



# ***F-4 PHANTOM II***

## **Construction Guide**



**Savage Light Industries**  
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# Savage Light Industries

## ***F-4 PHANTOM II***

You should read this construction guide completely and study the plans to become familiar with all of the assembly steps before you begin construction of the model. There may be some differences between what can be seen in the photos and what is seen on the plans and in the kit pieces. The plans and parts set contain the most recent revisions.

You should not remove any of the laser cut parts from their sheets until you are prompted to do so in this guide. Some of the pieces are small and easily lost while others are delicate and easily broken.

You may use whatever glue that you are comfortable with to build this model. Cyanoacrylate (CA) glue was used for most of the construction on the prototypes. Carpenter's wood glue was used to glue the wing sheeting to the wing ribs and quick-set epoxy was used to join the wing stub spar mounts to the fuselage. Medium-set epoxy was used to join the fins to the fuselage. Slow-set epoxy was used to join the wings to the fuselage and laminating epoxy was used for the reinforcements for horizontal stabilizer and on the inner to outer wing joints.

For parts of the construction and/or assembly of the prototype that required alignment over the plans such as the construction of the wings and fuselage and for the joining of the wings to the fuselage, the plan was taped to the backside of a large sheet of glass which is then placed on a flat building surface. The wing spars, ribs and/or assembly jigs were glued directly to the glass. If you want to use another method, make sure that the parts and/or jigs can be securely attached to the building surface.

While all laser cut parts are labeled with their part number, a large portion have also been etched with alignment marks and building hints to help you correctly orient the part during construction. An arrow etched onto a part indicates that the arrow should point to the centerline of the model. The word "front" etched onto a part means the "front" should be toward the nose.

This kit includes the finest contest-grade balsa sheeting available. Even so, there will be differences in density and grain making the sheet stiffer or softer. Carefully inspect the wood prior to construction and separate them according to their intended usage. Use the stiffest wood for the flat portions of the fuselage and save the softer and more flexible pieces for the round portions. Save the softest wood for sheeting of the 'spine', or top curved portion of the fuselage between the engine nacelles.

The exception to this is the 1/16" wing sheeting. For the wing, you'll want to use the stiffer pieces on the section of the wing ahead of the spars so that the wing sheeting doesn't "cup" between the wing ribs giving the wing the so-called "starved horse" look.

Due to variations in the width of the wood, the 1/2" triangle stock used for the upper and lower corner blocks of the fuselage may not be exactly 1/2" wide. When building the fuselage, align the triangle stock so it is flush with the inner outline of on the plane. This will ensure that there is a good glue joint between the bulkheads and the corner blocks. You can add filler pieces to the outside of the corner blocks once the fuselage has been removed from the building board.

This construction guide shows the curved portion of the fuselage sheeting being applied section by section. If you'd rather plank the fuselage with strips of wood, feel free to do so as there is enough wood included in the kit for either method.

This model was designed to use either 90mm or 3-1/2" fan units and brushless motors and speed controllers. There are two sets of bulkhead pieces used to mount the fan unit included in the kit. These are B7, B7-1 and B8. Each set has a one-letter suffix -A and -B. The -A parts are intended for 90mm fan units and the -B parts are meant for 3-1/2" fan units.

Before beginning construction, check the fit of these parts on the fan unit you're going to use and then use those parts when you build your model. In addition to the -A and -B parts, the aft inner inlet wall (I2) has a tic-mark near the top and bottom of the rear edge. If you're using the -B parts, I2 requires no modification. If you're using the -A parts, use a steel rule and a hobby knife to modify I1 to fit your fan unit. Lay the steel rule on I2 so one end is flush with the front corner and the other end is flush with the tic-mark and cut away the upper and lower portions of I1 to shorten the height of the back of I2 to allow it to fit inside B7-1A.

You can use NiCad, Nimh, or LIPO batteries for the motor batteries. We recommend that you use of a separate receiver battery pack instead of a BEC for maximum safety and reliability. We also recommend the use of metal-gearred servos for the same reason.

While the model was intended for use with Mini Spring Air 600-series retract units, you can substitute any brand including the Electric Jet Factory mini units or the Jet Hangar Hobbies mini units. The landing gear plates have been left undrilled so that they can be used with any brand of retracts.

This kit does not include the landing gear struts or the wire from which they're made. You'll need to obtain 1/8" music wire or whatever size will fit into your retracts and bend them to the proper shape shown on the plans. Do not use soft foam tires as they will dramatically increase the rolling resistance even to the point of preventing the model from taking off the ground. Instead, select moderately firm wheels which will minimize the rolling resistance and allow the model to accelerate quickly.

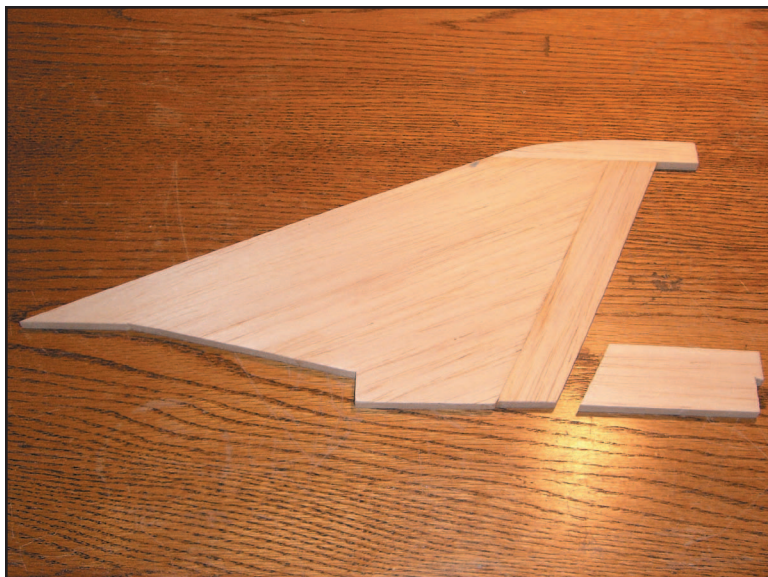


Photo 1

## Vertical Fin Construction

- 1. Cut from their sheets R1, R2, R3, R4 and R5 (1/4" balsa) Lightly sand the edges, then glue R1, R2, R3 and R4 together the pieces over sandwich wrap to make the vertical fin. Do not glue R5 to the vertical fin at this time. (Photo 1)

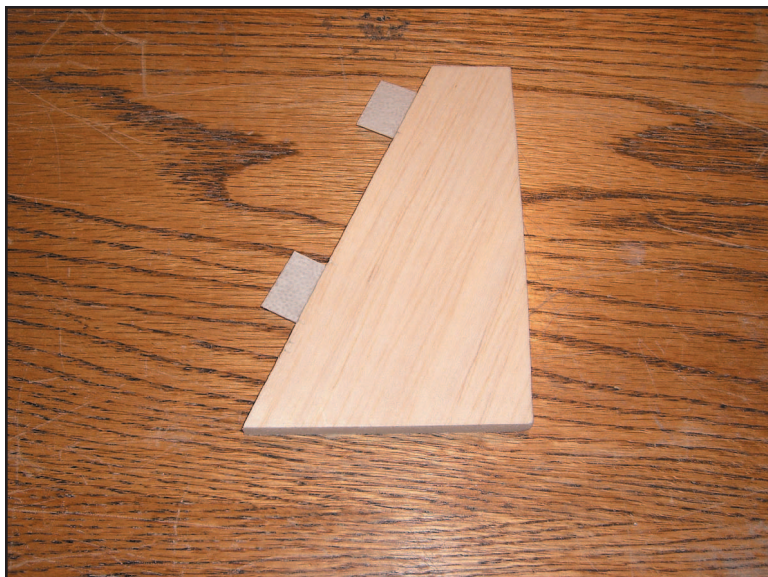


Photo 2

- 2. Mark the centerline of the leading edge of R6 and the hinge locations. Make sure the lower hinge location is above to location of the rudder torque rod. Cut slots in the R6 for the hinges and slip them into place, but do not glue them at this time. (Photo 2)

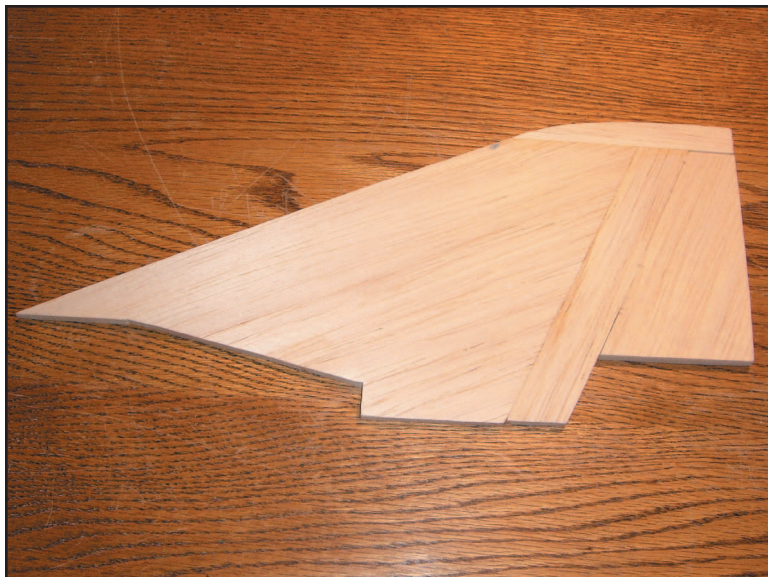


Photo 3

- 3. Mark the centerline of the trailing edge of the vertical fin as well as the hinge locations and cut the slots for the hinges. Assemble, but do not glue the rudder and the vertical fin. (Photo 3)



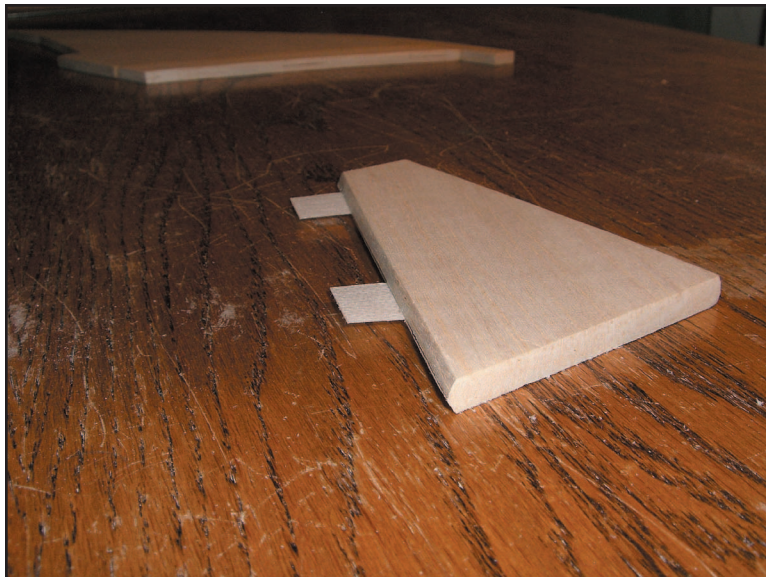


Photo 4

- ☐ 4. Use a razor plane and emory board to bevel the leading edge of the rudder. (Photo 4)

