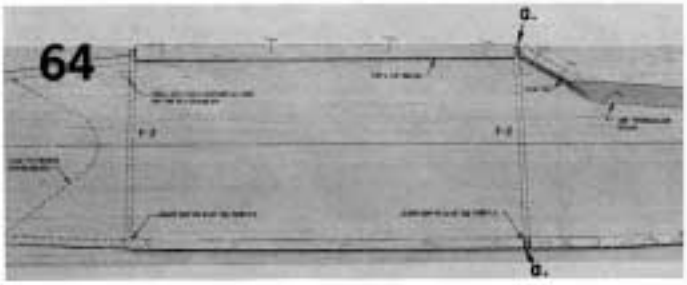
62. Cut indicated pieces of wood on the printed fuselage sides to proper length.

63. a. Pin and glue the pieces in place on the printed fuselage side.

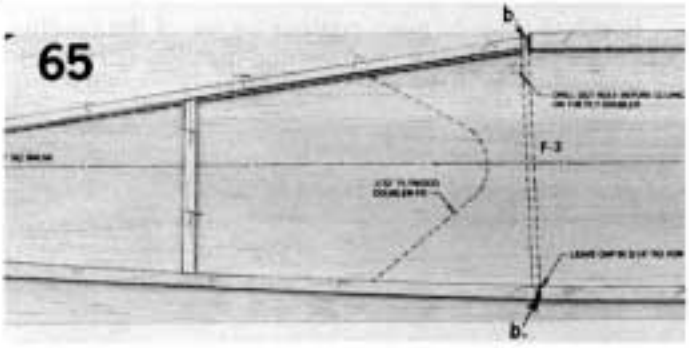
b. Note the gap left for the bottom of the firewall.



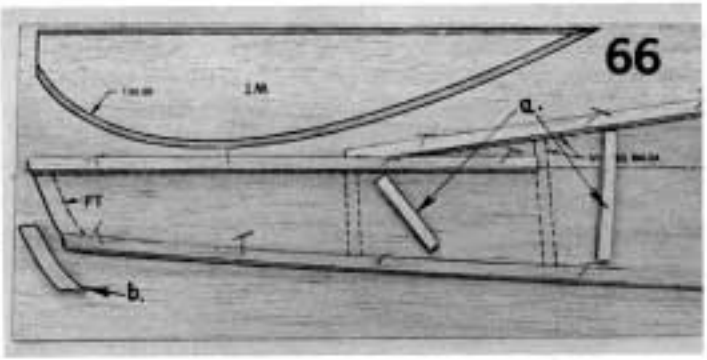
NOTE: If the $^{3}/_{16}$" sq. will not curve into place, soak it in water until it is more pliable. If this still doesn't make it flexible enough, make some razor saw cuts half way through the wood on the inside of the curve.



64. a. A gap is also left between the pieces for F-2.

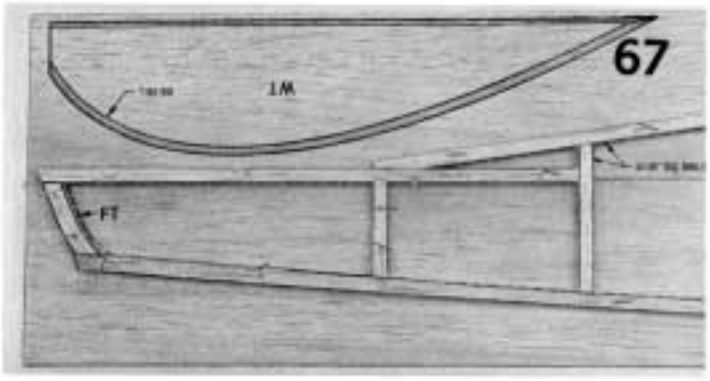


65. a. Continue on back, adding pieces as indicated. b. Leave a gap for F-3.

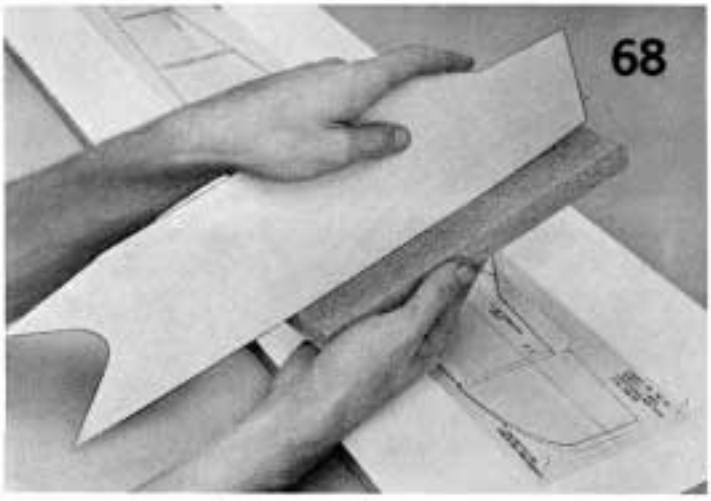


66. a. Cut the pieces a little over-long and finish to exact fit in place with the sanding block. Try for good joints without gaps, they are stronger than trusting the glue to fill the gap. But watch a tight joint so that the glue does not get pushed out of the joint. It is best to have glue on both surfaces to be joined, then wipe away any excess that is forced out. Epoxy glue will fill gaps in an emergency, but remember that epoxy glue does not evaporate as it dries and thus is heavier than glues like Sig Bond.

b. Cut FT out of the printed tail parts sheet.



67. Glue the parts in place.



68. Sand the edges of the $^{1}/_{32}$" die cut plywood fuselage doubler FD wherever required to make it fit onto the fuselage side in between the outside pieces.

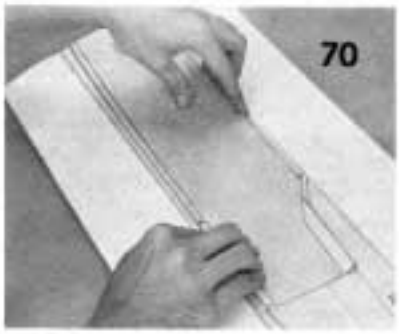
PLYWOOD DOUBLER GLUING NOTES

Do not use Sig Bond, Tite Bond, Elmer's or other water based glues to glue the plywood doubler to the fuselage side. The water will cause the fuselage side and the doubler to curl unless they are heavily weighted with very secure weights and left to completely dry.

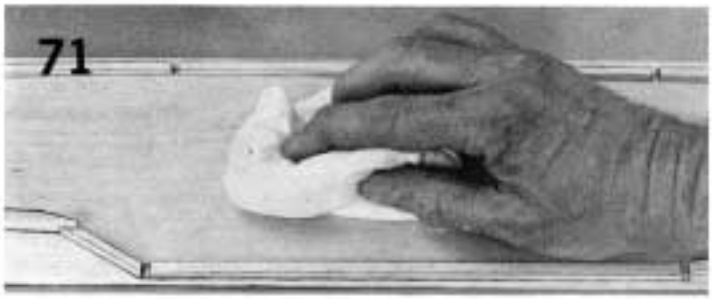
Some builders like to use contact cement for doublers. With this method, the doubler and the fuselage side are each coated with the glue and after drying are pressed together. If this is done, remember that once they touch each other they are permanently joined, so have some pins in place to guide the doubler into exact position as it is lowered. Also, a piece of wax paper between the two parts will keep them from sticking together until you are sure they are accurately positioned, then the paper can be slipped out and the parts pressed together.

The doubler on the prototype was glued on with Sig Kwik-Set epoxy. Cyanoacrylate gap filling or slow-set glues work well on doublers, do not warp and are light weight.

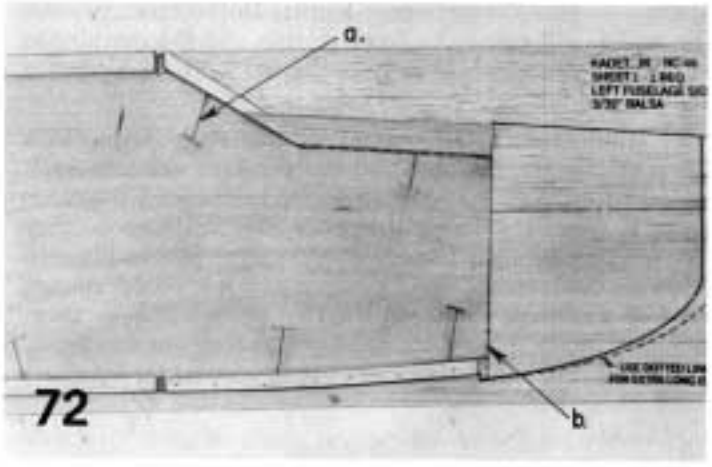
69. Spread a thin film of epoxy on the doubler with a paddle. You must work very quickly or the glue will start to set up before you are finished. Don't use a large amount of glue, it will add weight to the model.



70. Put the doubler on the fuselage side.

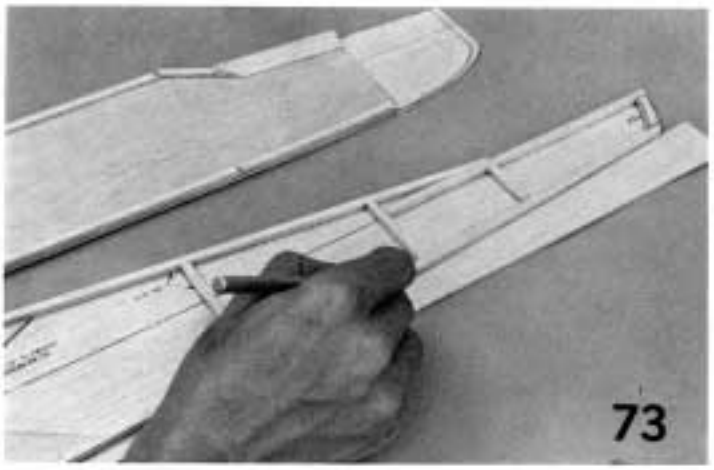


71. Rub down the plywood doubler thoroughly with a rag and continue doing it until the glue has completely set up. Full cure of 5 minute glue takes several hours or more so it is advisable to weight the doublers down for awhile for best results without any curling or warping.

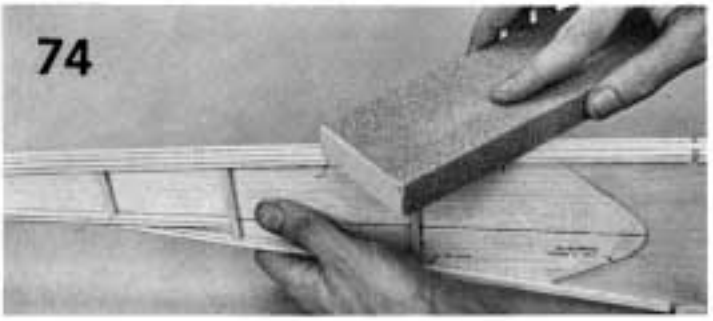


72. a. Pins around the edges can help hold down the doubler during the set up or drying process.

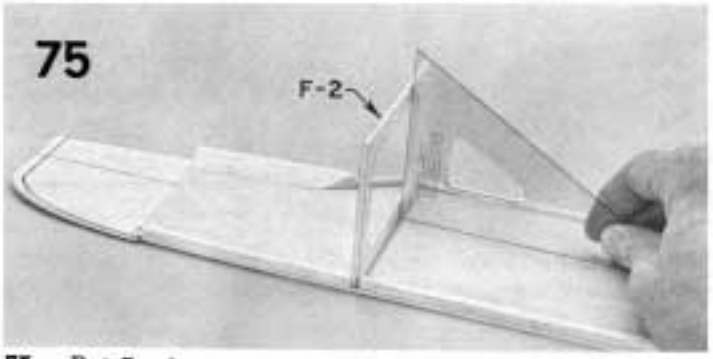
b. Note that the doubler comes all the way forward, covering the firewall position marks, so that the firewall is glued to the doubler when it is added later.



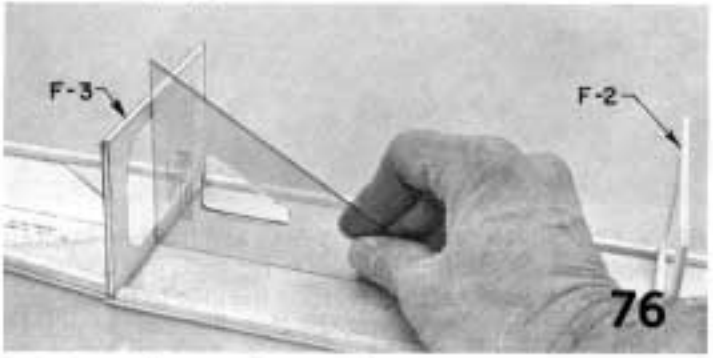
73. Cut the fuselage sides from the sheet with a modeling knife. Don't cut too close, leave a bit for sanding, cutting too close can result in too deep a cut that is harder to fix than taking down the side a little with the sanding block.



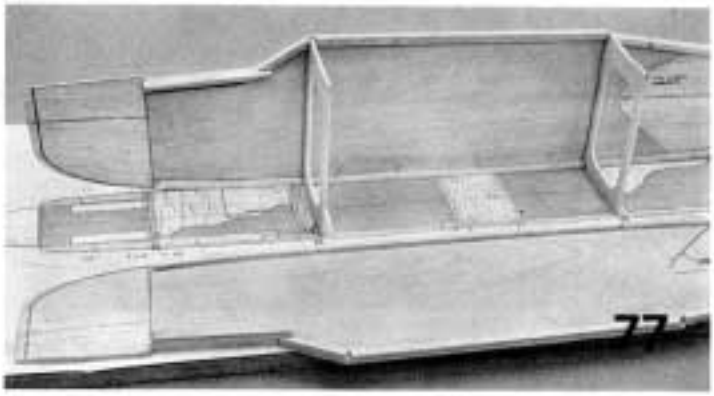
74. Finish the side to exact contour by use of the sanding block. Place the two sides together and match them by sanding as required to make them duplicates.



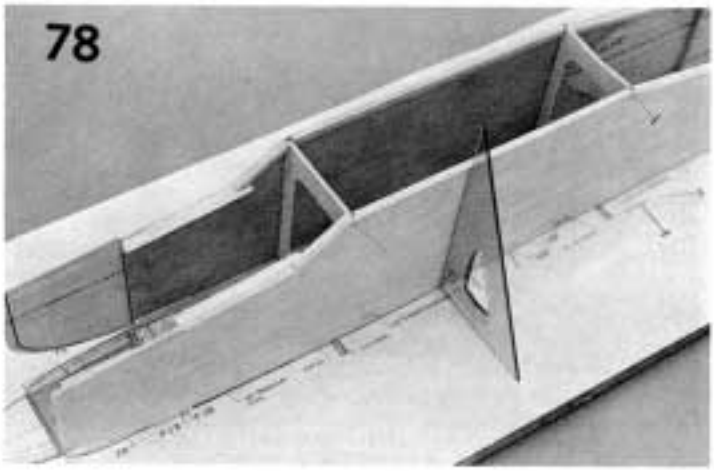
75. Put 5 minute epoxy on F-2 and glue in place. As the glue sets up, use a triangle to get F-2 exactly perpendicular. Other glue can be used if you secure the former in place while it is drying.