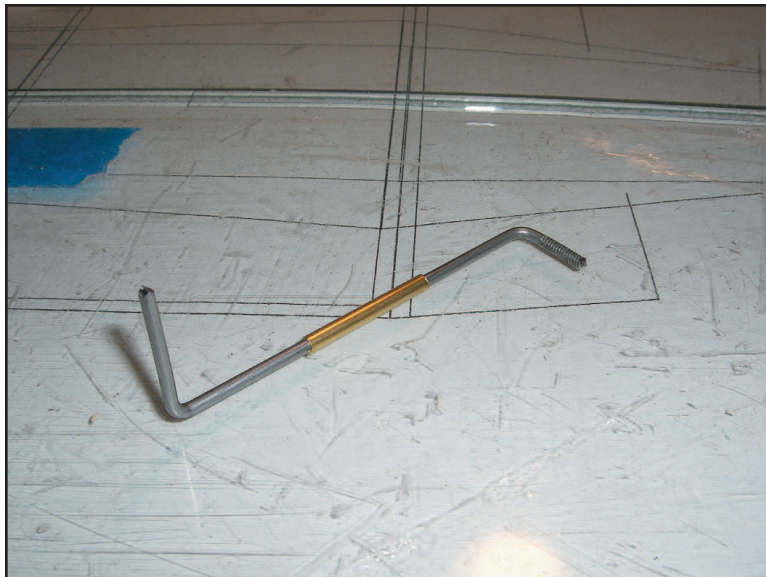


Photo 5

- ☐ 5. Cut a 1" length of 1/8" O.D. brass tubing (not supplied). Ream the inside of the tube to remove any burrs. Slip one aileron torque rod (not supplied) into the brass tubing. Bend the aileron torque rod as shown to make the rudder torque rod. (Photo 5)



Photo 6

- ☐ 6. Mark the location of the rudder torque rod on the leading edge of the rudder. Drill a 1/8" hole into the rudder. Use a hobby knife and sandpaper to cut a 1/8" wide half-round channel in the leading edge of the rudder. The channel should be deep enough so the leading edge of the rudder can sit flush against the vertical stab when the rudder torque rod is in place. Use a razor knife and sandpaper to make a 1/8" wide and 1/8" deep half-round channel in the leading edge of F5. The channel should be deep enough to allow the leading edge of F5 to be flush with the vertical stab when the torque rod is in place. Set the vertical fin and rudder aside for now. (Photo 6)



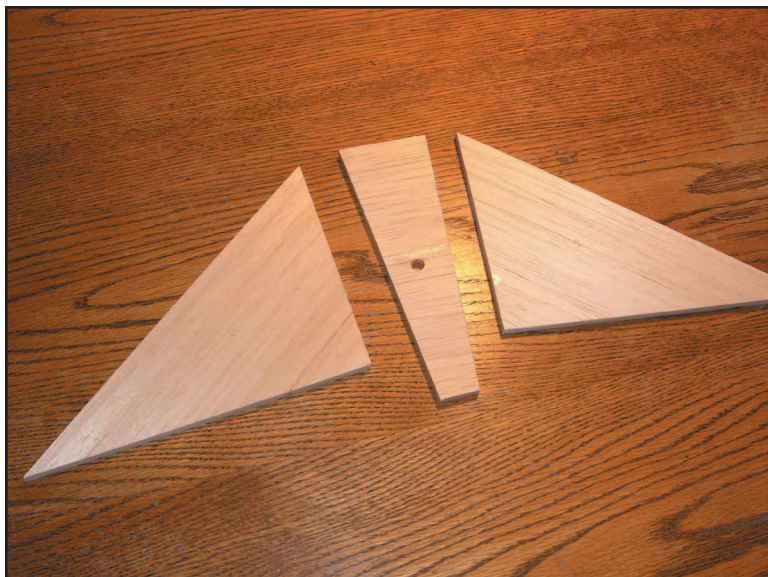


Photo 7

## Horizontal Tail Construction

- ☐ 7. Cut from their sheet, two E1, two E2, E3-1 and E3-2 (1/4" balsa). Glue each E1 and E2 together over clear sandwich wrap to make each half of the horizontal stab. Glue E3-1 and E3-2 together over sandwich wrap to make the horizontal stab center section. (Photo 7)



Photo 8

- ☐ 8. Cut from their sheets two Stab Jigs (1/8" lite ply) Stand one of the Stab Jigs up on the end and use it as a guide to sand a bevel onto one side of the horizontal stab center section as shown. Repeat for the other side. (Photo 8)



Photo 9

- ☐ 9. Measure and mark a line on the trailing edge of the horizontal stab that is 1/16" from the top of the stab. Mark the hinge locations on the stab. Measure and mark a line on the leading edges of the elevator and mark the hinge locations. Repeat for the other side. (Photo 9)



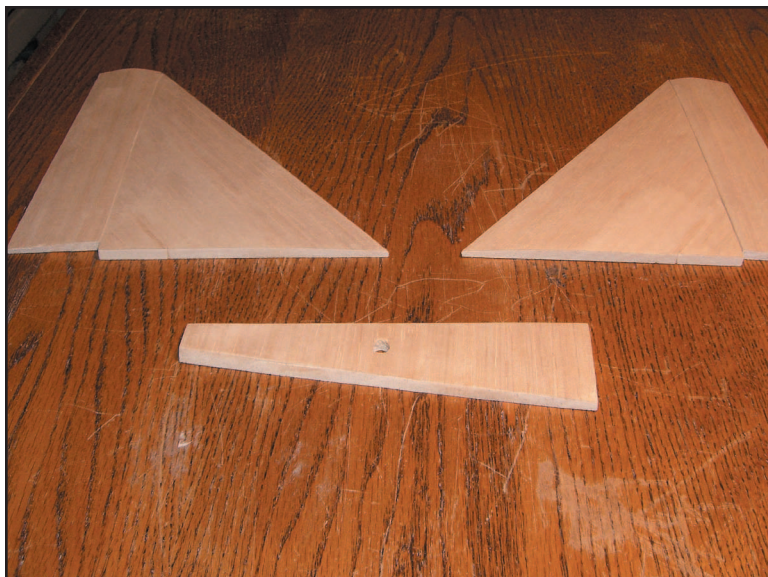


Photo 10

- ☐ ☐ 10. Cut a slot for the hinges into the horizontal stab and elevator and join them together. Flip the elevator over so the bottom is facing up and sand it so it ends up with an inverted Clark-Y profile. Repeat for the other side. (Photo 10)

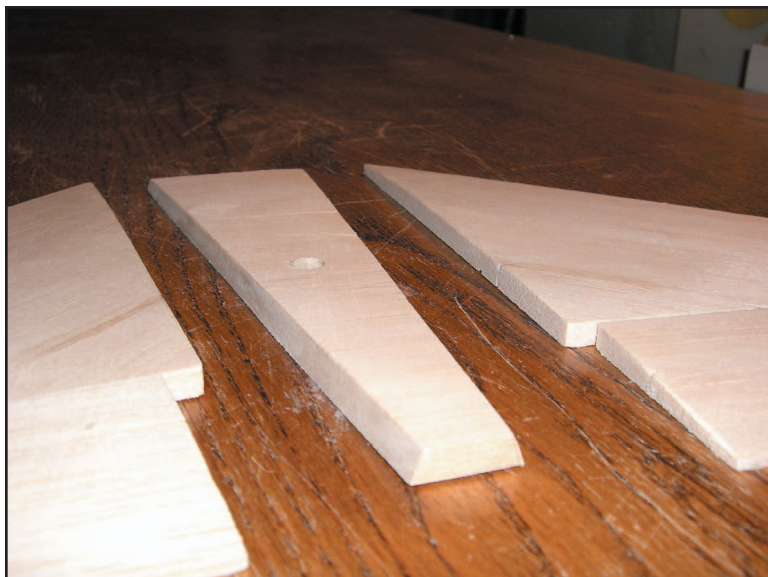


Photo 11

- ☐ 11. Sand the horizontal stab center section to match the profiles of the horizontal stabs. (Photo 11)



Photo 12

- ☐ 12. Tape a piece of clear sandwich wrap down to the building board (Photo 12)



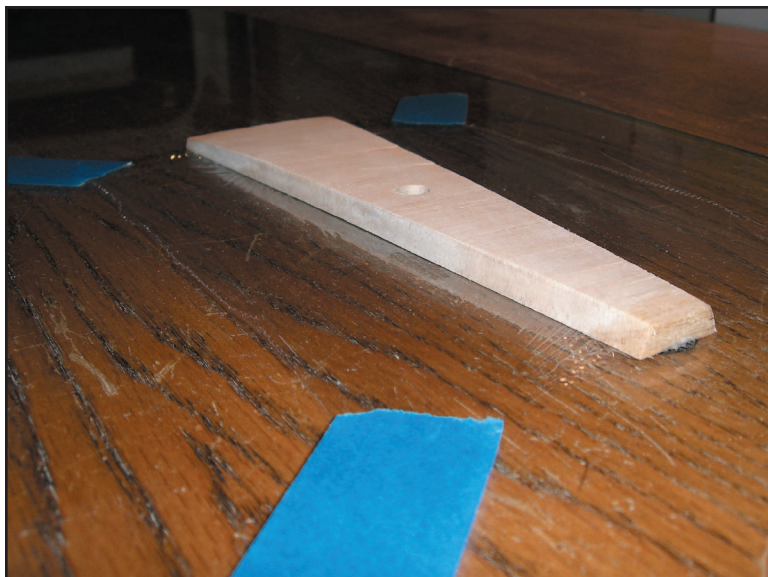


Photo 13

- ☐ 13. Tack glue the horizontal stab center section to the center of the sandwich wrap. (Photo 13)

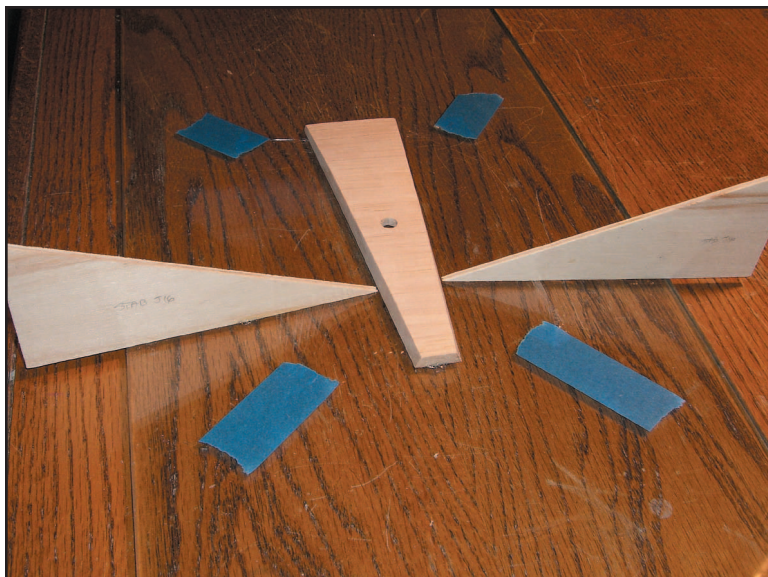


Photo 14

- ☐ 14. Position the Stab Jig so it is perpendicular to the edge of the side of the horizontal stab center section and secure it to the building board. Repeat for the other side. (Photo 14)

**NOTE:** The horizontal stab center section in this next photo sequence is the configuration used on the prototype. This was changed for the production kit. The trailing edge of the horizontal stab center section should be flush with the trailing edge of the horizontal stab and the front of the center section should be recessed about 1/2" from the leading edges of the horizontal stab.

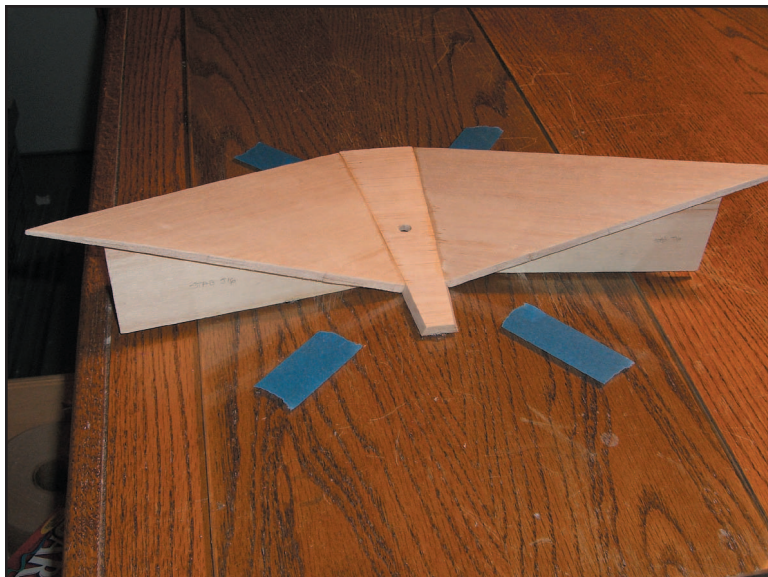


Photo 15

- ☐ 15. Position and glue the horizontal stab to the horizontal stab center section. Repeat for the other side. (Photo 15)





Photo 16

- ☐ 16. Cut a piece of 4 oz. fiberglass cloth that is big enough to cover the entire horizontal stab center section and about 1" of each horizontal stab. Use laminating epoxy to wet out the cloth to reinforce the horizontal stab joints. Let dry overnight. (Photo 16)



Photo 17

- ☐ 17. Once the glue has dried, remove the horizontal stab from the building board. Find a piece of scrap styrofoam or wood that is wide enough and tall enough to support the horizontal stab as shown. Cut another piece of 4 oz. fiberglass cloth that is big enough to cover the horizontal stab center section and about 1" of each horizontal stab. Use laminating epoxy to wet out the cloth. Tape a piece of clear sandwich wrap over the wet cloth and use your finger to feather the edges of the wet epoxy to make a smooth transition to the dry balsa. Let this dry overnight. When dry, remove the sandwich wrap and set the horizontal stab and elevators aside for now. (Photo 17)

## Wing Construction

**NOTE:** The wings are built and sheeted upside down over the plans.

- ☐ 18. Secure the plans on the building board. (Photo 18)

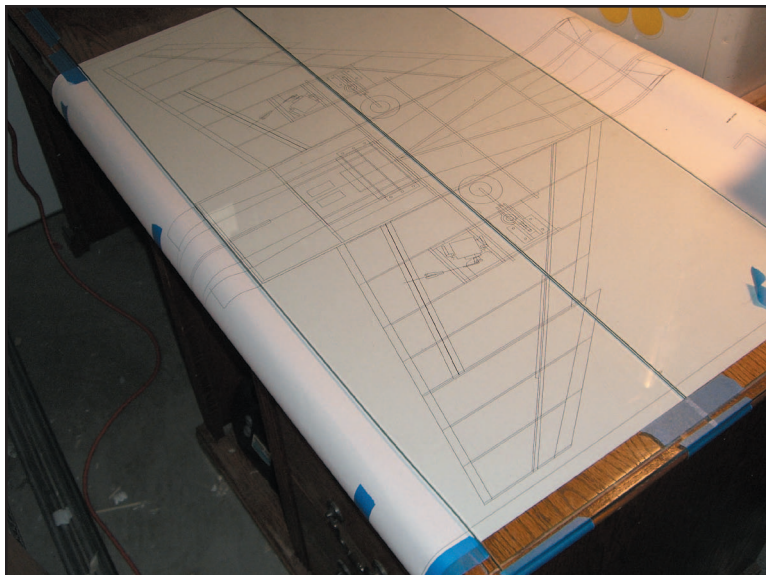


Photo 18



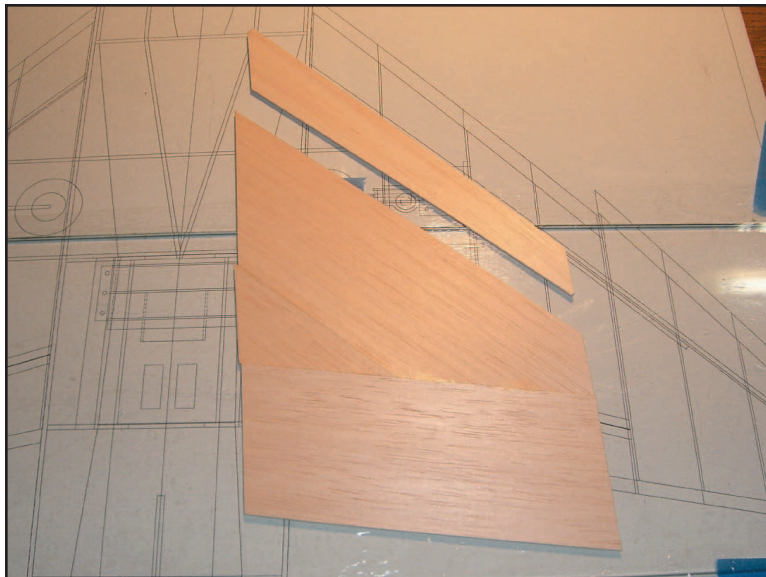


Photo 19

- □ 19. Using 1/16" sheet balsa, make up the wing skins for the inboard and outboard wing panels as shown. Note the stiffness and grain and use the stiffer grain wood for the leading edge sheet to prevent cupping between the wing ribs. Make a set for the top and bottom of the inboard wing panel and a set for the top and bottom of the outboard wing panel. Repeat for the other side. (Photo 19)

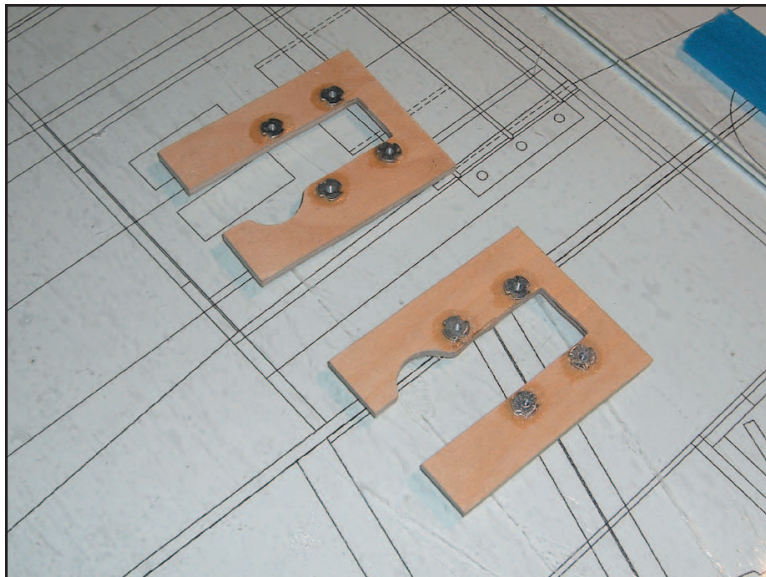


Photo 20

- □ 20. Cut from their sheets two MG main landing gear mounts (1/8" birch ply). Using your main landing gear retracts as a guide, drill 4 1/8" holes in each MG. Press a 2-56 blind nut into each hole on the top side of the MG and secure them with glue. (Photo 20)

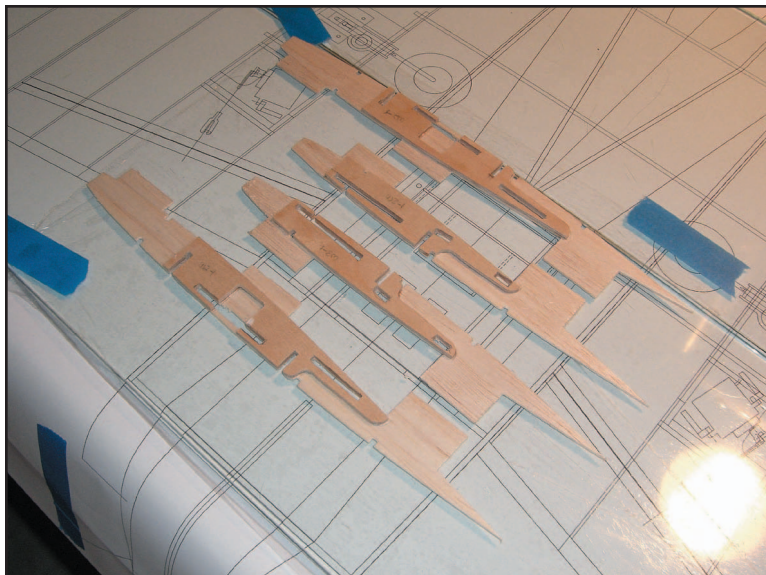


Photo 21

- □ 21. Cut from their sheets, two W2 and two W3 (1/16" balsa) and two W2-1 and two W3-1 (1/8" birch ply). Position and glue W2-1 to the ouboard face of W2 and glue W3-1 to inboard face of W3. Repeat for the other side. (Photo 21)