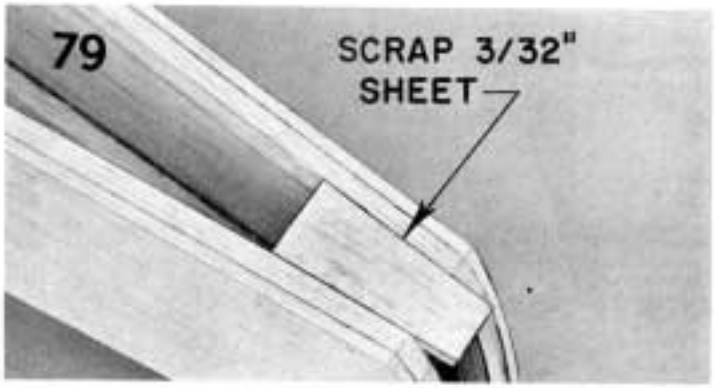
76. Repeat the procedure with F-3.

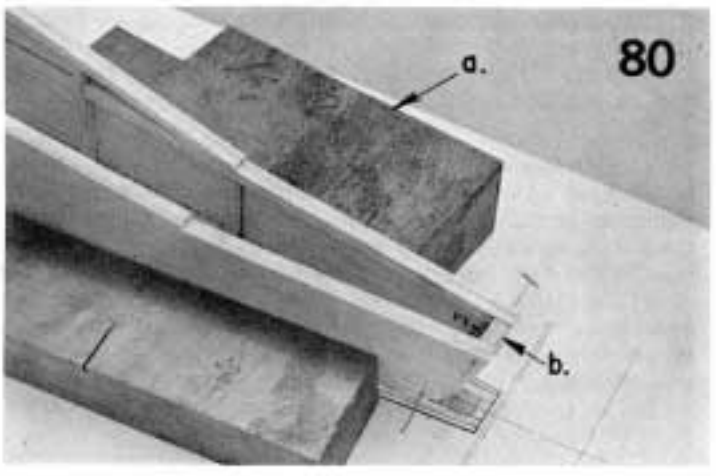


77. Pin the fuselage side to the top view plan along the flat part between F-2 and the back of the landing gear plate.



78. Epoxy glue the remaining side to F-2 and F-3. Pin in place and check for square with a triangle.

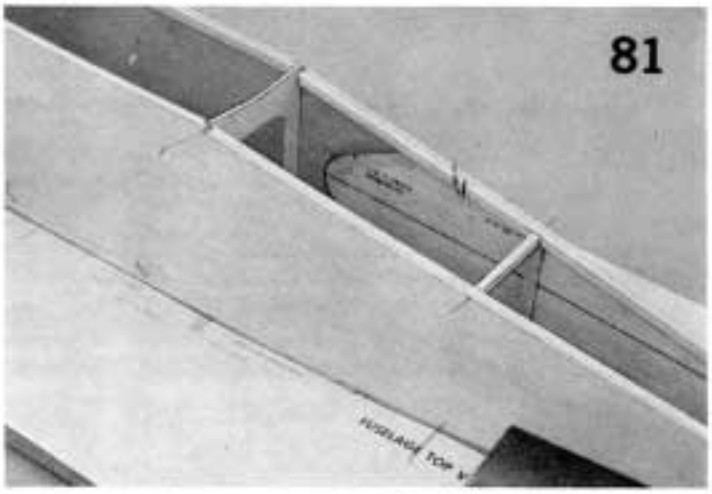




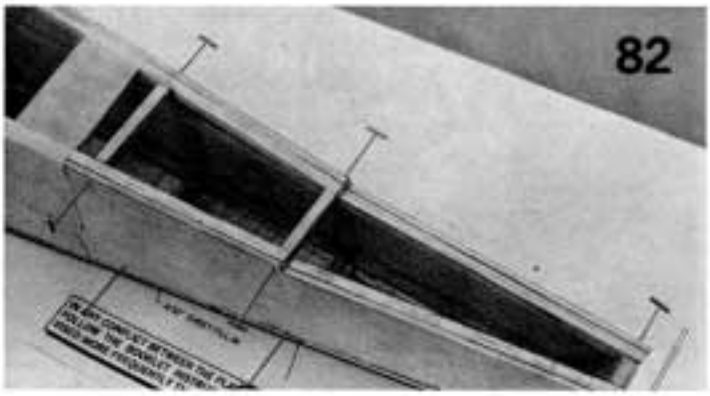
79. The bottom at the rear is joined with a piece of scrap $^{3}/_{32}$" sheet. (It is shown here after being glued in and dry. Don't take up the fuselage from the plan to put this piece in, but fit it in from above before the top crosspiece is put in.)

80. a. Pull the rear end together by using square weights or something similar (pieces of scrap iron shown here) that is perpendicular and yet heavy enough not to move.

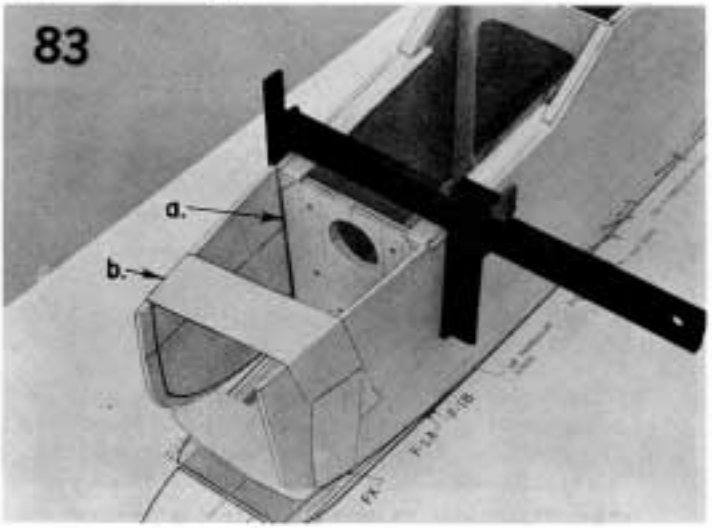
b. Pin and glue the rear cross pieces in place.



81. Pin and glue the remaining rear fuselage cross pieces in place.

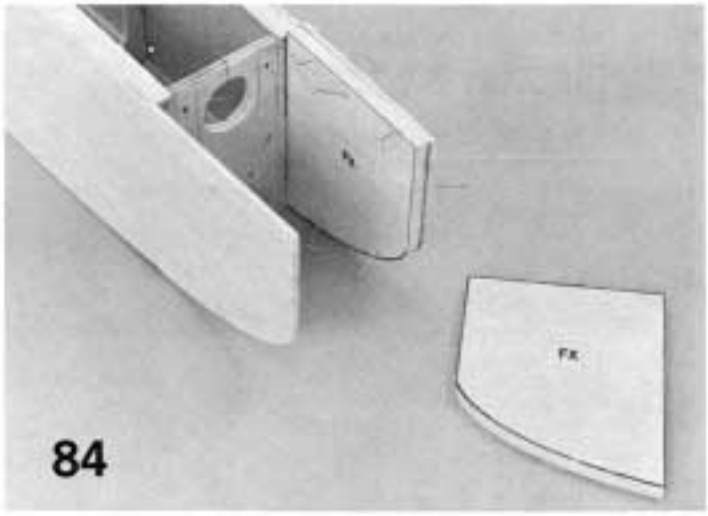


82. Use pins and masking tape to hold the fuselage together until the glue dries.

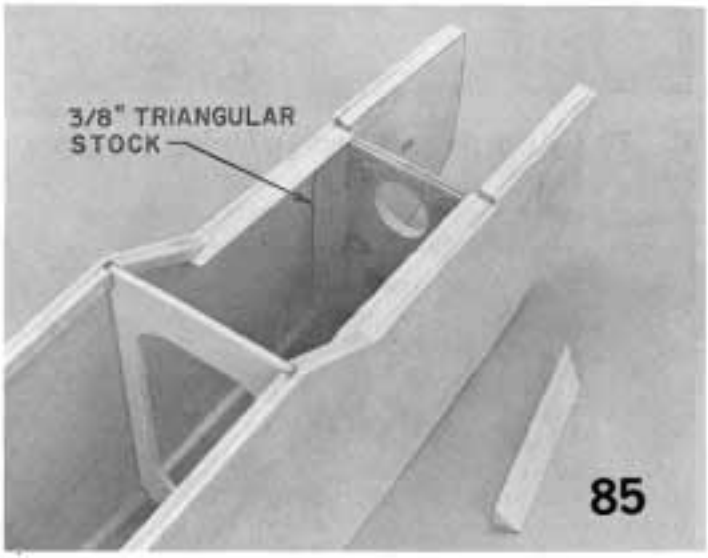


83. a. Put epoxy glue on both sides of the firewall F-1.

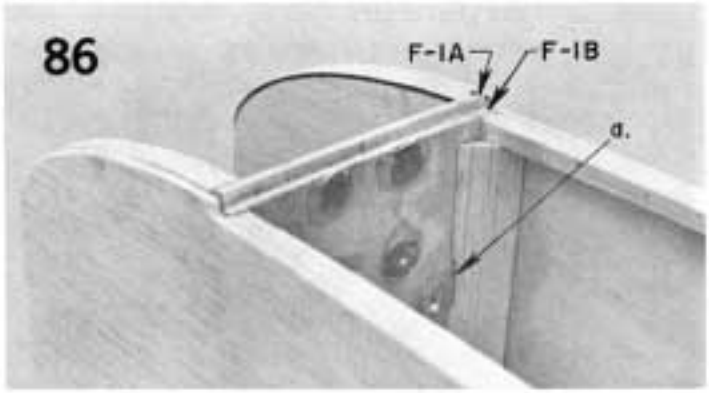
b. Pull the front of the fuselage together to hold the firewall in place and secure with tape, clamps or pins while the glue is setting up.



84. Glue FX pieces to the inside of the nose.

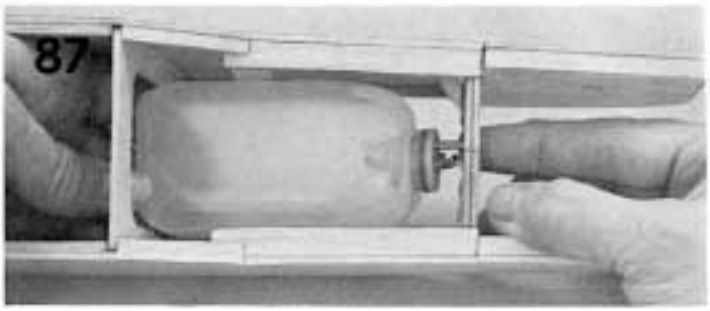


85. Cut pieces of $^{3}/_{8}$" triangular stock to fit as rear firewall braces.

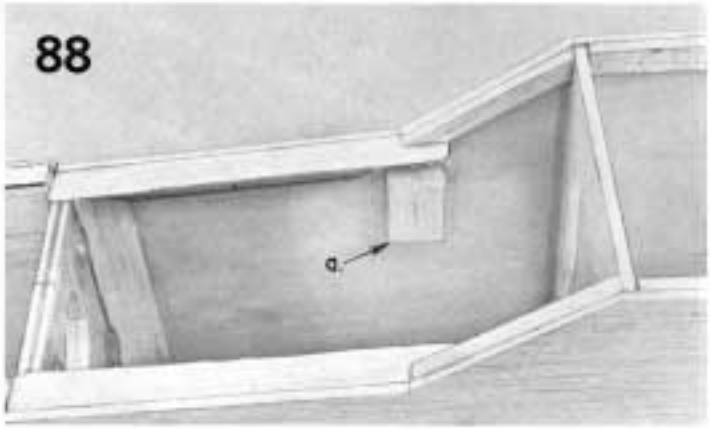


86. a. The triangular stock may need to be notched a bit to fit over the blind nut glue and sanded a bit to fit in the less than 90 degree corner. Epoxy glue is best for firewall braces.

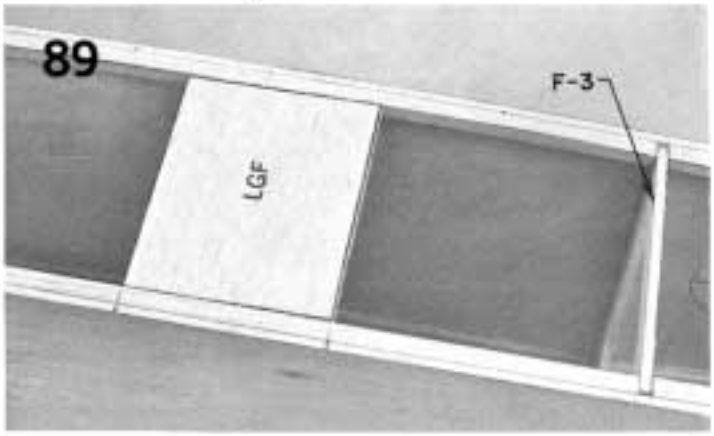
READ "TIPS ON TANKS" BEFORE PROCEEDING.



87. Practice passing the assembled tank through F-2 and make sure that it can be passed in and out of the fuselage nose after the fuselage is closed up. If there is any problem that hinders easy insertion and removal of the tank, fix it now while access to the nose is easy.



88. a. Place small blocks on each side of the fuselage to hold the tank centered. Don't get the blocks too tight, just enough to keep the tank from rattling around and yet release the tank easily for removal when needed.



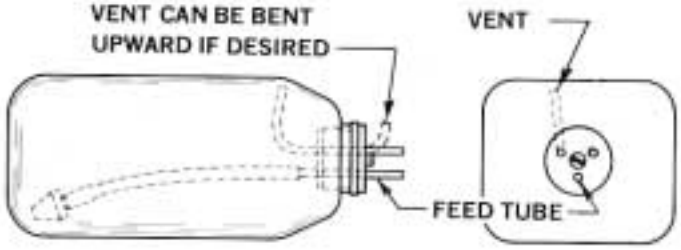
89. Glue LGF between the fuselage sides on the bottom in the position indicated in the plan fuselage top view.

USE ENOUGH GLUE!

Instant glues assemble a framework quickly but may not be good enough to withstand engine vibration if improperly used. Thin cyanoacrylate should only be applied to perfectly fitted joints, otherwise use gap-filling types. If you assemble with instant glue, we think it is a good idea to go over the framework with a normal slow dry glue like Sig-Bond and fillet all of the joints on the outside. One mistake often made is inadequate amounts of glue on large mating surfaces to completely cover them when the parts are joined. A structure does not have full strength unless all of the parts are glued to each other. For example, the wing spar webs must not just be glued to the spars but the outside wing sheeting must be glued to the ends of the webs as well as to the spars.

TIPS ON TANKS

Assemble the tank hardware as shown.



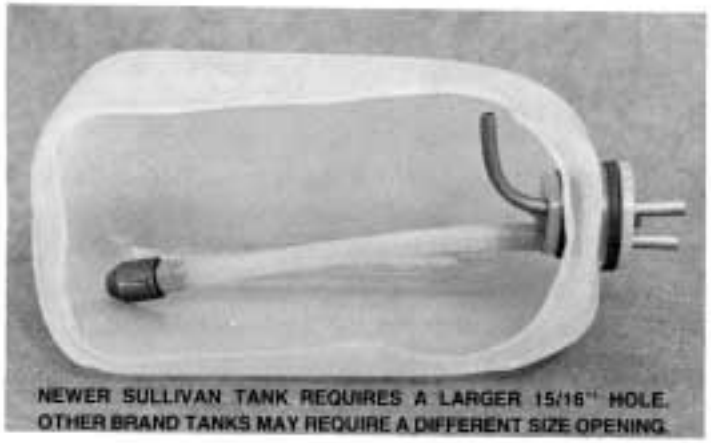
We occasionally receive suggestions from builders that a removable hatch be designed into a model for access to the gas tank. Our opinion is this is not the best method in most cases. The hatch opening makes the nose weaker and there is no good way to keep oil from leaking in around the hatch. A method of fastening has to be built into the fuselage to hold a hatch in place.