**NOTE: Be sure to make right and left side set that are mirror-images of each other.**



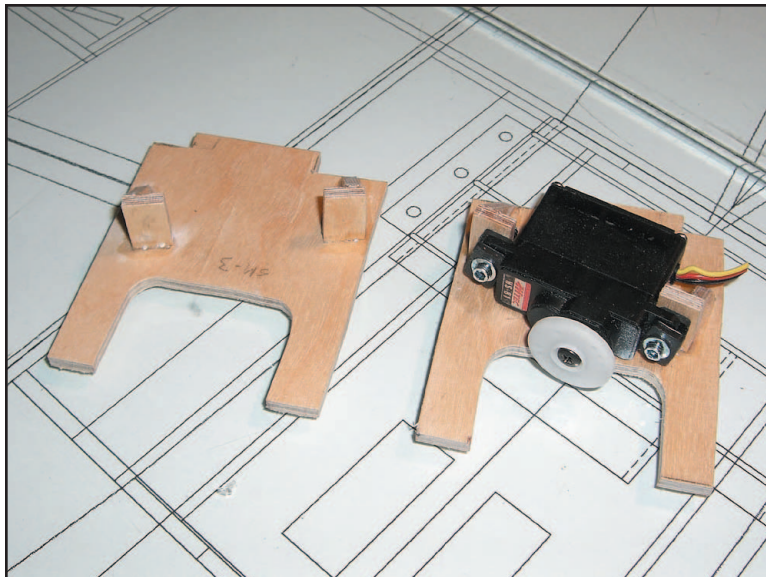


Photo 22

- □ 22. Cut from their sheets two SM1 servo mounts (1/8" birch ply), four SM2 servo mounting plates and four SM3 servo mount gussets (1/8" birch ply). Position and glue the SM3 gussets to the SM2 mounts. Make sure to glue the SM3 to the outer edges of SM2 to leave room for the servo wires and servo mounting screws. When the glue is dry, position and glue these assemblies to the SM1 servo plates. Make sure to make one left side and one right side. (Photo 22)

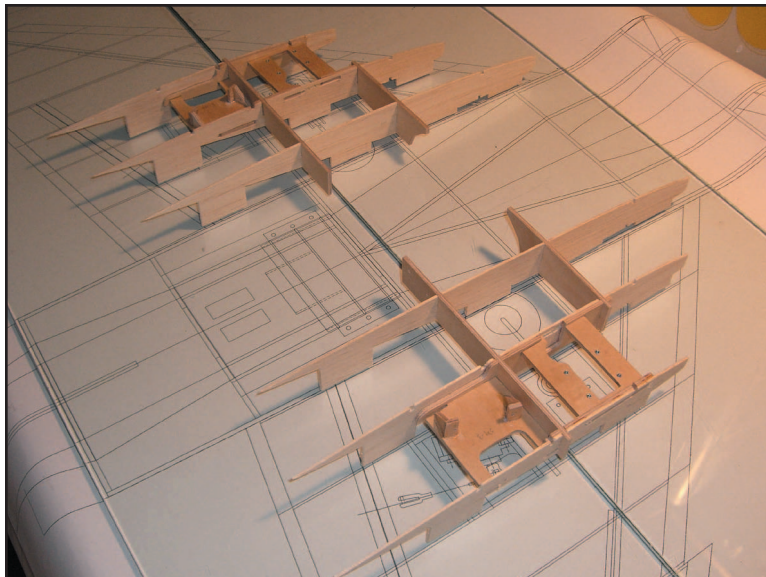


Photo 23

- □ 23. Cut from their sheets, two W1 (1/16" balsa), two FS and two RS (1/8" birch ply). Assemble, but do not glue W1, W2, W3 to the FS and RS. Slide the servo mount and the MG mount into place between W2 and W3. Make sure that the servo mount is facing to the bottom of the wing and the blind nuts on the MG mounts are toward the top of the wing. Position these over the wings, but do not secure them to the building board. Repeat for the other side. (Photo 23)

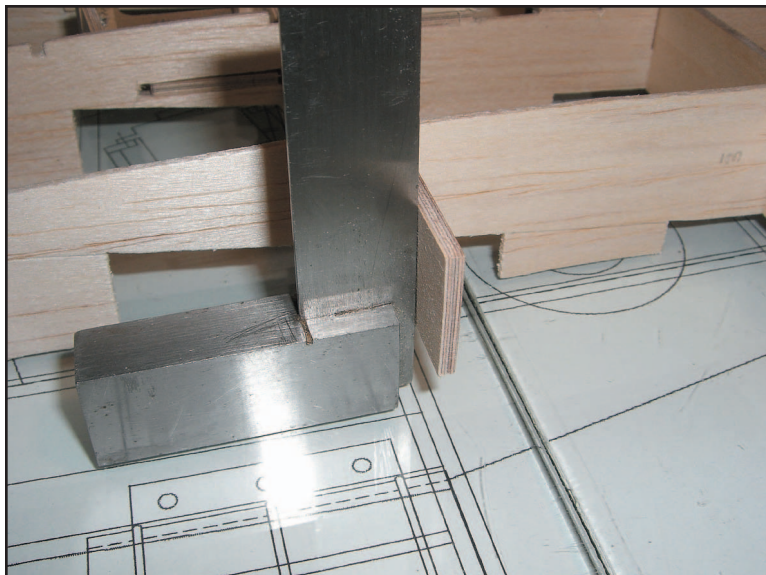


Photo 24

- □ 24. Use a building square to position the spars and W1 rib to the building board over the plans and to make sure the spars and ribs are perpendicular to the building board. Use the building square to position each rib and secure the ribs to the building board. Once this is done, glue all of the joints together. Repeat for the other side. (Photo 24)

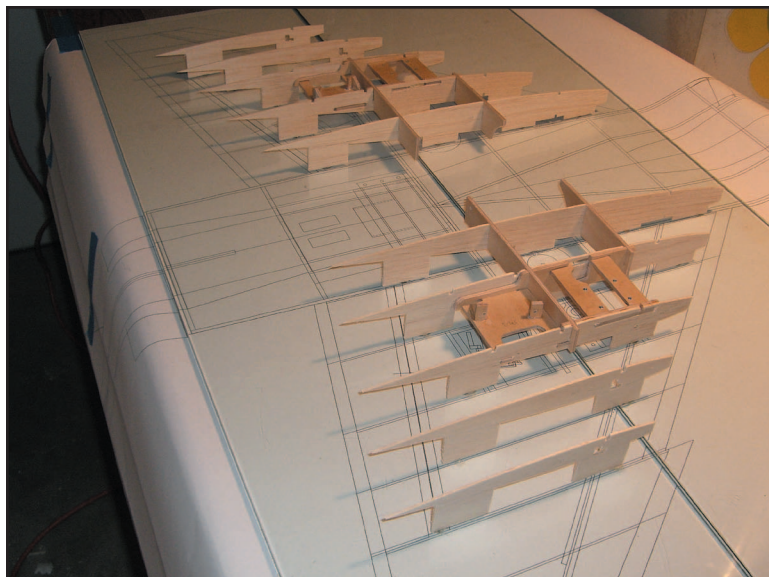


Photo 25

- □ 25. Cut from their sheets, two W4, W5 and W6 (1/16" balsa). Use the building square to position and square the ribs over the plans and secure them to the building board. Repeat for the other side. (Photo 25)



Photo 26

- □ 26. Use a sanding block or emery board to bevel the leading edges of the wing ribs to match the angle of the leading edge of the wing. Repeat for the other side. (Photo 26)

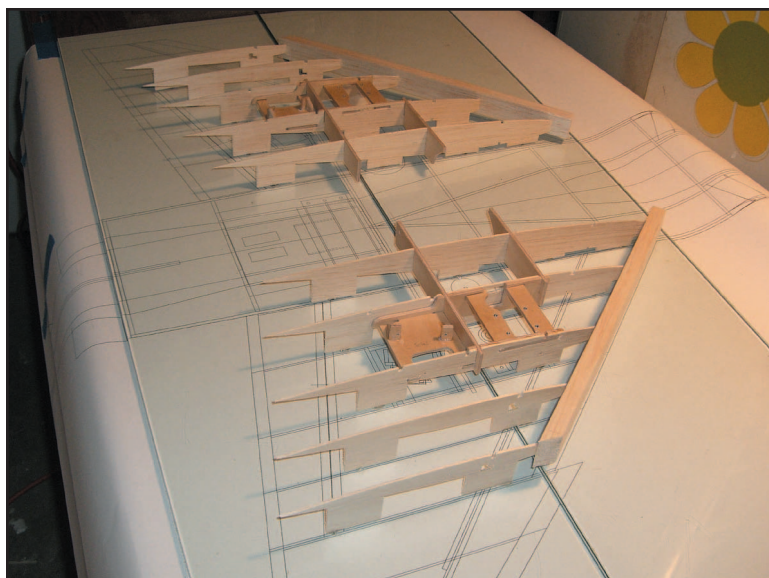


Photo 27

- □ 27. Measure and cut two leading edges from 1/2" x 3/4" balsa sticks. Position and glue these to each of the wing ribs. Repeat for the other side. (Photo 27)



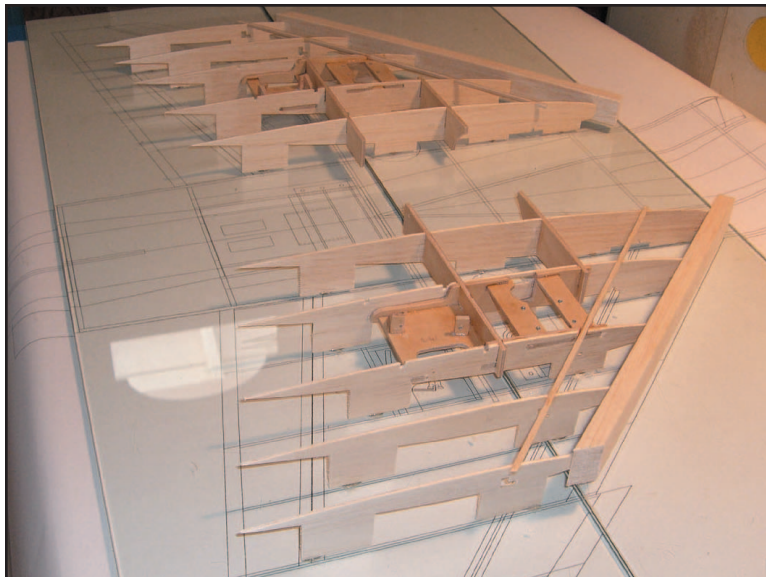


Photo 28

- □ 28. Measure and cut a main wing spar from a 1/8" balsa stick. Position and glue the spar into the wing spar slots in the bottom of the wing ribs. Repeat for the other side. (Photo 28)

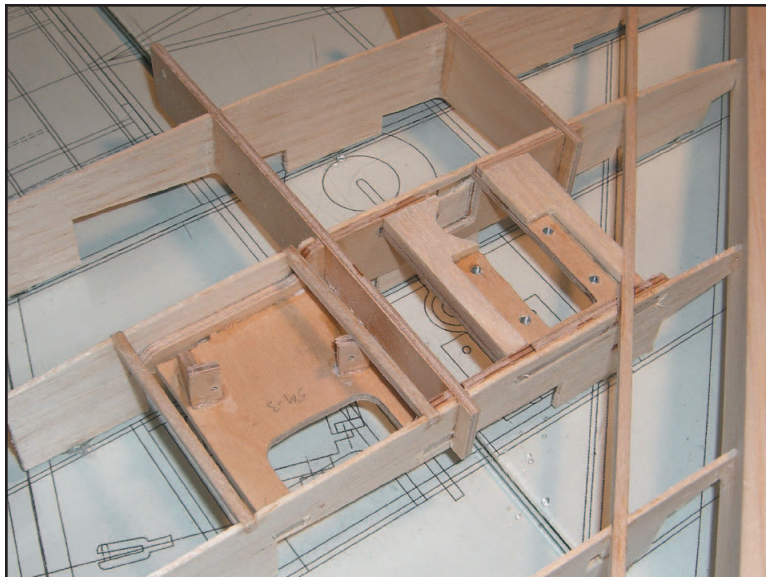


Photo 29

- □ 29. Cut two servo hatch doublers from a 1/8" balsa stick. Position and glue these into the bottom of W2 and W3. Cut MG doublers from 3/16" scrap balsa. Make sure to leave enough space for your retract, then glue them to the MG mount. Sand them to match the wing profile between W2 and W3. Repeat for the other side. (Photo 29)

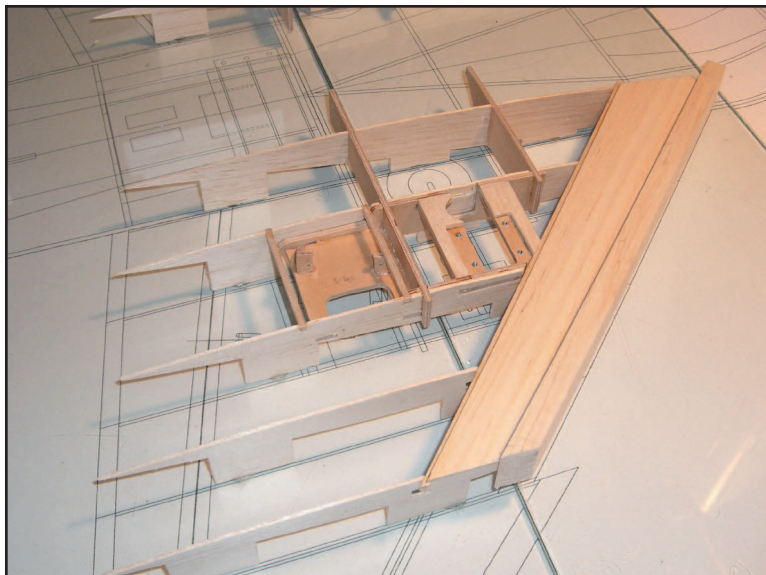


Photo 30

- □ 30. Position the forward wing sheeting over the wing between the leading edge and the main spar. Trim the trailing edge of the forward sheeting so it covers only the forward half of the main spar, leaving room for the aft wing sheeting to be glued to the rear half of the main spar. When you're satisfied with the fit, run a bead of carpenter's glue along the top of each wing rib between the main spar and the leading edge stock. Position the leading edge sheeting against the back of the leading edge stock and use thin CA to glue the sheeting to the leading edge. Push the sheeting down against the main spar and use thin CA to glue the sheeting to the main spar. Repeat for the other side. (Photo 30)



Photo 31

- □ 31. Test fit the aft wing sheeting to the wing. When satisfied, run a bead of carpenter's glue along each wing rib, along the FS and RS stub spars, along the servo opening doublers and along the MG doubler. Position the sheeting to the main spar and use thin CA to glue the sheeting to the main spar. Use a sand baggy or magazines to weight down the wing sheeting and let the glue dry overnight. Repeat for the other side. (Photo 31)

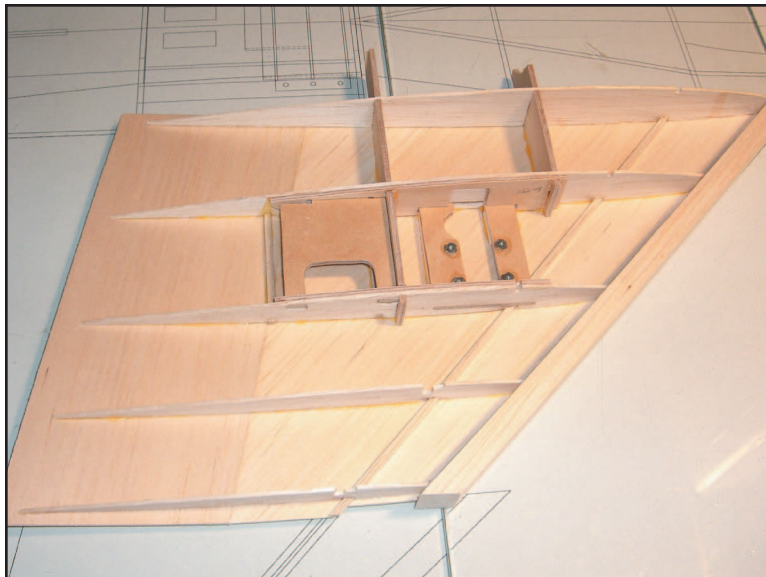


Photo 32

- □ 32. Carefully remove the wing panel from the building board and trim the building tabs flush to the tops of the wing ribs. Run a thin bead of glue along all joints to reinforce the glue joint. Repeat for the other side. (Photo 32)

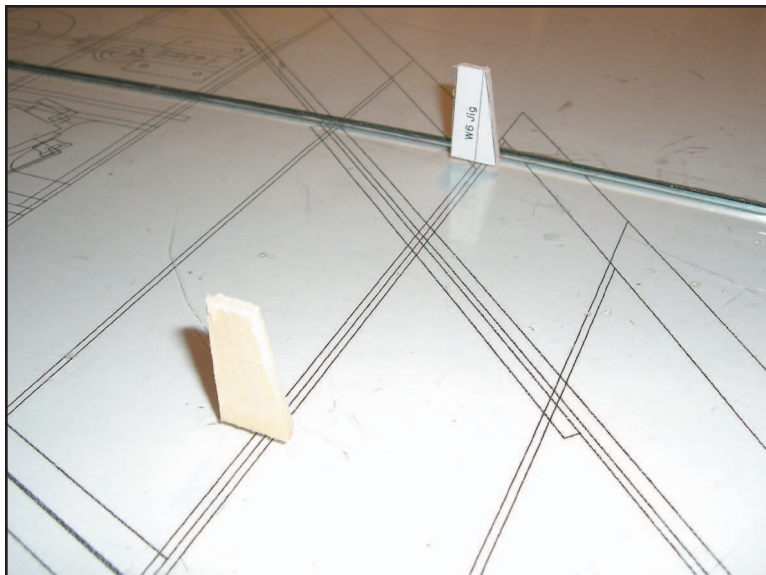


Photo 33

- □ 33. Cut from their sheets, four W6 jigs (1/8" lite ply). Using the alignment marks etched into each W6 position and secure them to the building board over the joint line between W5 and W6. Repeat for the other side. (Photo 33)



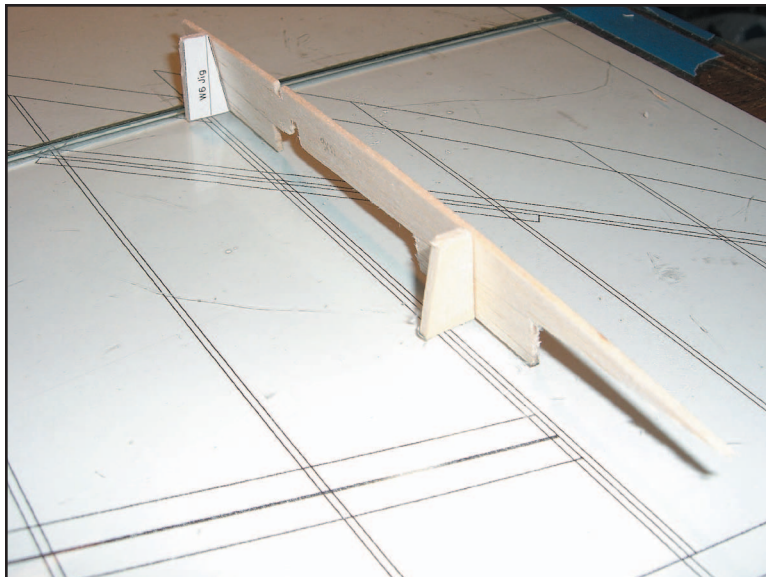


Photo 34

- □ 34. Cut from their sheets two W6 wing ribs (1/16" balsa). Lay W6 against the two W6 Jigs and use the building square to align it to the leading edge. Secure W6 to the building board and tack glue it to both W6 Jigs. Repeat for the other side. (Photo 34)

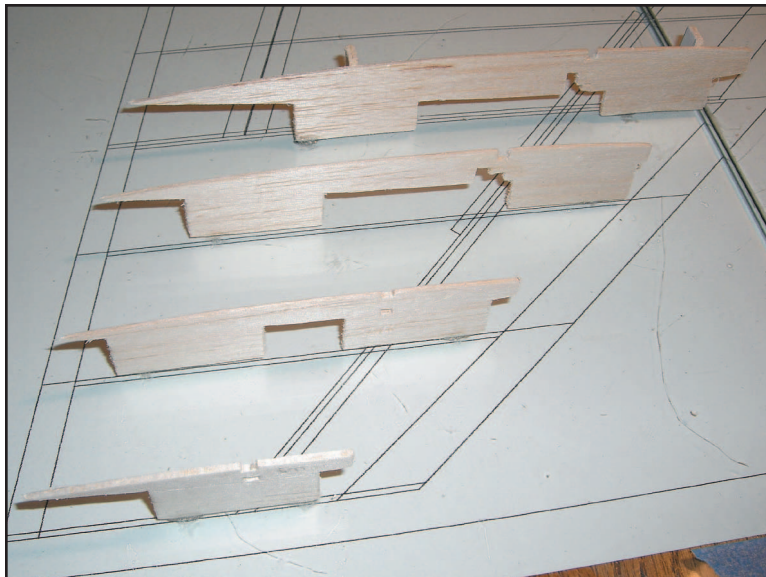


Photo 35

- □ 35. Cut from their sheets, two W7, W8 and W9 wing ribs (1/16" balsa). Use the building square to align these to the leading edge and secure these to the building board. Repeat for the other side. (Photo 35)