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. Check the models at a contest --- you'll find that the majority have sealed noses, as does this kit.

READ THIS BEFORE YOU DRILL THE 7/8" FIREWALL HOLE

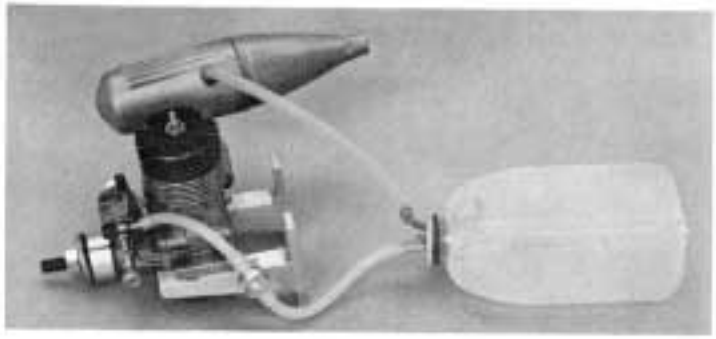
Some fliers prefer not to bring the tank cap through the firewall as is shown in the construction sequence in this book. Instead they drill two holes for the vent tubes only and make the vent tubes long enough to extend through the firewall. This method requires little sealing but it is more difficult to install and remove the tank. The best way to manage this is to feed long pieces of fuel line through the holes and attach them to the tank in the cabin area. Steer the tank into the nose as the tubes are pulled back through the holes. If you are undecided as to which method you should use, my advice is that the large hole installation shown in the construction pictures is the best for beginners.

Put scrap wood supports under and at the back of the tank. The front is supported by the 7/8" hole in the firewall. Seal the tank cap in the hole with G.E. Silicone Bathtub Seal (available at hardware stores) or Devcon Seal-It (see Sig catalog). Put an oil-proof finish on the firewall and in hole before sealing the tank cap. Get some of the sealer on the sides of the hole and also put a bead over the edge of the cap on the front. Should you need to remove the tank, break out the scrap wood supports in the rear and push out the silicone rubber seal around the front cap. Reach into the fuselage and guide the tank outside.


NEWER SULLIVAN TANK REQUIRES A LARGER 15/16" HOLE. OTHER BRAND TANKS MAY REQUIRE A DIFFERENT SIZE OPENING.

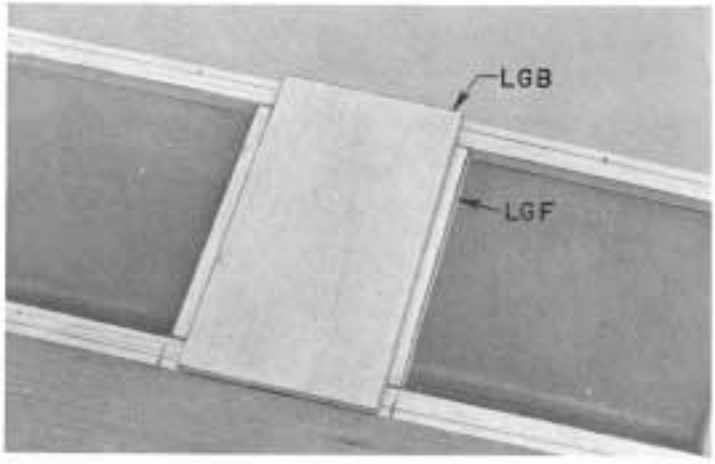
Some builders, after putting their receiver battery in a plastic sack, taping it shut, wrapping it in a foam rubber package and stuffing it into the nose under the tank, then stuff paper toweling or foam rubber in to fill the nose compartment and keep everything firmly in place.

After installation, put fuel tubing on the vent tube and run it to the outside of the cowling on the bottom, so that fuel overflow is not blown over the wing-fuselage joint, where it may leak into the fuselage. The best way to fill the tank is to take off the fuel line to the needle valve and pump the fuel in there until it runs out the vent. Be sure and use a filter on your fuel supply can, and it is a good idea to have a filter between the tank and needle valve also.

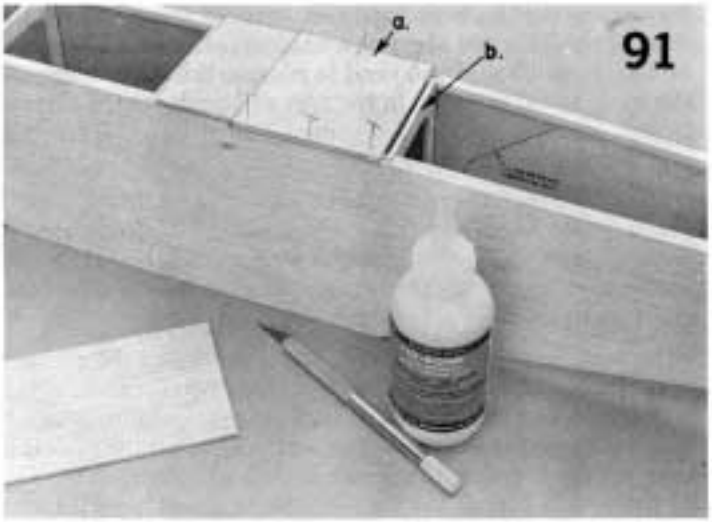


PRESSURE FEED

If the engine you are using is equipped with a muffler pressure tap, make use of it for more even fuel feed and reliable operation. The hookup for pressure is shown in the picture. To fill the tank, remove fuel line from the needle valve on the engine and pump the fuel in. When the tank is full, it will overflow through the muffler pressure line. Use transparent or translucent fuel line so you can see the fuel starting to overflow when the tank is full. Should some fuel happen to get in the muffler, drain it out before starting the engine. Do not try to fill the tank in reverse from the pressure line, the tank will not fill properly and fuel may be forced into the engine.



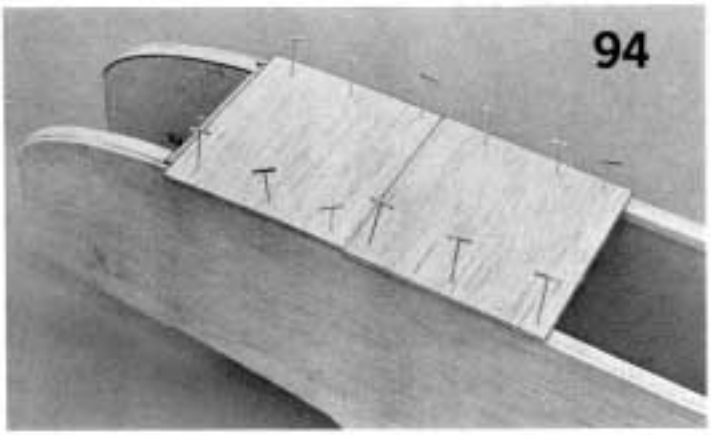
90. Glue the sawn plywood piece LGB to the bottom of the fuselage on top of LGF.



91. a. Cut pieces of $^3/_{32}$" sheet for the fuselage bottom.

b. Glue a piece of $^3/_{16}$" x $^3/_8$" balsa here in the same manner as shown behind F-2 in picture 93.

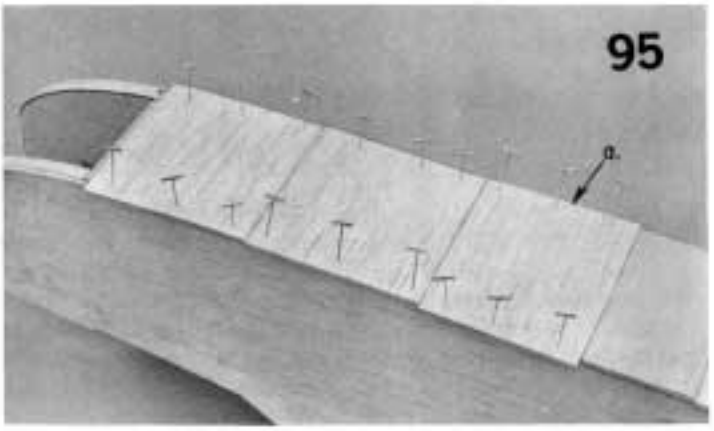
92. Cover the rest of the fuselage rear bottom with $^3/_{32}$" cross grained pieces.



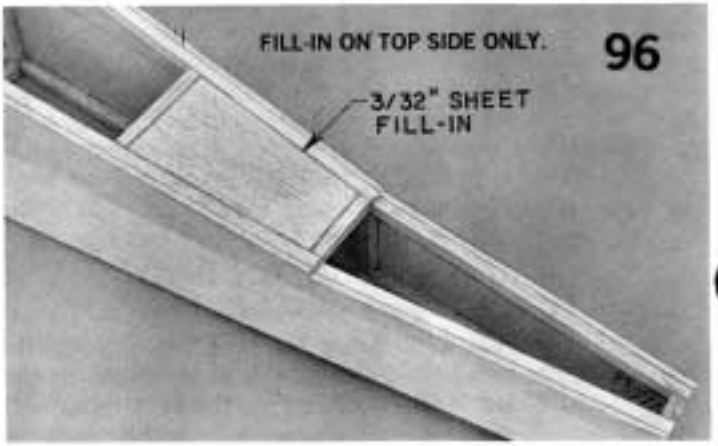
93. a. Glue a piece of $^3/_{16}$" x $^3/_8$" balsa behind F-2.

b. Glue a piece of $^3/_{16}$" x $^3/_8$" balsa behind F-1.

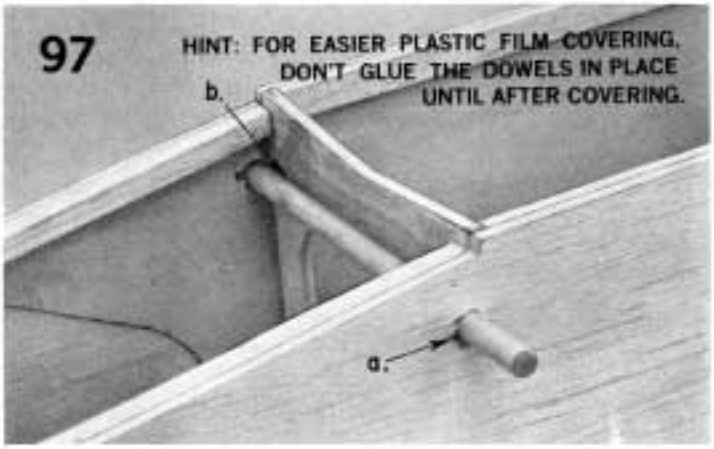
94. Sheet the front bottom with pieces of $^3/_{32}$" balsa.



95. a. Complete the bottom front planking by cutting a piece to fit between LGB and the last full 3" wide piece.



96. Cut a piece of $^3/_{32}$" sheet balsa to fit down into the fuselage top just ahead of the stabilizer mounting. Glue in place.



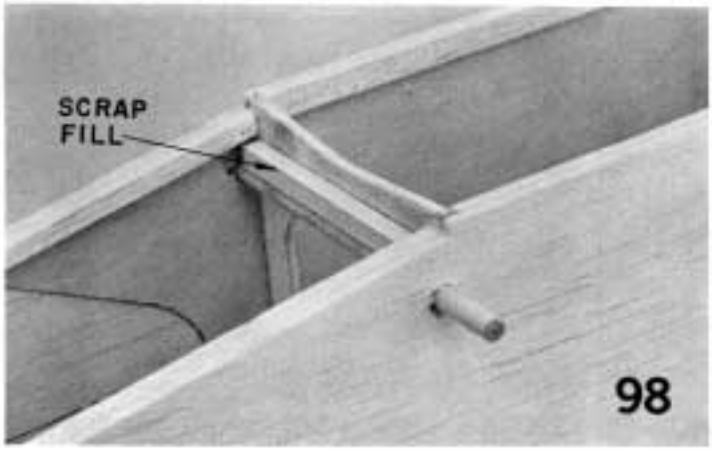
97. a. Drill out the holes for the rear $^3/_{16}$" dowel through the ply doubler.

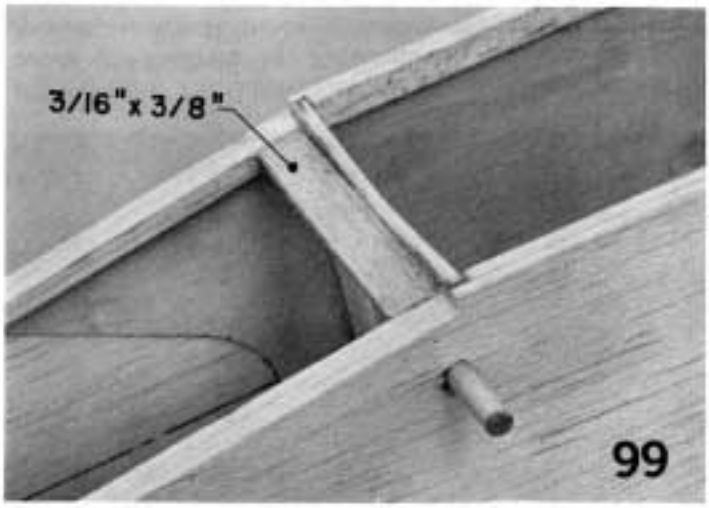
b. Glue the dowel in place against the back of F-3.

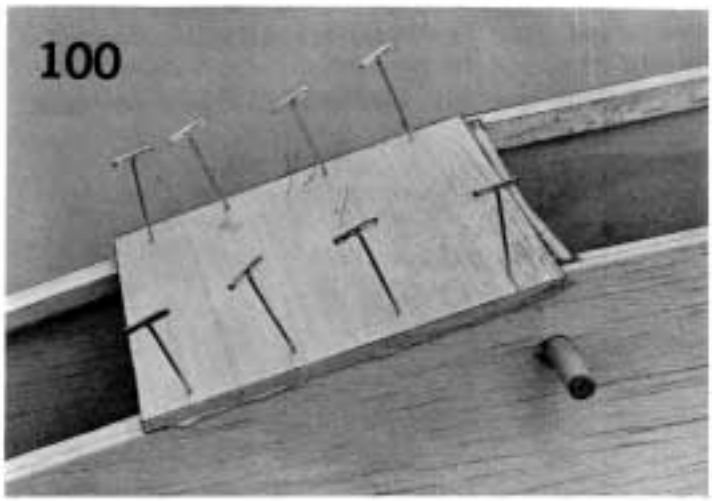
98. Add a piece of scrap to fill above the dowel.

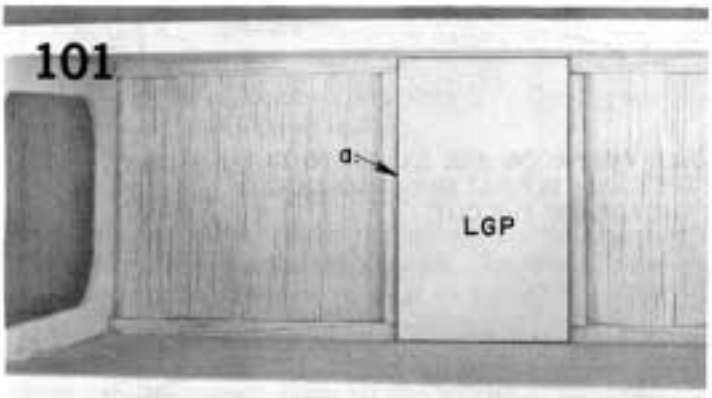
99. Glue a piece of $^3/_{16}$" x $^3/_8$" between the fuselage sides above the dowel position.

100. Sheet the top of the fuselage rear in the same manner as the bottom was done.

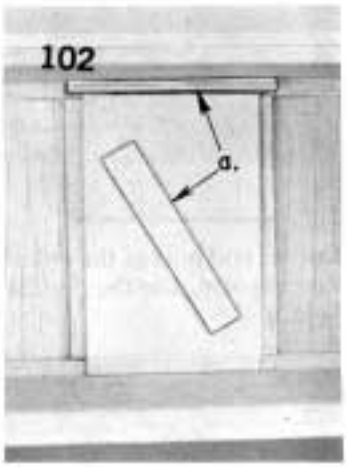








101. a. Glue sawn plywood piece LGP inside the fuselage on LGF.

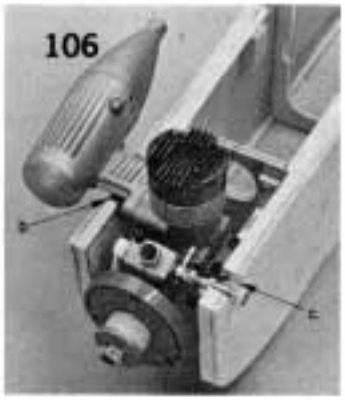


102. a. Use some scrap plywood to glue a brace on each side of LGP to tie it to the plywood doubler.

103. Hold the landing gear in position on the bottom of the fuselage and drill $^{7}/_{64}$" holes through LGB on into the fuselage interior.

104. Use a long $^{5}/_{32}$" drill or a piece of $^{5}/_{32}$" music wire to enlarge the holes on the inside to accept the shanks of the blind nuts.

105. Bolt the landing gear in place and pull the blind nuts into the wood, using epoxy glue to hold them in place.

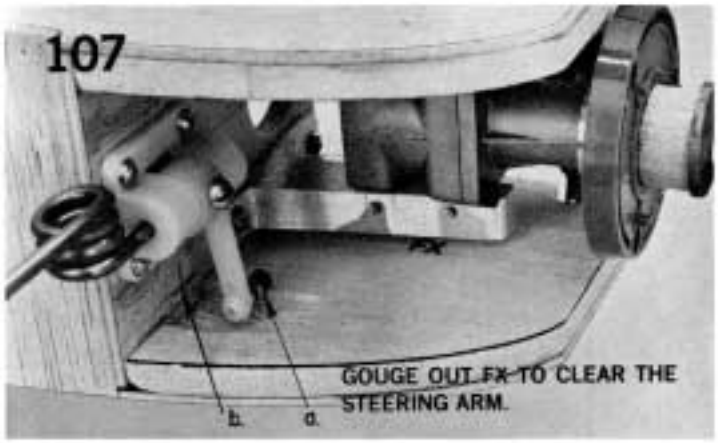


106. a. Bolt the motor on the mounts.

b. Cut the fuselage out as required to pass the muffler.

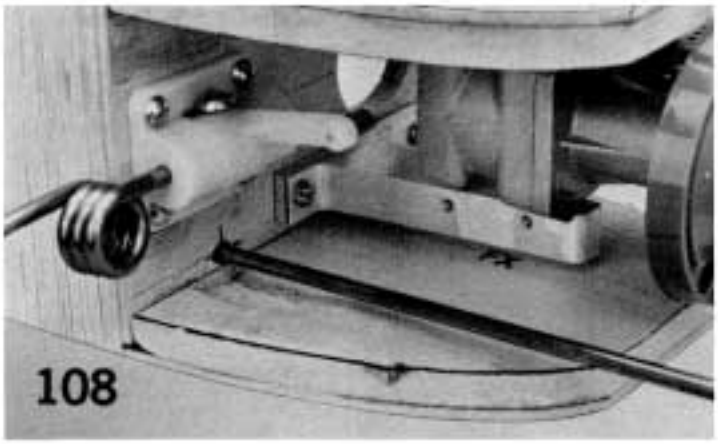
c. Cut out the fuselage as required for the needle valve.

Cut off end hole of the nylon steering arm. Use the middle hole.



107. a. Bolt the nose gear in place with the cable attachment fitting on the steering arm.

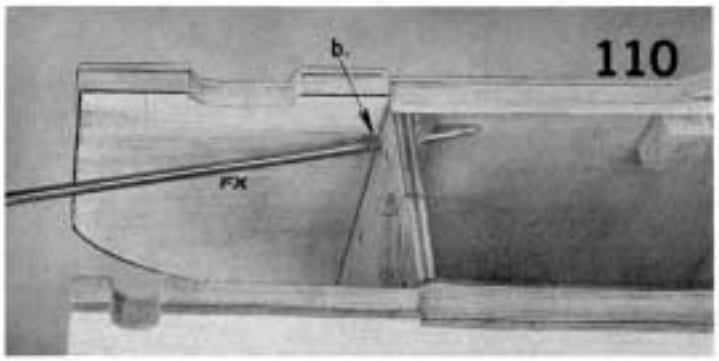
b. Mark the best spot on the firewall for the pushrod to exit and hit the fitting. (The steering arm must be angled forward so when the servo pulls it back for a turn, it will clear the firewall. So remember that the arm moves farther out than it does in and pick the center of the movement for gauging the exit hole.)



108. With a long drill or a piece of music wire (put a point on it and a notch) drill out the firewall on the mark.

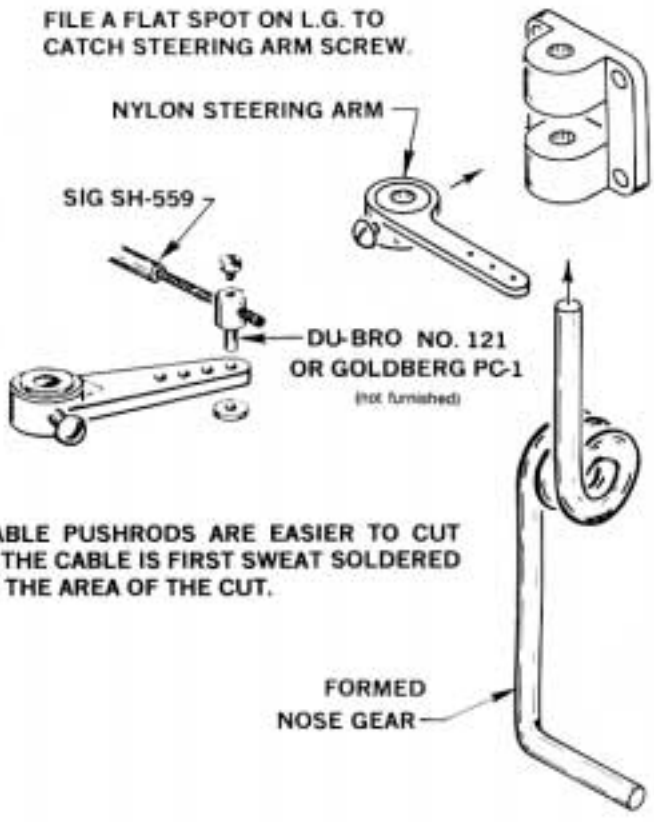
109. Drill on through the fuselage with the drill or wire at the approximate angle to carry the pushrod cable to the servo. (Look ahead a little in the book if you are uncertain and place your servos in the fuselage at the approximate place they will be so you will have a better idea of what you are shooting at.) Placement is not very critical --- the approximate location is shown on the plan. Be sure and leave enough space ahead of them to get the tank in and out.

There are some other types of mounts that also put the receiver in the removable unit, you might want to use them. If the rails to hold this type will permit, access to the tank could be obtained by removing the mount, and space allowance in front would not be necessary.



110. a. Place the motor on the mounts and locate the proper place for exit of the throttle pushrod so it will be directed at the throttle arm on the carburetor.

b. Drill out the hole for the pushrod cable.



PREPARING CABLE PUSHRODS

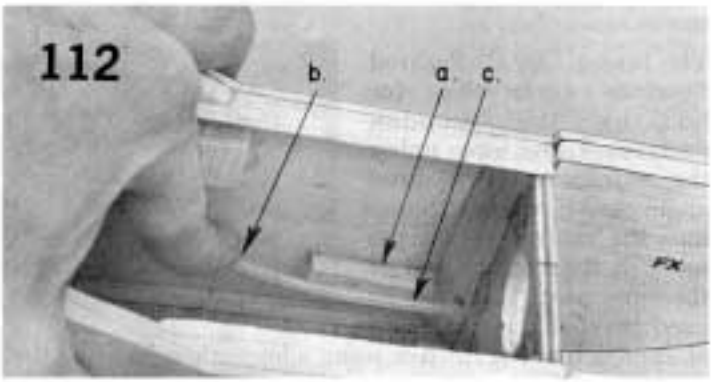
To keep ends of the cable from unraveling during handling, tin the end with solder. Use a non-corrosive paste flux (shown here is Kester, available at hardware stores) and rosin core solder. Have a hot iron and flow the solder completely through the cable.

Grind or file the end smooth. Bring it to a point so that it will easily insert into the pushrod fittings.

After the proper length is arrived at, sweat solder the area to be cut so that it will not fray and unravel while being cut. It can be cut with a good pair of side-cutting pliers, filed in two, ground through on the edge of a grinding tool, or cut with a silicon cutting wheel on a motor tool.

c. Look ahead in the book and you can see the rest of the path through the tank block and F-2 for this pushrod.

111. Put the nosewheel pushrod tubing in place and use the cable to locate it in relation to the steering arm. Do not glue the pushrod tubing to the firewall yet.



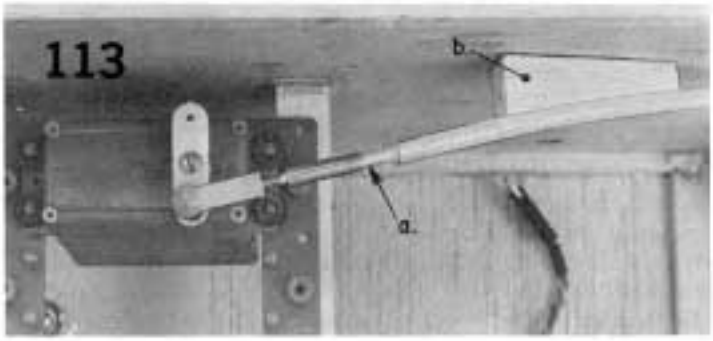
112. a. Cut a scrap block to serve as a standoff for the tubing inside the fuselage just behind the nosewheel.

b. Push the cable down into place for a flowing curve to the next hold down point in F-2.

c. While holding it in place, glue the tubing to the block with 5 minute epoxy and allow it to set up.

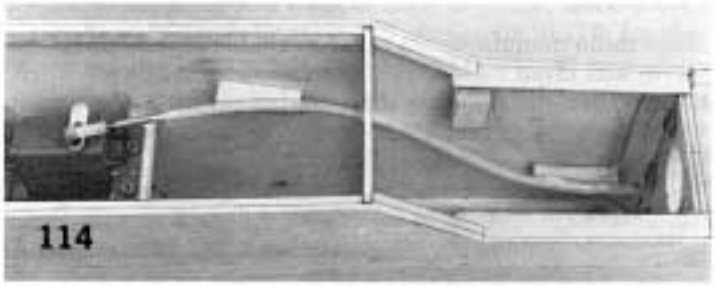
d. Now you may return to the front and glue the end of the tubing in the hole in the firewall. Plug the hole around the tubing completely with glue so it will not leak oil.

113. a. At the servo end of the pushrod, use a round toothpick to temporarily line up the tubing with the servo fitting so the correct angle for the tubing to approach the servo will be established.

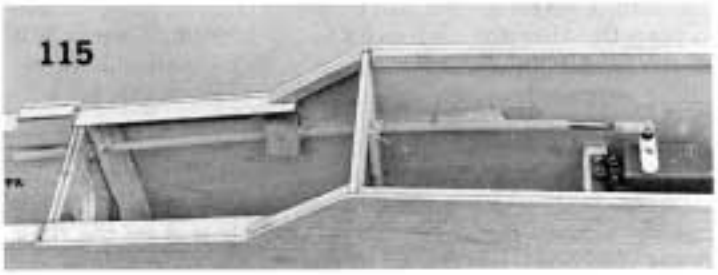


b. Put a scrap standoff block on the fuselage side to hold it in the proper position.

(Note: For purposes of installation, the tubing shown here was left a little overlong. It will have to be cut off a bit afterward to allow the full back and forth movement of the attachment fitting to the servo.)

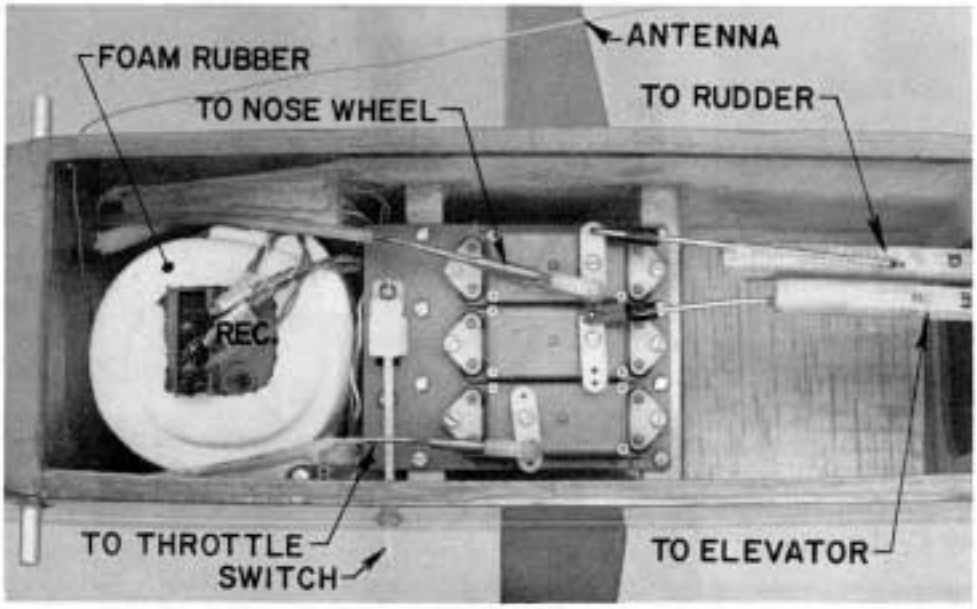


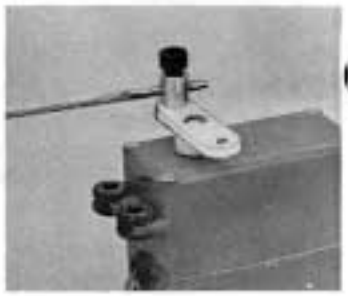
114. This is the pushrod completely installed.