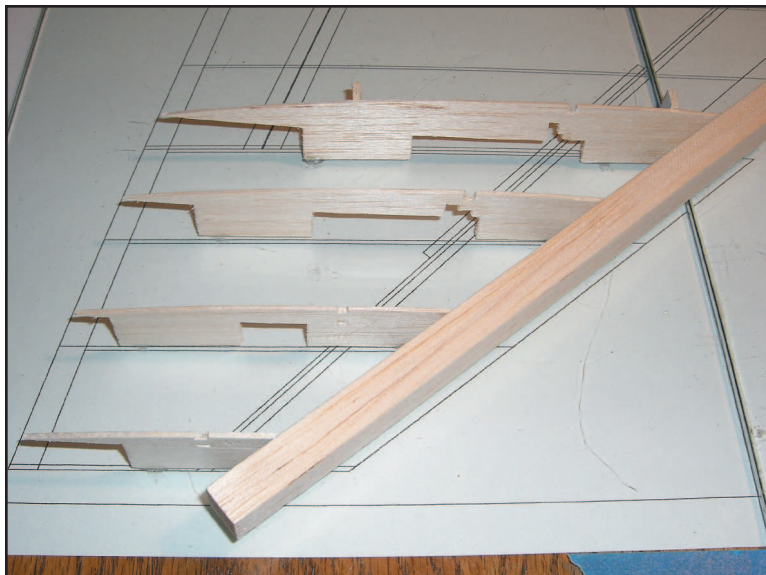


Photo 36

- □ 36. Use a sanding block or emery board to bevel the leading edges of the wing ribs to match the angle of the leading edge like you did in Step 26. Measure and cut two leading edges from 3/4" balsa sticks. Position and glue these to each of the wing ribs. Repeat for the other side. (Photo 36)

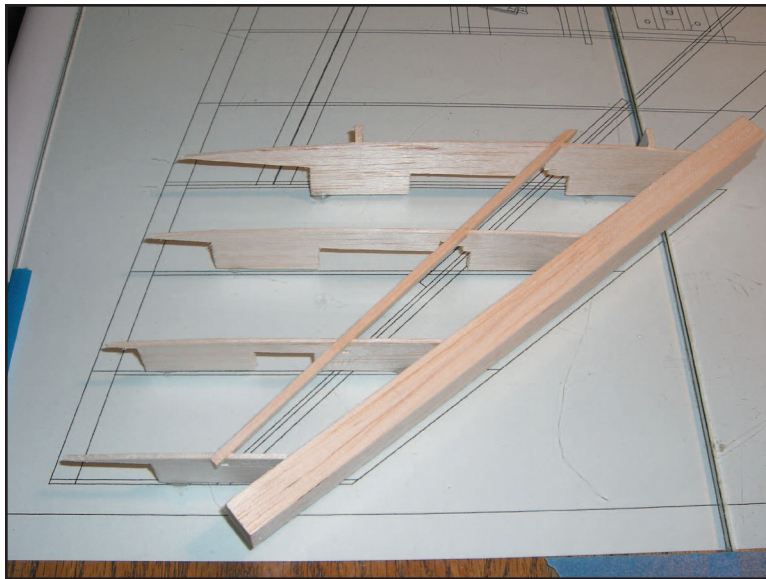


Photo 37

- □ 37. Measure and cut a wing spar from a 1/8" balsa stick. Position and glue this into the wing spar slots in the bottom of the wing ribs. Repeat for the other side. (Photo 37)

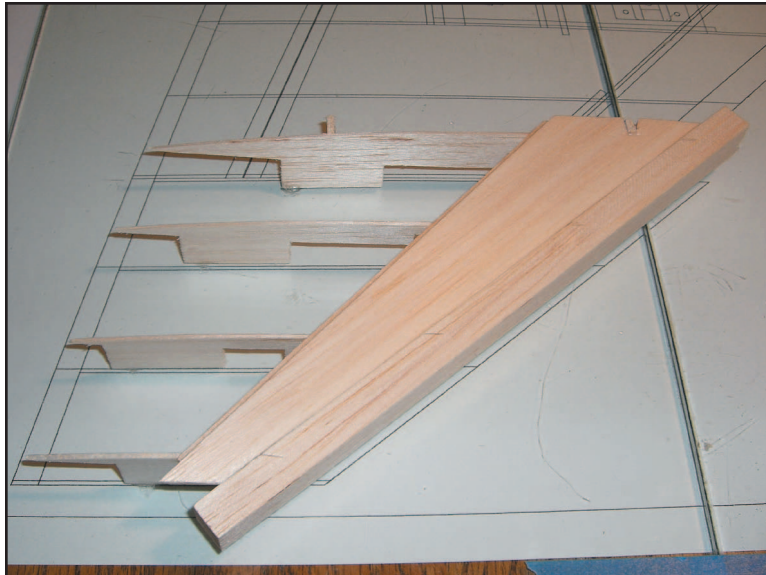


Photo 38

- □ 38. Position the forward wing sheeting over the wing between the leading edge and the main spar. Trim the trailing edge of the sheeting so it covers only the forward half of the main spar, leaving room for the aft wing sheeting to be glued to the rear half of the main spar. When you're satisfied with the fit, run a bead of carpenter's glue along the top of each wing rib between the main spar and the leading edge stock. Position the leading edge sheeting against the back of the leading edge stock and use thin CA to glue the sheeting to the leading edge. Push the sheeting down against the main spar and use thin CA to glue the sheeting to the main spar. (Photo 38)



Photo 39

- □ 39. Test fit the aft wing sheeting to the wing. When satisfied, run a bead of carpenter's glue along each wing rib. Position the sheeting to the main spar and use thin CA to glue the sheeting to the main spar. Use a sand baggy or magazines to weight down the wing sheeting and let the glue dry overnight. Repeat for the other side. (Photo 39).



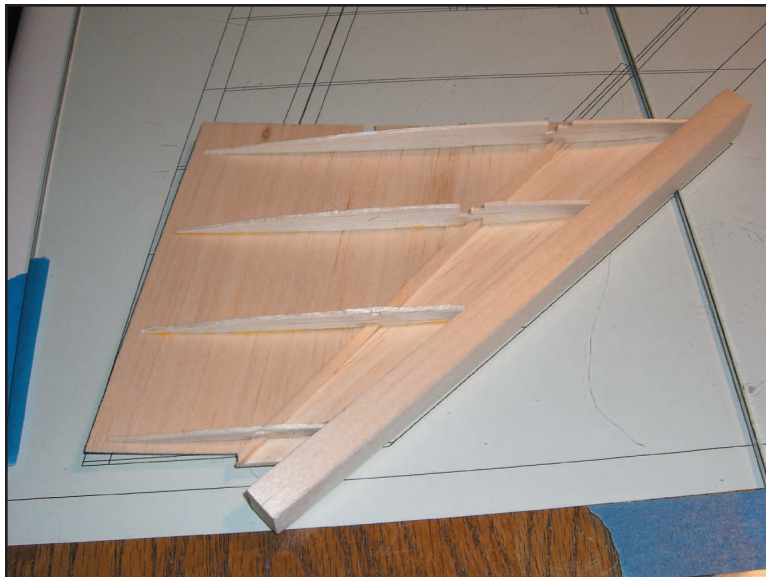


Photo 40

- □ 40. Carefully remove the wing panel from the building board and trim the building tabs flush to the tops of the wing ribs. Run a thin bead of glue along all joints to reinforce the glue joint. Repeat for the other side. (Photo 40)

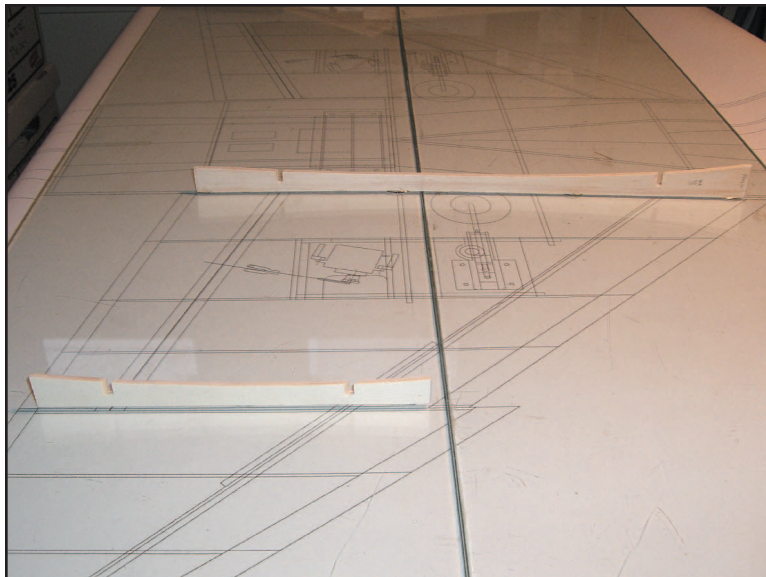


Photo 41

- □ 41. Cut from their sheets, two WJ-1 and two WJ-2, two WJ-3 and two WJ-4 (1/8" lite ply). Use the building square to align WJ-1 over W1 rib location and WJ-2 over W6 wing rib location and secure these to the building board so the front corners of WJ-1 and WJ-2 are even with the aft face of the leading edge stock. Repeat for the other side. (Photo 41)

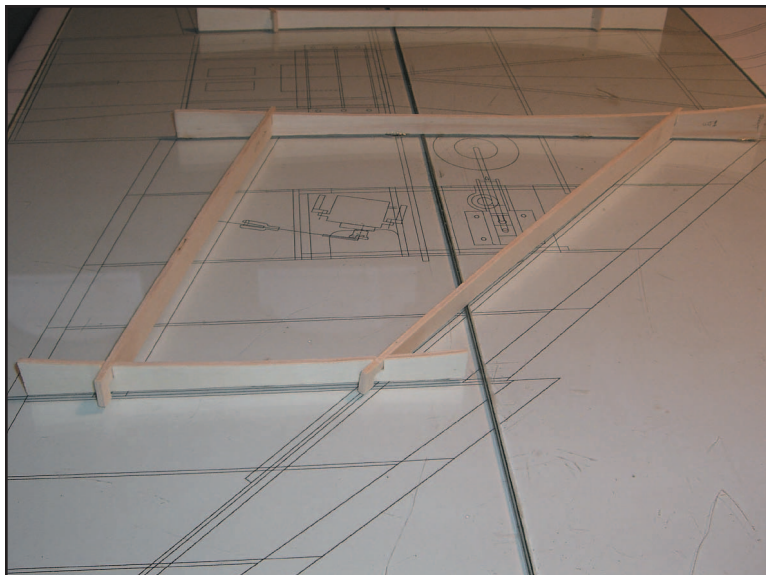


Photo 42

- □ 42. Slide WJ-3 into the forward slots in WJ-1 and WJ-2 and slide WJ-4 into the aft slots into WJ-1 and WJ-2. Tack glue all of the joints to keep the wing jigs from moving. Repeat for the other side. (Photo 42)