115. The motor control pushrod is installed in the same manner.

FOR MORE INFORMATION ON SERVOS AND PUSHRODS, READ THE SECTION ON PAGE 22.





The Goldberg PC-1 or similar DuBro 121 are handy for cable end attachment, as on the nosewheel steering arm, but can also be used on servos as shown. They are easily adjustable by loosening the screw and sliding the cable.

THE INS AND OUTS, UPS AND DOWNS OF SERVOS ----- OR: WHICH WAY DID THEY GO?

Life is not simple in the model game when it comes to pushrod installation. Most servos are standardized as to which direction they move in response to a particular transmitter stick movement but there are exceptions. Regardless of the direction of movement of the servo, you can adapt to it by moving the pushrod to whichever side of the servo output arm or wheel will give you the pushrod movement direction desired. Sometimes this requires that a pushrod brought down the side of the fuselage has to cross-over to the inside of the servo output arm to get the desired direction of pushrod movement. You can see an example of a cross-over on the standard rudder servo in the radio installation pictures of the Kadet Junior prototype No. 1 shown here.

Some radio manufacturers make available reverse direction servos and often include one or more in an outfit for situations where the opposite direction of pushrod movement without changing servo sides is desired. If a reverse direction servo had been used for the rudder in the Kadet Junior No. 1 installation, the nosewheel steering cable would not have had to cross-over to the inside. It would have been on the outside where only a small bend would have been necessary in the angle of the cable to reach the servo. The rudder pushrod would be on the inside where there is plenty of room to maneuver it around. Several companies make reversing converters that can be plugged into a servo cord to reverse the direction of movement of a standard servo. But if you do not have a reverse servo it is quite possible to get along without it as can be seen in examples in this book.

WHICH SIDE FOR THE RUDDER PUSHROD?

The choice of which side of the fuselage the rudder pushrod will exit from is determined by the position of the throttle control arm on the engine to be used. If it is on the right (most common), use the servo nearest the right side of the fuselage for motor control. Use the servo nearest the left side of the fuselage for the rudder, with the rudder pushrod coming out to the left side of the rudder and the nosewheel steering arm hooked up on the left side of the nose gear bearing. This setup is shown in the step-by-step construction pictures in this booklet applying to the Fuji .19 used on the 3rd prototype.

The 1st prototype Kadet Junior, as shown on the cover of this booklet and the box label, was powered by a K & B .19 which has the throttle control arm on the left. (Fox engines also have their control arm on the left.) So the installation for this K & B .19 model is a mirror image of the one shown in the step-by-step photos with a Fuji .19.

As you can see, it is best to know in advance the radio and motor brand you will be using before you install permanent cable pushrods.

NOTE: The full size plan shows K & B .19 in the nose but the rudder pushrod is shown exiting on the left as would be the case for a Fuji .19 or other right throttle arm engines.

SERVO HOOKER-UPPERS

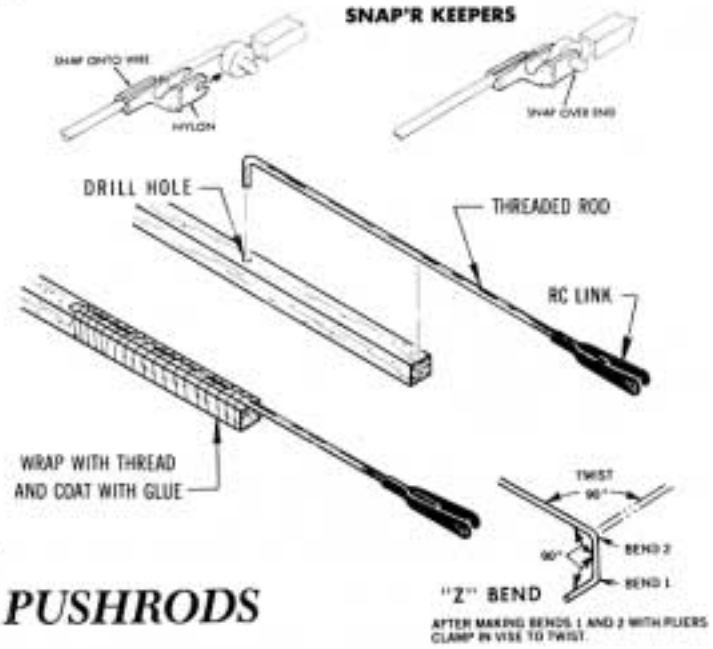
Having the proper connector makes servo installation much easier. We show here a variety of ways to attach pushrods to servos.

The Rocket City 07 Pushrod Retainer works okay for hooking the wooden pushrods to the servo unless the movement or pushrod angle chosen makes it bump into the center post of the servo at the extreme end of the movement. (This can be fixed by changing the angle of approach to the servo or using a longer arm to bring the retainer out farther away from the center post of the servo. This retainer is very easy to attach and detach.

Du Bro Ball Links, which come in several different types --- threaded, bolt-on, rivet, etc. --- gets the pushrod action up above the control arm so the pushrod can approach from a variety of angles without any chance of interfering with the servo center post. It is good for cable pushrods. A fine adjustment can be made by screwing the end in or out.

The Sig SH-184 or Goldberg Snap'R Keeper can be installed on a wire pushrod after it is bent, due to the design of the body of the fitting.

You should decide on which type of fittings you will use in the case of the cable pushrods and have them on hand during construction because the type chosen will affect the location of the pushrod exit holes through the firewall, etc. The balsa pushrods to the rudder and elevator are not limited as to location and can be adapted to any of the types of connectors shown without preliminary planning of exact position.



PUSHRODS

R/C LINK CLEVIS MAY BE FURNISHED IN NYLON OR METAL.

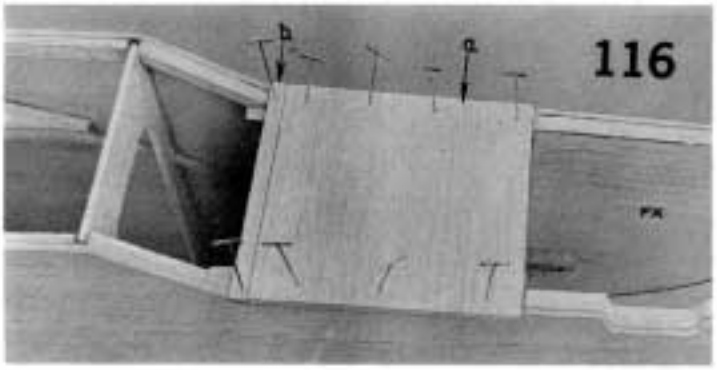
MAKE CONTROL SURFACE ENDS OF PUSHROD FIRST, FEED THROUGH FUSELAGE, HOOK RC LINK TO SURFACE, CUT SERVO END OF BALSA TO EXACT LENGTH NEEDED, MEASURE AND INSTALL SERVO CONNECTING WIRE END.

MAKE THE BALSA PUSHRODS THE LENGTH SHOWN ON THE PLAN. DO NOT SHORTEN THE WOOD AND SUBSTITUTE WIRE TO MAKE UP THE LENGTH. DO NOT PUT LONGER LENGTHS OF WIRE ON THE PUSHRODS THAN SHOWN ON THE PLAN.

Some of the variety of detachable pushrod retainers for securing the pushrod wires to the servo that are available are shown here. Or you can make a "Z" bend in the end of the wires to go into the servo. When a "Z" bend is used, the pushrod must be put onto the servo outside of the fuselage and then threaded through the fuselage, which is more difficult to manage than the pushrod alone, as is the case when a retainer fitting is used.

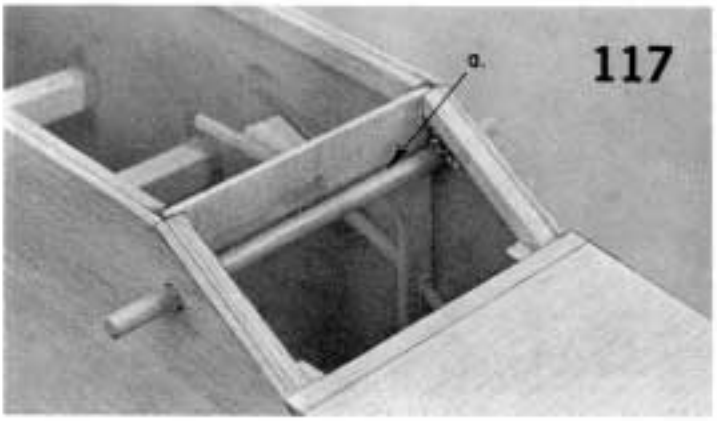
¼" square balsa sticks are provided to make the fuselage pushrods that run to the elevator and rudder. Bind the fittings to each end with heavy thread and epoxy glue. Use threaded rods with RC links at the tail end of the pushrods so that trimming adjustments can be quickly made. Straight pieces of $^{1}/_{16}$" diameter wire are provided for the other end of the pushrods to allow hookup with the servo arm.

BEFORE PROCEEDING, READ THE NOTES ON THE FULL SIZE PLAN ABOUT THE CABIN AND DECIDE WHICH VERSION YOU WANT TO BUILD.



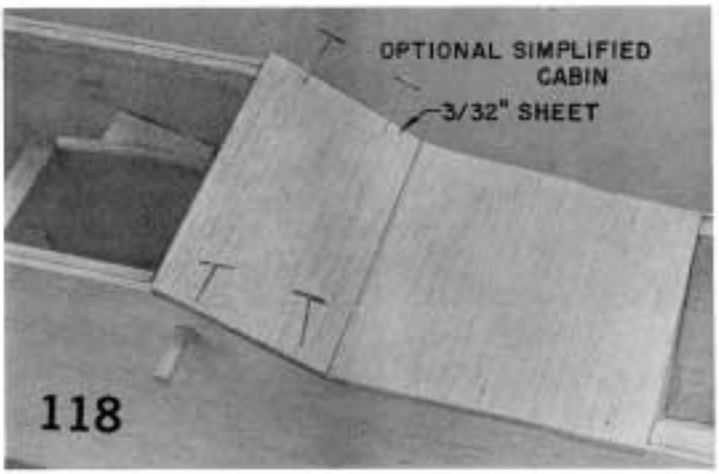
116. a. Glue a piece of $^{3}/_{32}$" x 3" sheet on the nose.

b. It takes a small scrap to complete the planking to the fuselage face. Bevel the edge so it will seat against the fuselage.



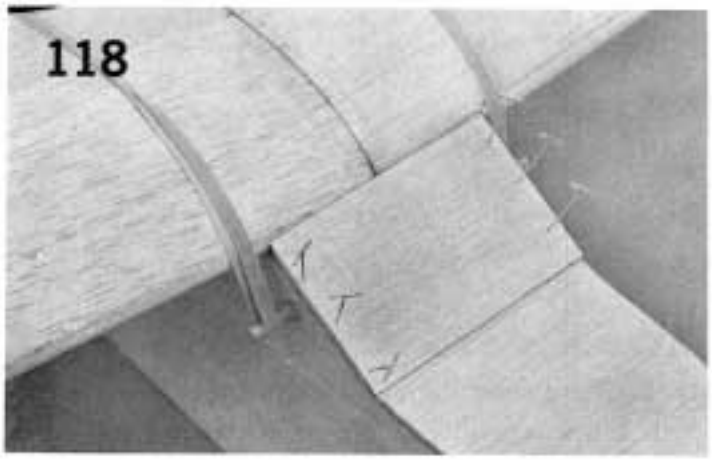
117. a. Install the front $^{3}/_{16}$" dowel. Glue it to the face of F-2 as well as to the fuselage sides.

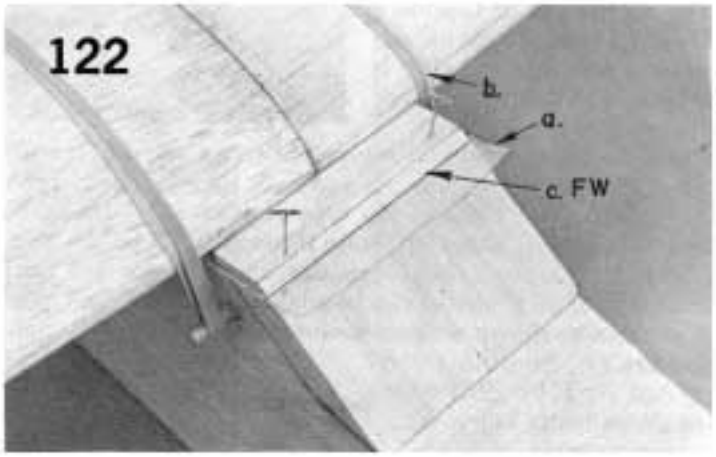
(Note: Refer to the plan and read about the optional simplified cabin. If you want to do it this way, use the next two pictures. Otherwise, skip 118. and go on to 119. for the rounded windshield shape used on the prototype.)

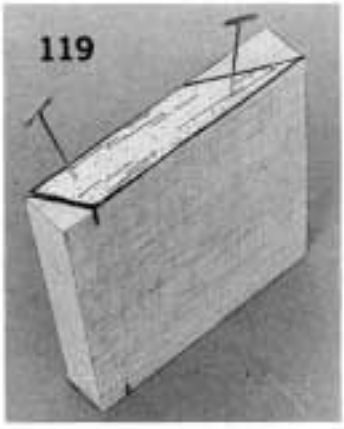


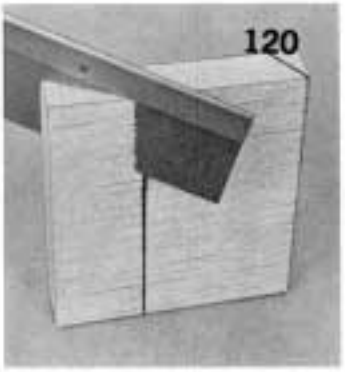
118. Optional Simplified Cabin. Put the wing in place and glue the piece of $^{3}/_{32}$" sheet planking to the front of the fuselage.

(Hint: A good seal at the joint between the fuselage and wing can be had by covering the leading edge of the wing with plastic wrap or wax paper and filling the joint with Sig Epoxolite or Sig Kwik-Set Epoxy mixed with microballoons or talcum powder to make it into a putty.



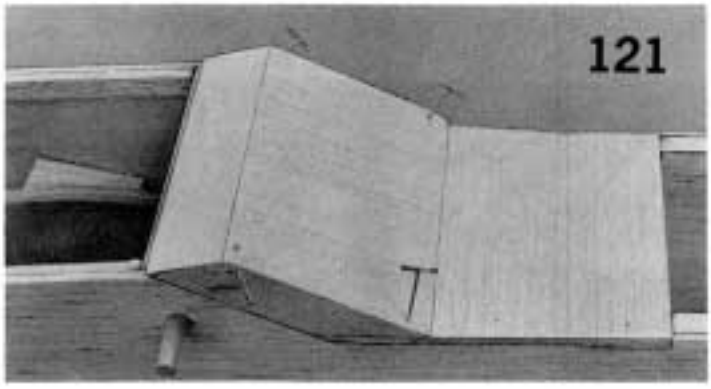






119. Cut the windshield block pattern from the fuselage sideview (or trace it, if you want to save the plan), pin and trace it onto the ½" x 3 ¼" x 3" windshield block.

120. Cut or saw the windshield block FZ to shape. Finish it with a sanding block while fitting to the fuselage.



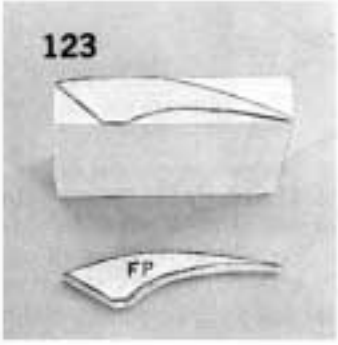
121. Glue the windshield block to the fuselage.

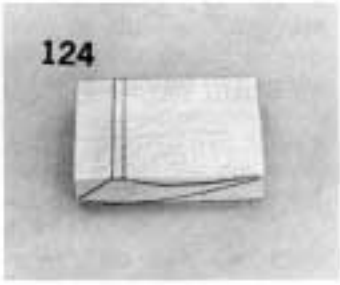
122. a. Put a piece of wax paper on top of the windshield block and the front part of the fuselage.

b. Strap the wing in place with rubber bands.

c. Pin and glue piece FW in place on the front of the wing. (Pattern is on Page 31.)

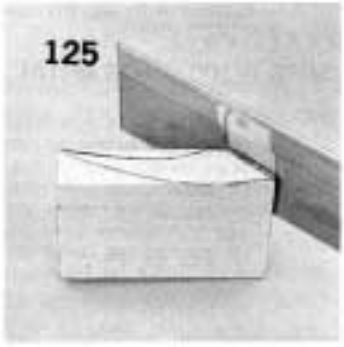
(Note: The first printing of the full size plan shows FW as a plywood piece called FP. Plywood was found impractical for carving and shaping and not necessary for strength ---there is no load on it. FW is cut from $^{3}/_{32}$" balsa using the pattern. FP will now be the part seen in picture 123.

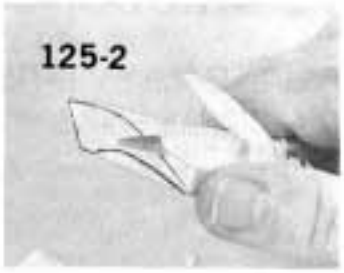




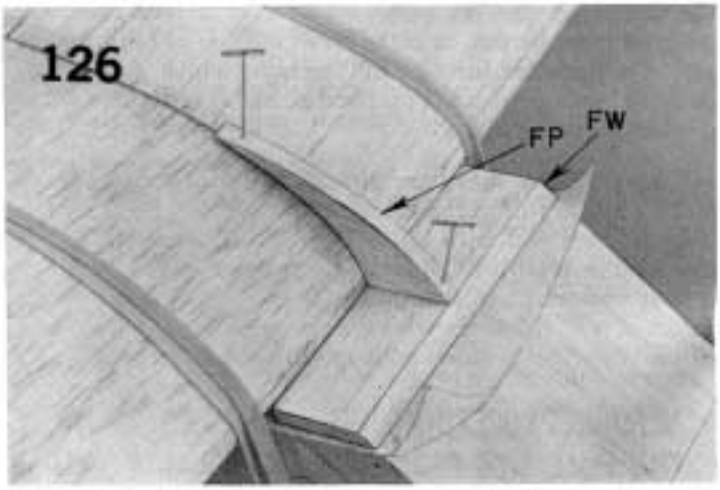
123. Cut out FP and also trace the pattern on the two ½" x 1 ½" x 2 ¼" wing-cabin fairing blocks.

124. Put the pattern on both sides of the blocks and connect them.

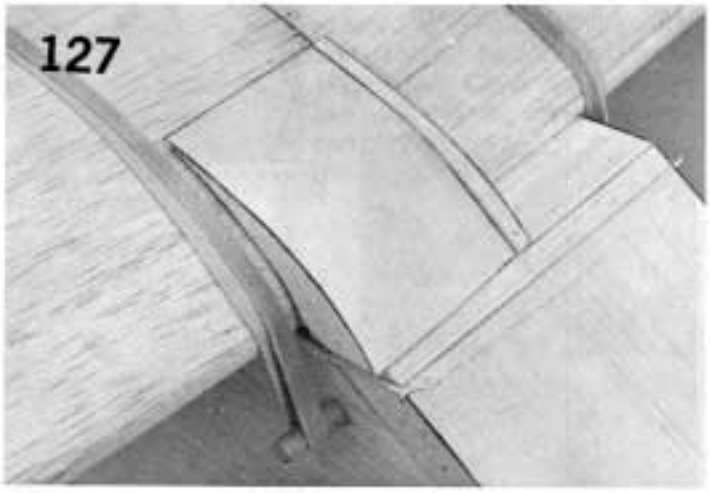




125. Roughly cut the block to shape.



126. Glue FP in place on the wing and to FW.

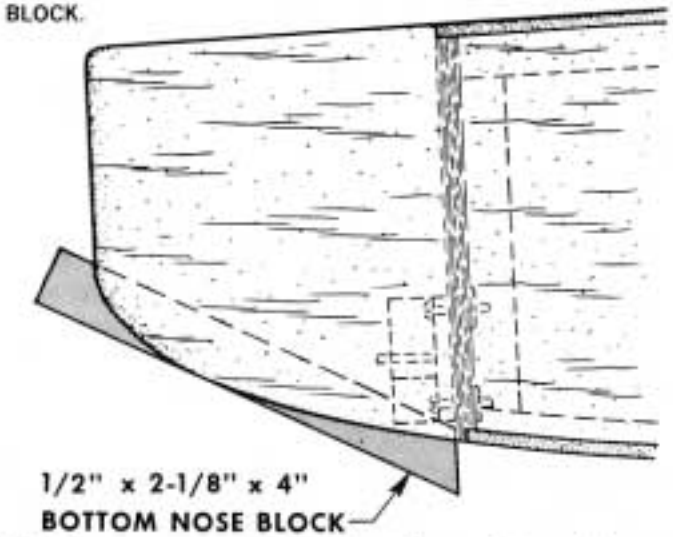


127. Fit the rough cut wing-cabin fairing blocks into place.

128. Trim them to a rounded shape.

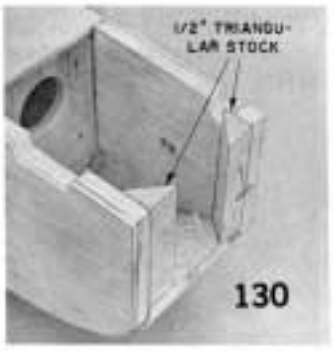
(Optional Simplified Nose: Beginners at building and carving and those who want to speed along to completion can omit the bottom block and leave the bottom of the cowl open. This doesn't look as neat, but saves time and makes access to the firewall bolts and landing gear steering adjustment a little easier.)

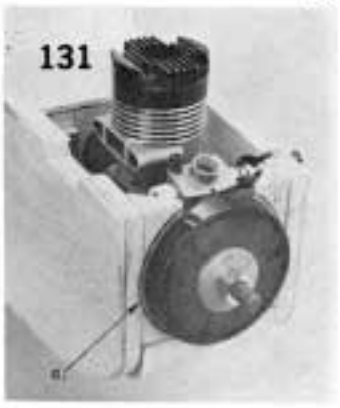
129. Fit the ½" x 2 1/8" x 4" bottom nose block into place.

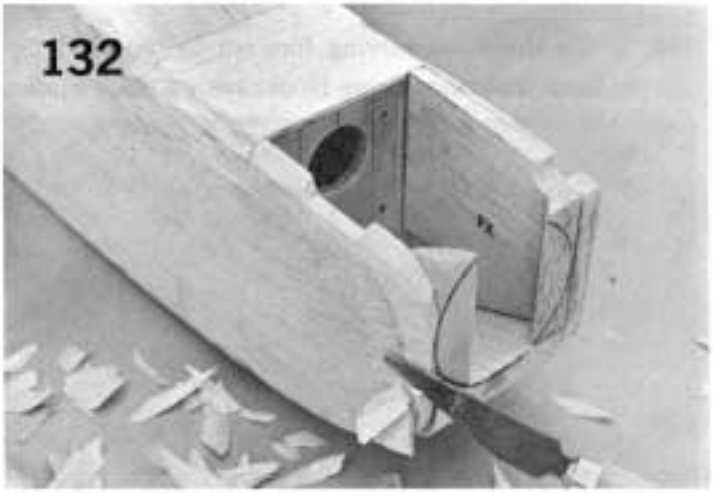


130. Glue two pieces of ½" triangular stock into the nose.

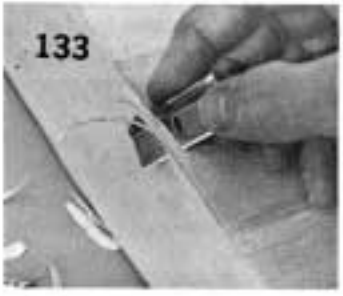
131. a. Mount the motor and draw around the spinner backplate.



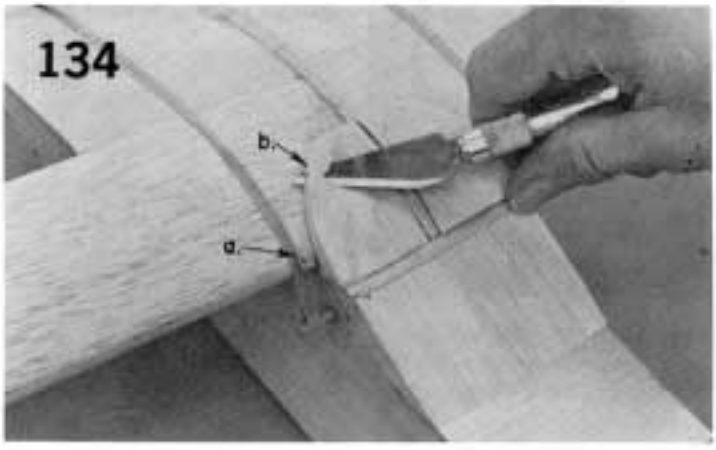




132. Carve the nose to a pleasing shape. You may find it a help in carving the nose to shape if the motor and spinner are in place so you can see the relationship between the two. If you do this, tape up the motor openings to keep sawdust out.



133. Cut fuselage corners partially to shape with a razor blade and finish to a rounded shape with sanding block. Look at the fuselage cross sections on the plan for shape.



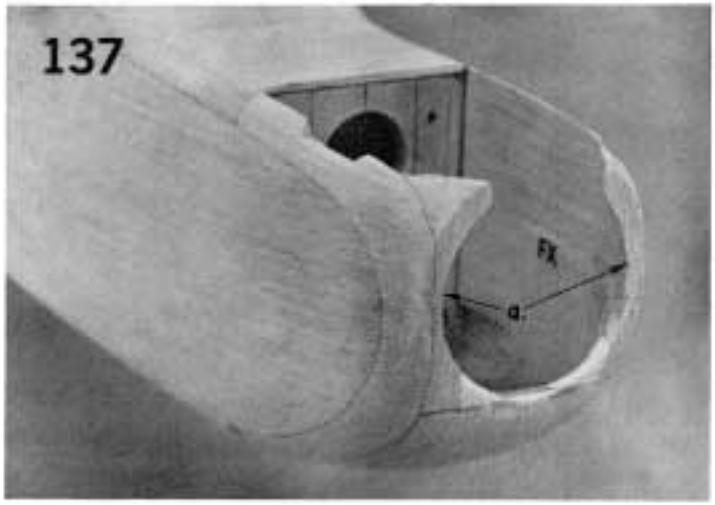
134. a. The wing should be strapped back on and pinned in place so that it cannot shift.

b. Carve the fairing blocks to rough shape with a knife.

135. Carry the shaping process on down to the windshield block.

136. a. Continue the carving forward to the cowl top.

b. Sand the wing-fairing blocks with a small sander.

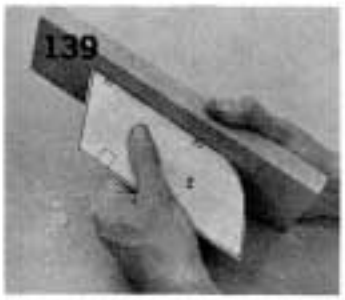


137. The final shape of the nose.

a. Cut out the opening behind the spinner in the ½" stock to make the opening as wide as possible. This makes it easier to get a screwdriver in to remove the motor mounts when necessary.

TAIL CONSTRUCTION

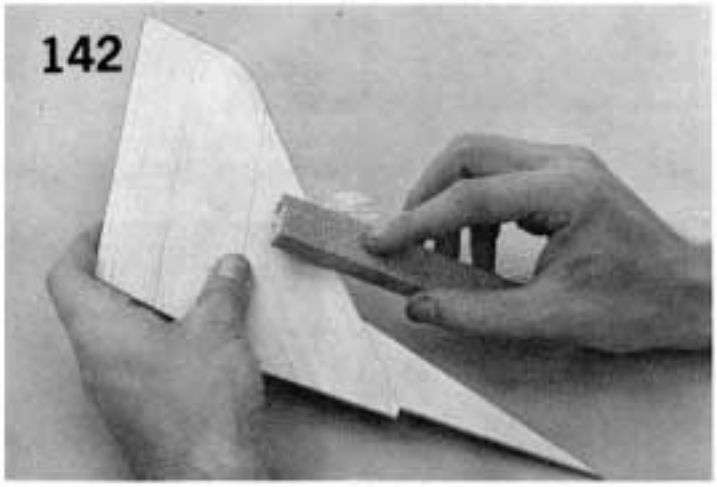
138. Cut out the tail parts on a jig saw or with a modeling knife. Don't cut too close to the lines.



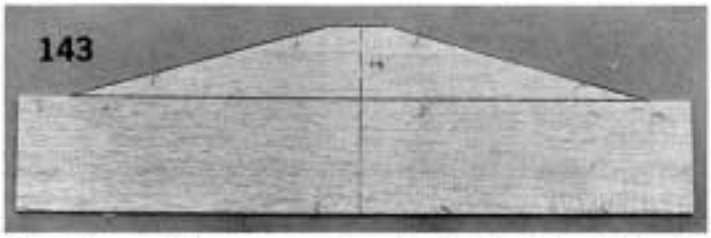
139. Sand down to the outline.

140. Glue the fin parts together.

141. Sand off the lines and smooth both sides of the fin.



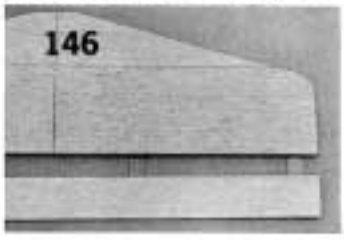
142. a. Round the front edges of the fin. Do not round the trailing edge or the bottom.

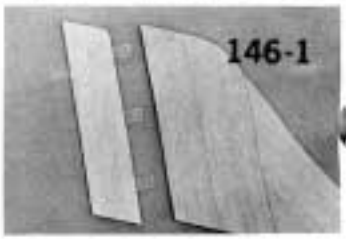


143. Glue stabilizer part S-1 to the $^{3}/_{16}$" x 3" x 18" balsa sheet. Mark a center line on the sheet so that S-1 will be centered.

144. Trace on tip of the stabilizer from the plan drawing.

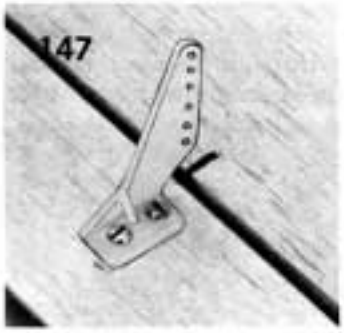
145. Trim off the tip. Sand as fin was done above.