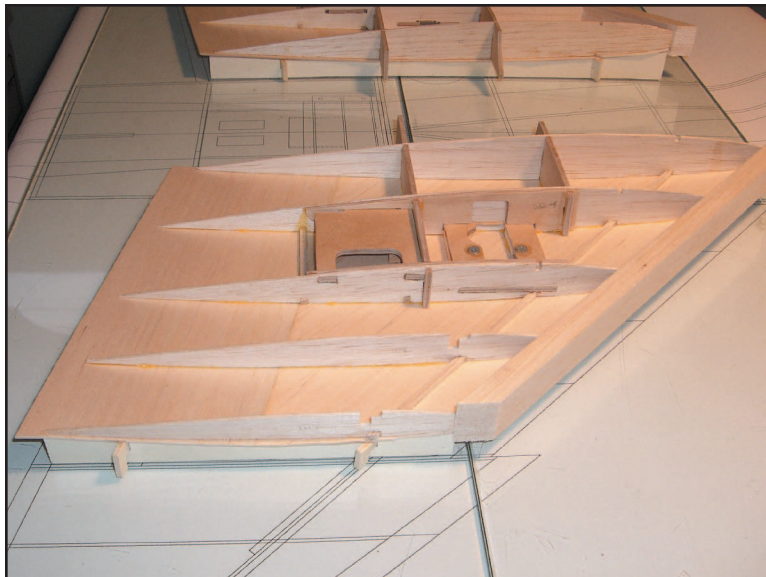


Photo 43

- □ 43. Put the inner wing panel into the wing jig with the aft face of the leading edge stock resting against the front corners of WJ-1 and WJ-2. Align the wing panels so that the wing ribs W1 is resting on WJ-1 and W6 is resting on WJ-2. Tack glue the wing panel to WJ-3 and WJ-4 so it doesn't move. Repeat for the other side. (Photo 43)

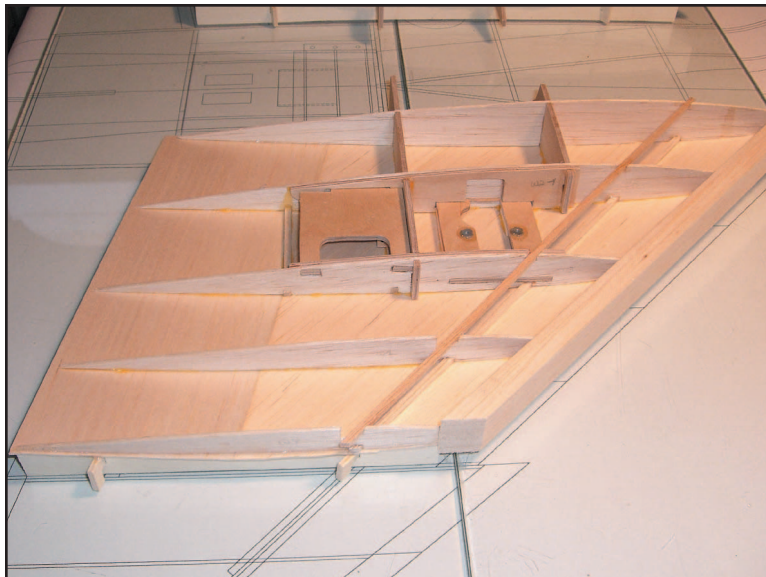


Photo 44

- □ 44. Cut a main spar from a 1/8" balsa stick and slip it into the main spar slots in the tops of the wing ribs and glue it in place.. Repeat for the other side. (Photo 44)

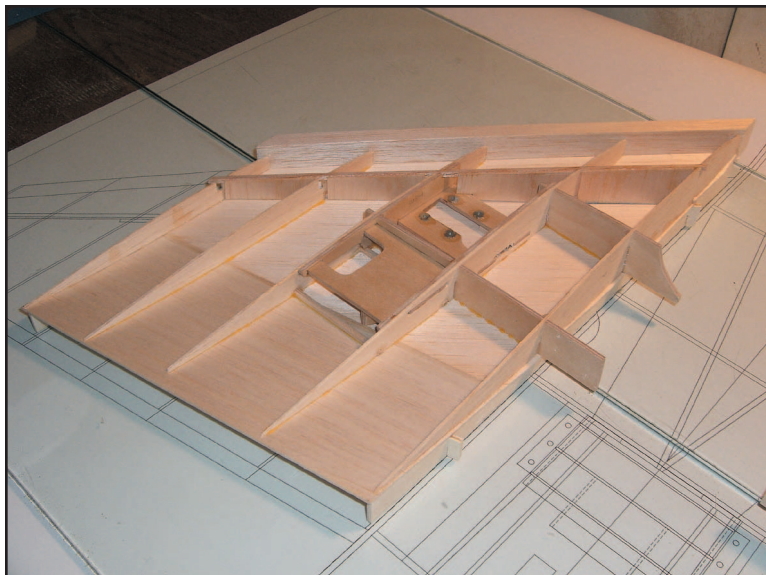


Photo 45

- □ 45. Using 1/16" balsa sheet, cut and glue the shear webs between the wing ribs and to the aft faces of the top and bottom main spars. Make sure the grain of the shear webs runs vertically. Repeat for the other side. (Photo 45)

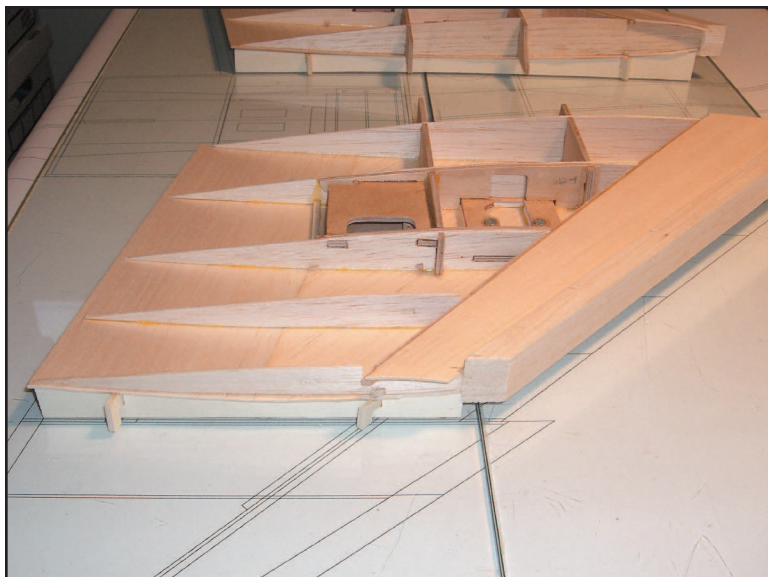


Photo 46

- □ 46. Position the forward wing sheeting over the wing between the leading edge and the main spar. Trim the trailing edge of the sheeting so it covers only the forward half of the main spar, leaving room for the aft wing sheeting to be glued to the rear half of the main spar. When you're satisfied with the fit, run a bead of carpenter's glue along the top of each wing rib between the main spar and the leading edge stock. Position the leading edge sheeting against the back of the leading edge stock and use thin CA to glue the sheeting to the leading edge. Push the sheeting down against the main spar and use thin CA to glue the sheeting to the main spar. Repeat for the other side. (Photo 46)



Photo 47

- □ 47. Test fit the aft wing sheeting to the wing. When satisfied, run a bead of carpenter's glue along each wing rib, and along the FS and RS stub spars. Position the sheeting to the main spar and use thin CA to glue the sheeting to the main spar. Use a sand baggy or magazines to weight down the wing sheeting and let the glue dry overnight. Repeat for the other side. (Photo 47)

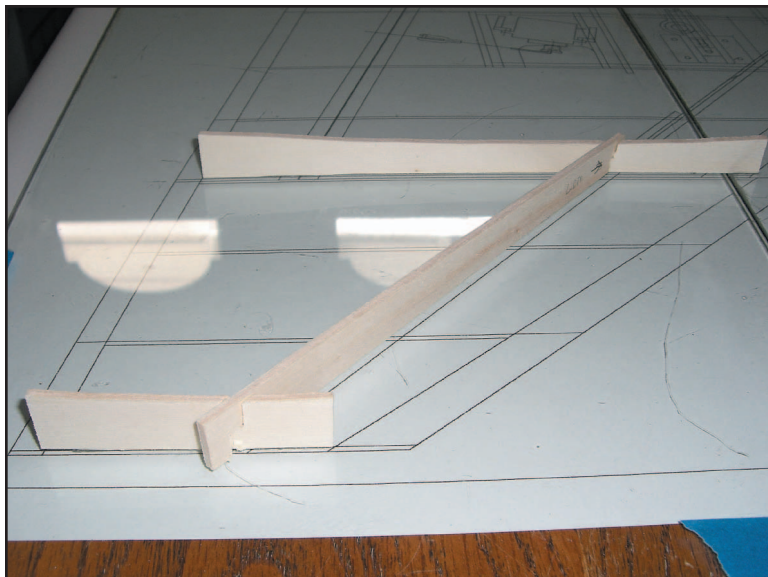


Photo 48

- □ 48. Cut from their sheets two WJ-5, two WJ-6 and two WJ-7 wing jigs (1/8" lite ply). Use the building square to position WJ-5 and WJ-6 so the front corners are aligned with the aft face of the leading edge stock and over wing ribs W7 and W9. Secure these to the building board. Slide WJ-7 into the slots in WJ-5 and WJ-6 and tack glue the joints. Repeat for the other side. (Photo 48)



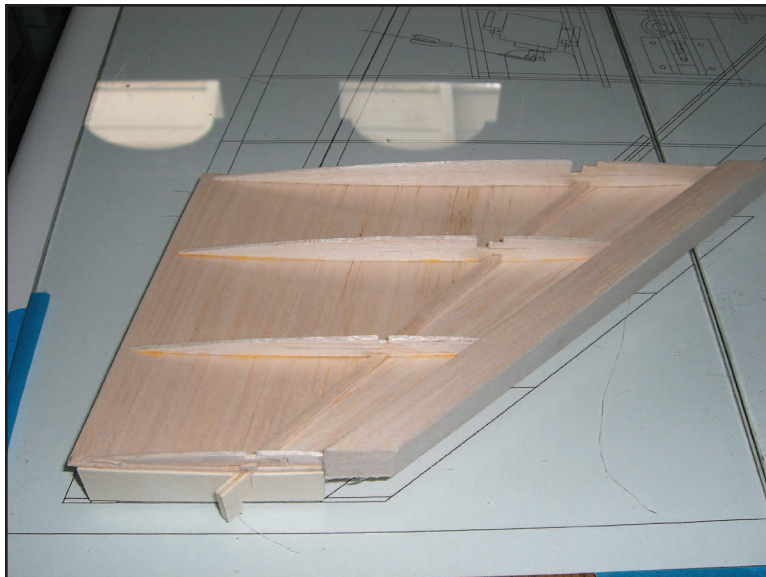


Photo 49

- □ 49. Put the outer wing panel into the wing jig with the aft face of the leading edge stock resting against the front corners of WJ-5 and WJ-6. Align the wing panels so that the wing ribs W7 is resting on WJ-5 and W9 is resting on WJ-6. Tack glue the wing panel to WJ-7 so it doesn't move. Repeat for the other side. (Photo 49)