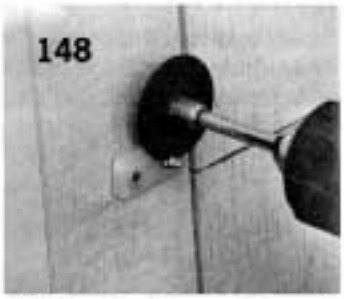


146. Cut the slots for the hinges, but do not glue the hinges in until after the tail parts are covered, either with silk or

iron-on covering. (Some builders like to color dope and/or decorate the parts also before joining.) Join the tail parts together after covering is completed. Cover the fuselage before gluing the tail to it, but cut away the covering to expose the bare wood in the spots where the tail is glued on. Always have wood-to-wood joints. Never have covering between the parts.

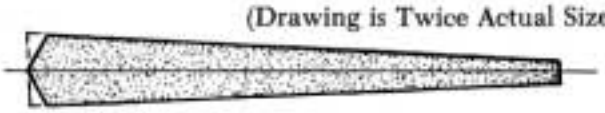


147. Install the horns.



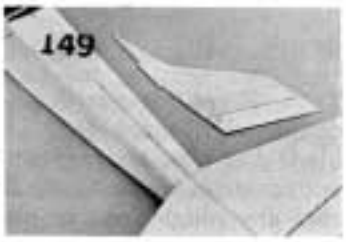
148. Cut or file off the ends of the horn screws.

(Drawing is Twice Actual Size)

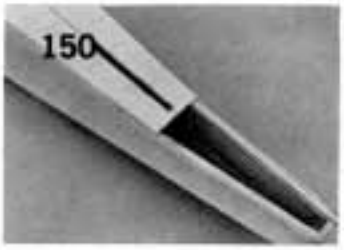


RUDDER & ELEVATOR CROSS SECTION

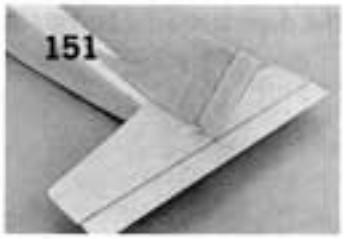
Draw centerline on front of $^{3}/_{16}$" x 1 $^{3}/_{8}$" shaped stock and sand the front as shown.



149. Draw a center line on the fuselage and mark the cutout for the fin tab slot.

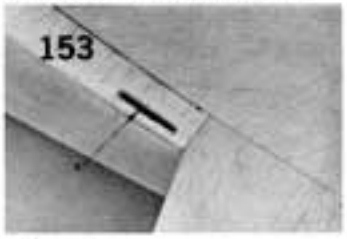


150. Cut out the slot.



151. The fin fits into it.

152. a. Cut out a slot for the pushrod exit.

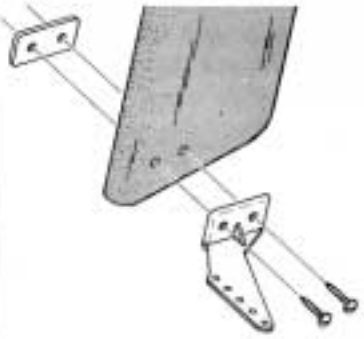


153. If desired you can add a nylon pushrod guide (not furnished) as shown here on the 1st prototype.

(Note: This picture also illustrates the right side-left side choice you must make as to which side the pushrod will be on. The 1st prototype was powered by a K & B .19. This has the throttle on the left, which meant the rudder had to go in the right side. The 3rd prototype, shown in the step-by-step construction pictures in this book, used a Fuji .19 and had the throttle on the right, the rudder pushrod on the left.)

154. The elevator pushrod exits through the openings in the fuselage rear. Open it up as required to pass the pushrod. The pushrod wire may be bent slightly if it tends to rub on the fuselage.

IF THE RC LINK FITS TOO TIGHTLY IN THE NYLON HORN, DRILL OUT THE HOLES IN THIS HORN WITH A NO. 51 DRILL BIT.



Take note that the elevator horn arm is centered on the elevator, not the horn mounting holes, which must be offset to locate the arm in the center of the fuselage opening.

COVERING AND FINISHING

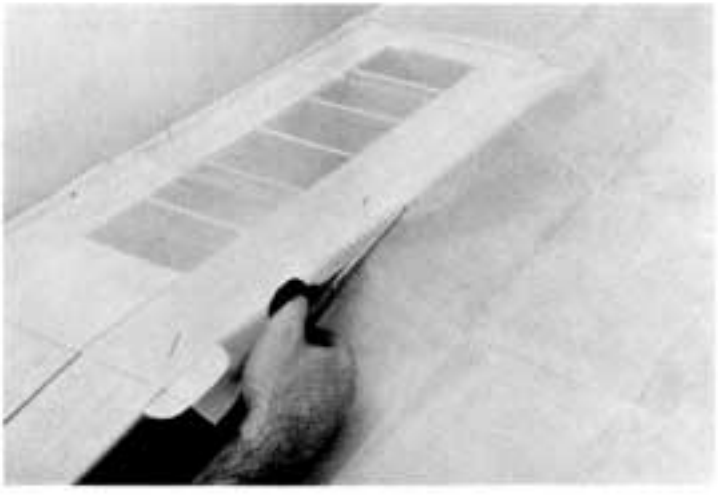
IMPORTANT! Don't skip covering the fuselage and tail just because they are solid wood. Painting them without covering first is not enough. They will be much more resistant to splitting and breaking on hard impacts if they are covered with something --- SIG Silk, Silkspan, SIG Silray or iron-on covering material.

The manufacturer's directions for applying iron-on coverings are packed with the material. Follow these closely, for different types of covering have different iron temperatures and techniques of application.

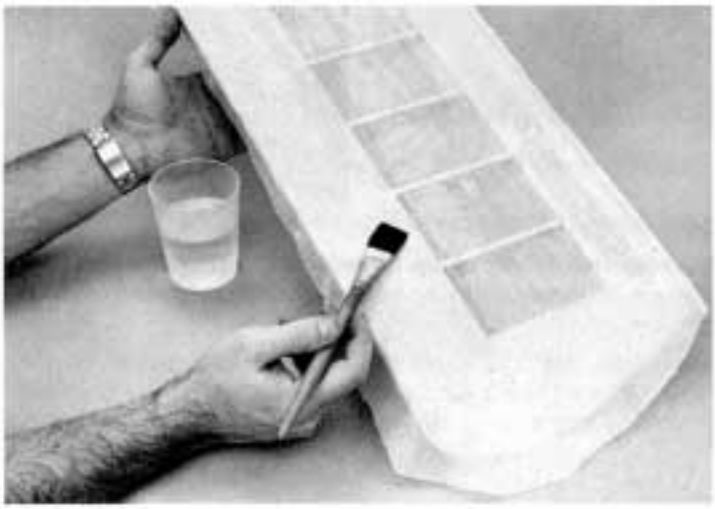
Whatever kind of covering you desire to use, it will not conceal a rough framework. Sand carefully with fine sandpaper before beginning to cover.

COVERING WITH SILK, SILKSPAN OR SILRAY

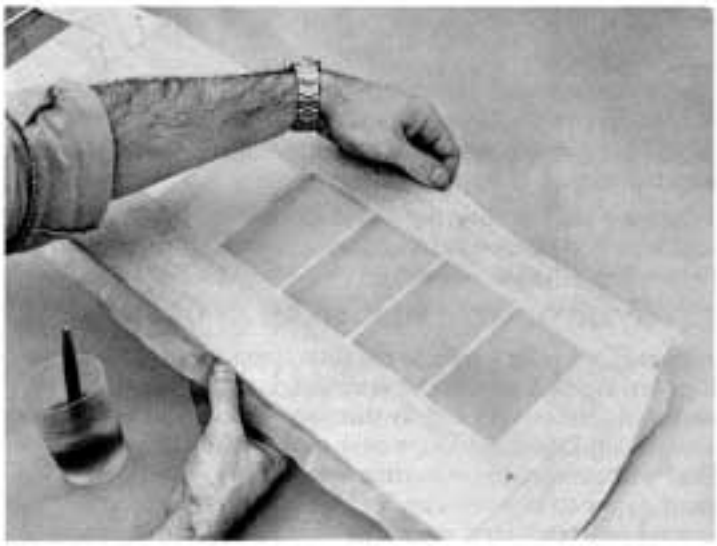
Although we refer to silk in the directions, all of these coverings are applied wet in the same manner, as follows: Brush an unthinned or very lightly thinned coat of clear Sig Supercoat or Sig Lite-Coat Dope over all parts of the framework that will contact the covering. When dry, resand with fine sand paper to remove any fuzz or raised grain. Brush on a second coat and sand again.



The bottom of the wing is a good place to start covering. Cut a piece of material about ½" larger all around than half of the wing, with the grain running lengthwise. (The grain of woven materials runs parallel to the finished bias edge.) Some builders next dip the piece in water and apply it to the wing. I find that the silk sticks together and takes alot of pulling and smoothing to get it in place so I do it a bit differently, as shown in the following photo.

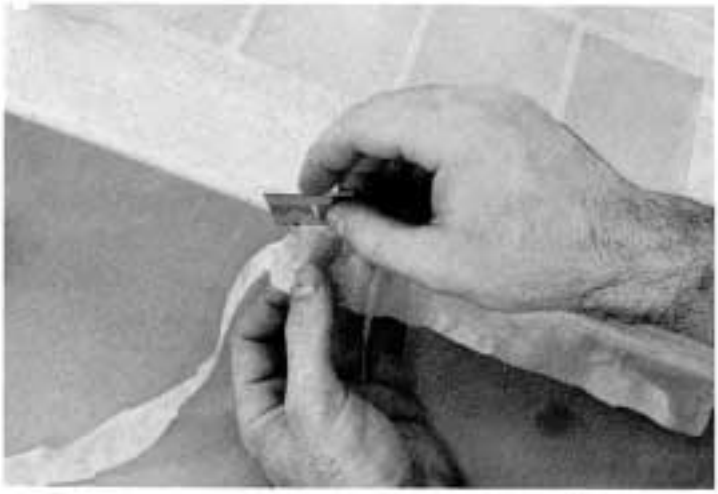


Pin the dry covering in place and "paint" the water on with a brush.



Go around the edges, pulling out wrinkles and stretching the material smooth. You need not pull it up drum tight, in fact going to this extreme is not advisable. Just pull out all of the wrinkles. Use pins, if necessary, to hold the silk smooth, though wet silk usually stays in place without too much pinning. I like to fasten one end --- in this case the center joint of the wing --- pretty firmly with pins so that you can pull against this anchored end in stretching the silk the long way.

Brush around the outside edge of the stretched silk with clear dope. The dope will soak through the material and adhere to the dope already dried into the framework.



Trim off the edges with a sharp blade. I find that a thin double-edged razor blade is ideal for this, but a single-edged blade does okay and you can't cut your fingers on it. On the bottom, trim off flush with the wing all the way around. Go over any rough areas or places that have not stuck down properly with more dope and press the loose spots down as the dope is drying and getting stickier.

The top half is done in identical fashion except that the silk should be brought down over the edges instead of being trimmed off flush. On the front, lap the silk over the edge of the bottom, over-lapping about $^1/_8$". At the back, bring the material down over the back edge of the trailing edge but do not lap it over the bottom covering.

Use the same process on the tail section and fuselage.

Allow the water to dry out of the wood before applying the first full coat of clear dope. On the open framework area on the wing, brush the dope on sparingly. If too much is ap-

plied, the dope will be rubbed through the material and will run down the surface on the inside and form a puddle. When these puddles dry, the large amounts of dope solids in them cause more shrinkage than the rest of the covering and a scarred area results. So apply dope very lightly the first time over. A second coat will seal most of the pores of the material and from this point, running through will not be a problem.

Use one or two coats of regular Supercoat clear on the wing to shrink the covering. After that, unless the covering is still not tight and unwrinkled, Sig Lite-Coat low shrink clear dope is recommended to help prevent warping. 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 CURE FOR FUSELAGE WARPING

You may have noticed that when a piece of balsa is doped on one side and not on the other, it will curl. The same thing can happen on the fuselage sides under the wing opening, particularly when you put on a number of coats. (The rest of the fuselage will not show this effect to any extent because it is four sided and cannot distort.) The effect isn't noticeable until after full cure of the dope and aging, which may take several months. To prevent this from happening, give the inside of the fuselage a coat of dope every time you give the outside a coat. This has an added advantage in making the cabin area fuel proof. In addition, when the hardwood servo mounts are installed, have them a little over-long so that the cabin sides are bulged slightly outward.

A third coat of clear should provide a good base for color. Sand lightly when dry with 220 grit 3-M Tri-M-Ite no-load paper. Don't bear down on the edges of the ribs or the silk fibers will be cut through. 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 test 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 with 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.

The original Kadet Junior was given 2 coats of sprayed Sig Supercoat white. The windows and decoration scheme was then traced on with a soft pencil and the design covered with masking tape. Two coats of Sig Supercoat Light Red were then sprayed on. When the masking tape is pulled off, the design will probably not have perfectly even edges. If you do not wish to pin stripe it with a ruling pen and dope, as described in the next paragraph, use the pen to touch up the edges.

The black pin striping was applied with a mechanical drawing ruling pen. Thin the dope slightly with blush retarder to slow the drying process and aid the flow of dope through the pen points. Clean the pen frequently with dope thinner and wipe on a cloth before reloading with fresh dope. Don't try to draw a thick line with the dope and pen but instead draw a thin line on each side of the desired pin strip (about $^1/_8$" wide were used on the original) and fill in between the lines using the pen free hand and opened up for a wider flow. If you have a steady hand, use a small brush. Use a French curve to outline curved parts of the decorations. The cabin windows were painted silver.

Complete the job with several sprayed coats of clear over the color scheme. This seals the colors and adds gloss. For best results, it is not a good idea to try to mix different brands of paint. Use SIG products from the start.

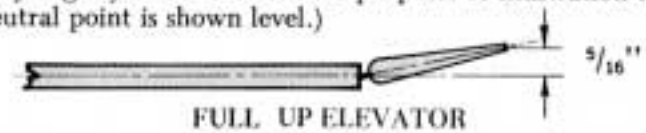
CONTROL MOVEMENTS

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

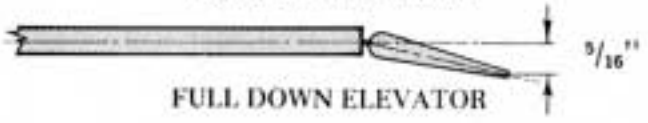
Control measurements below are suggested as a beginning. Test flights may indicate a need for more or less movement, depending on individual model differences, center of gravity (C.G.) location, your personal preferences, etc.

ELEVATOR IN NEUTRAL

(Flight Tests may determine that the neutral point should vary slightly from level but for purposes of illustration the neutral point is shown level.)



FULL UP ELEVATOR



FULL DOWN ELEVATOR

FULL LEFT RUDDER

FULL RIGHT RUDDER

BALANCING

The balance point for test flying is 2 ¾" from the leading edge. Mark this spot (stick a piece of masking tape on temporarily to mark) on the bottom of each wing at the tip. Suspend the model on finger tips placed on the bottom of the wing on the mark. Balance with an empty fuel tank, but with all other equipment installed and the model completely finished and painted. It should hang from the finger tips approximately level.

If the tail hangs down, it is tail heavy. Add lead or weight to the nose as necessary to get it to hang level. Be sure and fasten the weight securely. Do not attempt flight in a tail heavy condition.

If the nose hangs down below level, the model is nose heavy. If it is only a little nose heavy, don't do anything about, it will be okay to go ahead and test fly. If it is more than a little nose heavy, correct by moving the radio batteries out of the nose and as far back in the cabin as is necessary to achieve balance.

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 over-controlling.

Make any changes in the balance position gradually, checking results and the effect of the change on control responses and the performance of the model in the air.

FLYING

We are including in this kit the booklet called "Sig Factory Fliers Pre-Flight Check List". While it was written for the big Kadet, all of the suggestions about first flights given there apply to the Kadet Junior as well. Read it carefully before going to test fly your Kadet Junior.

In the Check List you will find a section called "Wing Is On Securely". These instructions apply to the Kadet Junior except that 8 rubber bands are probably enough. Remember that different brands of rubber bands have different stretch characteristics and may not fit the directions given in this section. Apply some common sense judgement to the number of rubber bands used. It is a good idea to stretch each new band to it's limits before using to locate any hidden defects.

IMPORTANT: If the Kadet Junior is flown with 4 channel radio equipment, plug the rudder servo into the receiver outlet marked "aileron". This will enable you to develop the proper left and right reactions that will later be needed when advancing to an aileron-controlled model. On an aileron model, the rudder is used only for ground steering and some specialized aerobatic maneuvers. Getting used to this extra function, using your other hand, is a much easier transition from three to four channel operation than would be the case if you had to change hands on the primary turning function. (Which would be required if you had been flying the Kadet Junior with the rudder servo plugged into the "rudder" output socket of the receiver.) The important thing you are learning is an automatic left and right reaction on a particular transmitter stick with a particular hand. Forget which control surface is doing the turning on the Kadet, assume that the rudder is an aileron.

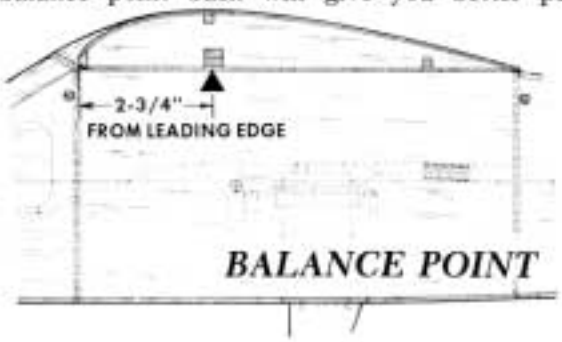
If a good, smooth take-off surface is not available, the model can be hand launched by the pilot's assistant. (Do not attempt to hand launch by yourself --- instant action on the transmitter may be required.) Holding the front part of the fuselage with the left hand and under the tail with the right, run into the wind at a fast trot and thrust the model forward with the nose slightly up in a spear throwing motion. It is not necessary to achieve a lot of velocity in the launch --- it is more important that it be released smoothly and with the wings level. The model may dip slightly and then should begin climbing at a slight angle. If it does not begin to climb after about fifty feet of flight, apply a small amount of up elevator to lift the nose.

Use the rudder to keep the wings level and headed straight into the wind until about 75 feet of altitude is obtained. Keep first turns gentle and not steeply banked. Stay up wind of the transmitter. Use trim levers on your radio equipment where necessary to obtain straight and level flight with the control sticks in neutral position but don't attempt to make these adjustments until the model is at a good altitude. Throttle back at altitude to find out the model characteristics in a gliding condition so that some indication is seen of what to expect during the landing approach. It is a good idea to make several practice landing approaches at a good altitude to get the feel of the model for this approaching critical maneuver. Make your final and complete landing approach while your engine still has plenty of fuel remaining so that the engine is not liable to stop before completion of the flight. This will allow application of power if the approach is being under shot. Notice the percentage of missed landings at an R/C field. Those undershot greatly outnumber those missed by overshooting. So if an approach that looks a little high is maintained, chances are good that a spot-on landing can be made.

After you get through the first flights, as described in the Check List, you should begin to "trim" the model's control surfaces. If it is turning to the right, for example, with the stick in neutral, and you must move the transmitter trim lever to the left to make the model fly straight, then land the model and position the rudder to the left of center by turning the RC link on the pushrod one or two turns on its threads. Check in the air for the result. Repeat the process, if necessary, until the trim lever is centered when the model is flying straight with the stick in neutral. You may find that the reaction of the model is different to high power and low power, requiring changes in trim lever position during flight, as for a landing approach. This is one of the controls you must learn to operate during practice flying, but it is not a critical matter at first since these minor corrections can be made with stick movement alone as you are steering the model along its course.

A common mistake made by beginners is to fly around with the model having too much up trim. It climbs out steeply under full power in this condition (and is probably a safety factor for a rank beginner) and you can level it off by throttling back on the motor. However, in this over-up condition it wallows around with the nose high, it is hard to turn properly and it will not fly into the wind because of low airspeed. The solution is to apply some down trim to the elevator to bring the nose down and make the model fly more nearly level at cruising power. It may be necessary to droop the elevator a bit from level by screwing in the RC link on the elevator pushrod to get enough down. The way to learn how to do this trimming process is to experiment

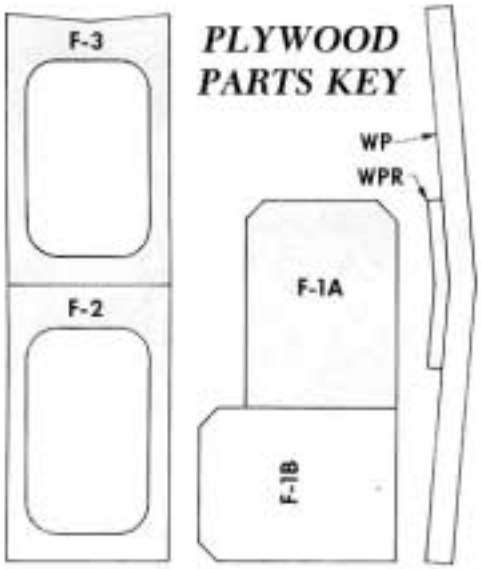
with the model in the air and note it's reaction to increased down trim or other changes. Moving the center of gravity in combination with trim changes can also alter the flying characteristics. For example, you may find that the balance point specified for test flights will be okay for the first few flights but when the model is trimmed down to fly more level under cruising power you may find that moving the balance point back will give you better performance. It is impossible to give exact directions for every case, since individually built models vary slightly and the engine used also affects results. But if the model is not flying in a satisfactory manner, the chances are it is not trimmed properly and should be adjusted accordingly. Do a little tinkering, a bit at a time. This is an instructive way to fathom the mysteries of perfect trim and in the process you can improve your flying performance considerably.



ABOUT PRINTED WOOD PARTS

Some years ago we had kits featuring die cut parts in both thick and thin sizes. If the thick parts were cut from dry wood, the wood often crushed or crinkled on the edges, even when using a brand new die. If the thick parts were cut from wet wood there was an improvement — though many of them still crushed — and the swelled wet wood parts changed shape after drying, making them inaccurate. So we asked modelers if they would rather have the parts printed on the wood instead. They could be cut out in a few minutes with a saw or modeling knife and thus avoid any "die-crunching". Most voted in favor of this idea.

To answer a question we are sometimes asked — no, we do not do this to save money. It is actually more expensive to print the parts using a silk screen press than it is to run an equivalent sheet through our automatic feed die cutting machine. If we hand-sawed the parts it would be even more expensive and the labor cost would have to be added to the kit price. We believe that most modelers would rather cut their own out and save the cost. Since there are not many thick parts in our average kit, it really doesn't consume a lot of the total building time for the builder to do the parts.



ABOUT POLY HINGES

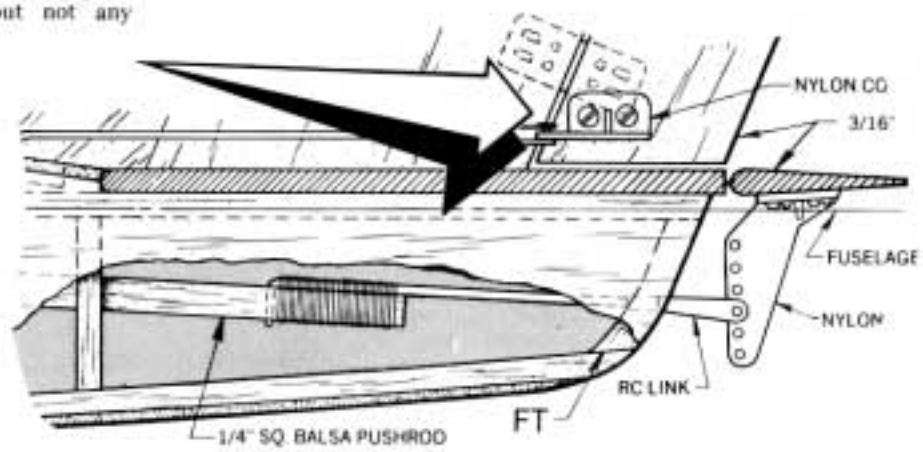
Occasionally a magazine kit reviewer makes a comment about poly-type hinges being "too stiff" and tells about replacing them with pinned hinges. I thought the same when I first saw poly-molded hinges. But, just to find out what the story was, I put them on some models. Now, after using them for some years, I prefer them to pinned hinges. They are easy to install and can't clog up with glue. The "stiffness" is nothing compared to the air load from the controls that the servos have to work against. Much of the initial stiffness can be eliminated by pre-flexing them to extreme angles. (Don't worry about them snapping when you do this.) I have never had control surfaces mounted on poly hinges flutter. Nor have any broken — though I have had that happen with pinned hinges. The final proof of their usefulness is the millions that have been flown on our kits and those of other companies. If there were any problems involving poly hinges it would be common knowledge. Try them. They'll do the job!

GRASS FIELD FLYING

If your flying field is not smooth, paved or closely cropped grass, lift off qualities on takeoff will be improved by positioning the main gear about 1/2" to 3/4" farther forward than shown on the plan. (Move the ply mounts forward or add scrap ply to make them wider to allow landing gear shifting as desired). This more forward position makes it easier to rotate into lift off attitude as elevator is applied during the takeoff run through the grass. The model will not stick on the ground quite as well using this forward l.g. position when landing or paved surfaces, but not any troublesome degree.

FIBERGLASS WING JOINT TAPE

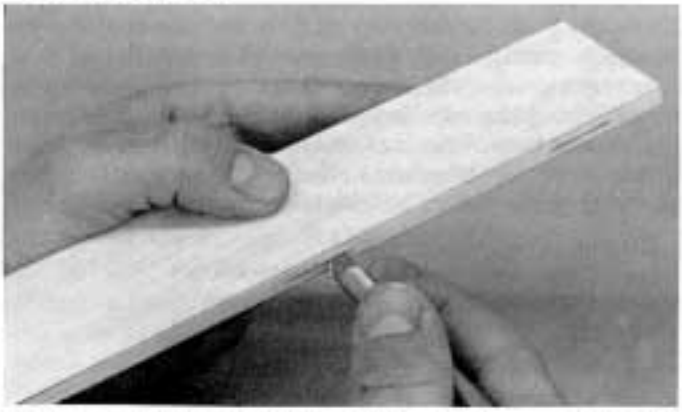
Many builders feel insecure about wings without fiberglass tape on the center section joint. The Kadet has proven over many years not to need it but the joint will be stronger if it is used. This helps protect against any accidental overloads during transportation in a car trunk and helps correct any badly fitted joint or improper construction. So we are now including the tape in the kit to be applied as follows: Using epoxy glue, apply the fiberglass tape on both sides of the wing center joint. After it is smoothed in place, coat the top of the tape and a 1/4" to 1/2" strip on each side of it with epoxy glue.



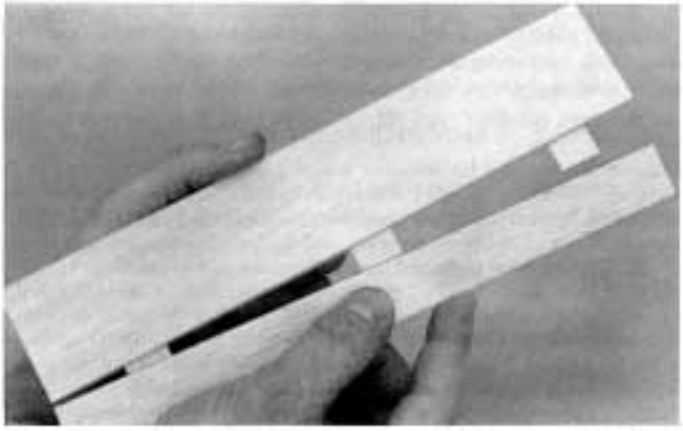
FULL-SIZE PLAN CORRECTION

The horn on the rudder is shown too low on the full size plan. Raise it to the position shown in the corrected drawing at right. (If it is located on the right side of the rudder, it will not be necessary to raise it since the horn will be at the top of the bracket in that case.) If the RC link fits too tightly in the nylon control horn, drill out the holes in the horn with a No. 51 drill bit.

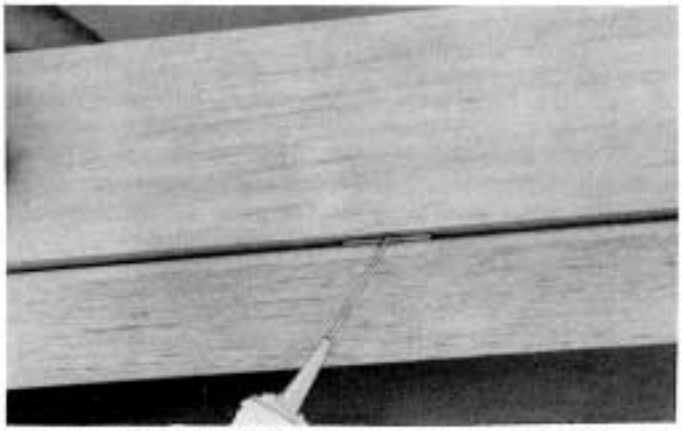
HINGES



1.) Using a No. 11 X-Acto blade (or similar) cut a slot approximately 1/2" in depth and slightly wider than the hinge. After all slots have been cut, insert an EASY HINGE halfway into each slot in one of the pieces to be hinged. Then carefully slide the matching model part onto the other half of the hinges. You'll find it easiest to slide the part onto the hinges at an angle, one hinge at a time.



2.) At this point the surface to be hinged is attached but not glued. Align the two surfaces and adjust the gap between them as required. For best control response, the gap should generally be as small as possible but big enough to allow the control surface to move to the maximum deflection that you will require.



3.) Place three or four drops of any brand cyanoacrylate adhesive (thinnest variety) directly onto the EASY HINGE in the gap. You will notice that the glue is quickly wicked into the slot as it penetrates both the wood and the hinge. Continue this process, gluing the same side of all of the hinges. Then turn the surfaces over and repeat the gluing process on the other side of each hinge. After the glue has cured, approximately three minutes, the joint can be flexed. You may notice a slight stiffness in the joint. This can be eliminated by flexing the surface to full deflection each direction a couple of dozen times. Don't worry about shortening the life of the hinge as they are almost indestructible.

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