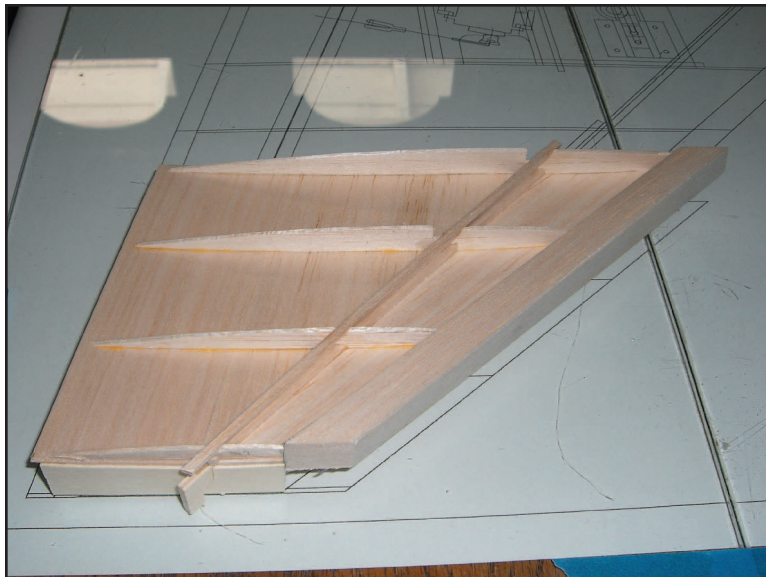


Photo 50

- □ 50. Cut two main spars from 1/8" balsa sticks and slide them into the main spar slots in the tops of the wing ribs. Using 1/16" balsa sheet, cut and glue the shear webs between the wing ribs and to the aft faces of the top and bottom main spars. Make sure the grain of the shear webs runs vertically. Repeat for the other side. (Photo 50)



Photo 51

- □ 51. Test fit, then position and glue the forward wing sheeting using the same technique you used for the inner wing panels using CA and carpenter's glue. Test fit the aft wing sheeting to the wing and position and glue it using the same technique you used for the inner wing panels. Weight the wing sheeting and let the glue dry overnight. Repeat for the other side. (Photo 51)

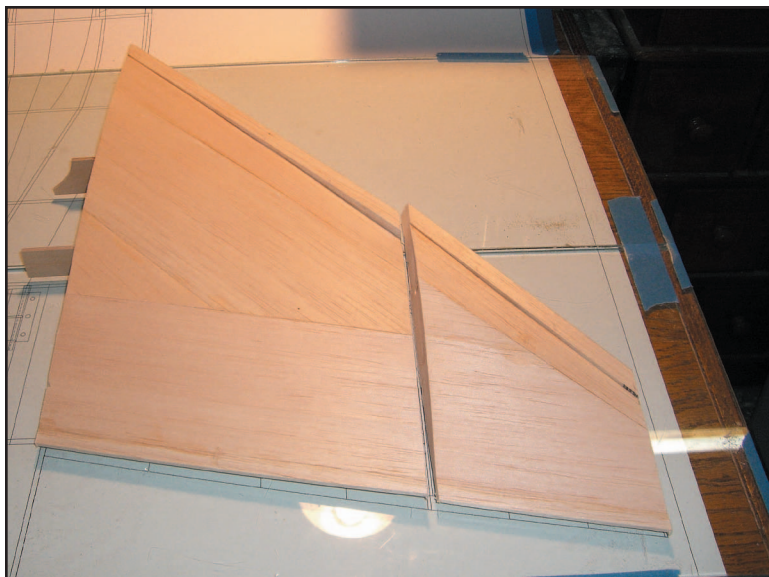


Photo 52

- □ 52. Once the glue has dried, remove the outer wing panel from the jigs. Using a razor saw, hobby knife and sanding block, sand the leading edge stock and wing sheeting flush with the wing ribs. Cut the wing sheeting so it is flush with the rear of the wing ribs and glue the top and bottom sheeting together using thin CA. Measure and cut two trailing edge pieces from 1/2" x 1/8" stock and glue them to the trailing edges of the wing sheeting. (Photo 52)

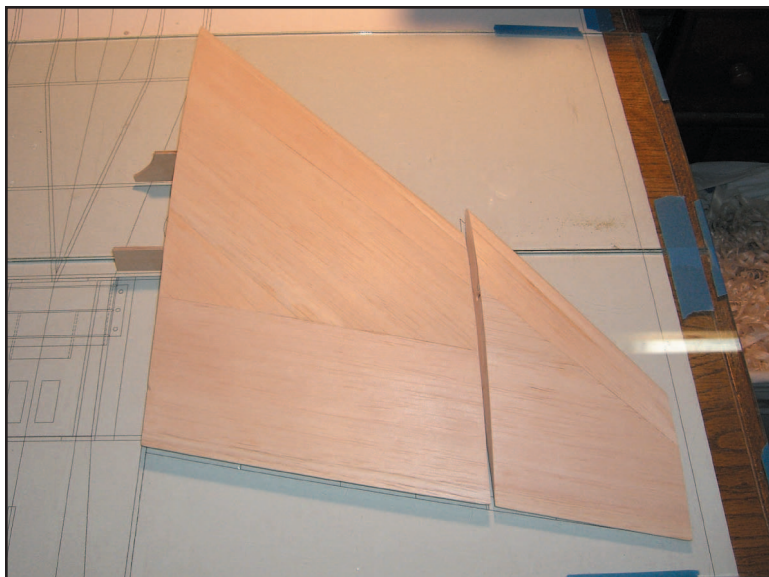


Photo 53

- □ 53. Use a razor plane and sanding block to shape the leading edges and trailing edges so they are even with the wing sheeting. (Photo 53)

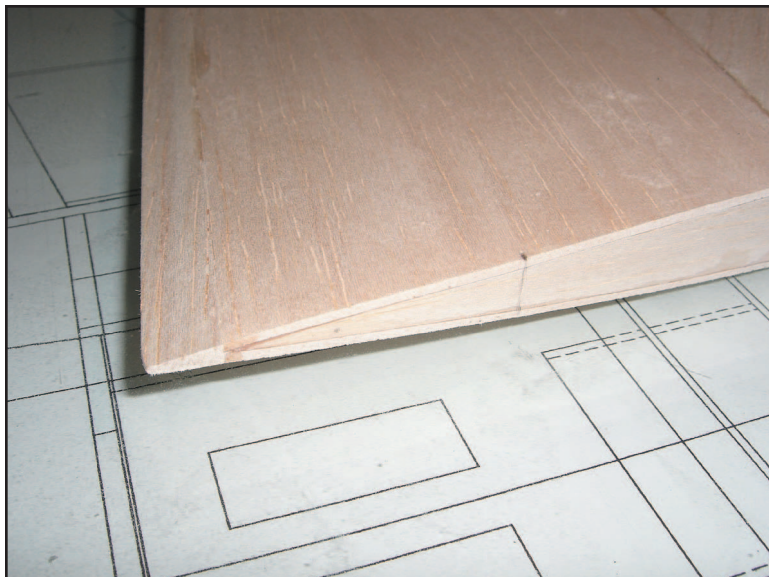


Photo 54

- □ 54. Measure and mark the position of the forward aileron spar stock onto the W6 rib. (Photo 54)



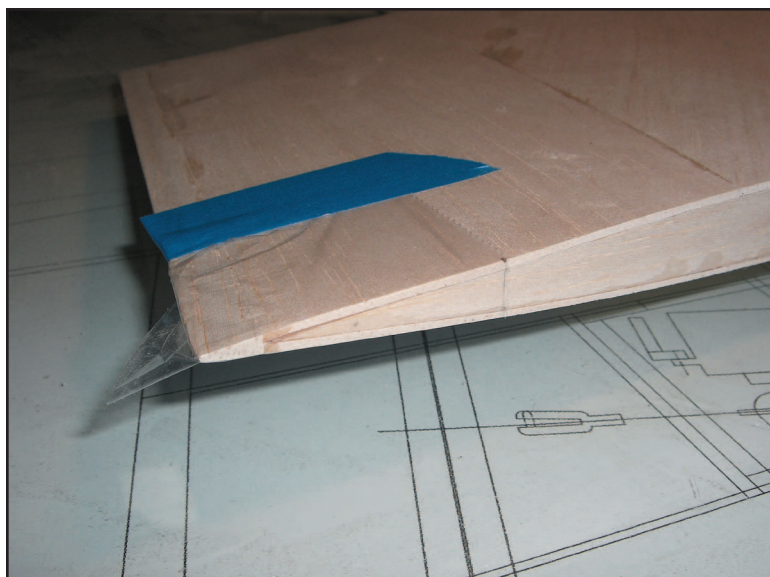


Photo 55

- □ 55. Tape some clear sandwich wrap around the W6 rib to prevent it from being glued to W7 rib when you join the inner and outer wing panels. Repeat Steps 52-55 for the other side. (Photo 55)

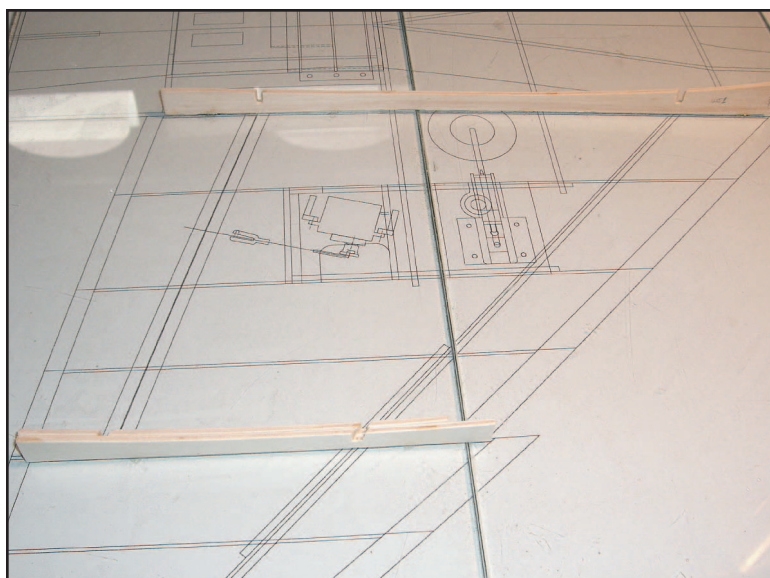


Photo 56

- □ 56. Separate WJ-1 and WJ-2 from WJ-3 and WJ-4. Separate WJ-5 and WJ-6 from WJ-7. Use the building square to position WJ-1 and WJ-2 over ribs W1 and W6. Align the forward corner of WJ-1 and WJ-2 so they are even with the aft face of the leading edge stock and secure them to the building board. Use the building square to position WJ-5 over rib W7 and align the forward corner of WJ-5 so it is even with the aft face of the leading edge sheeting and secure WJ-5 to the building board. (Photo 56)

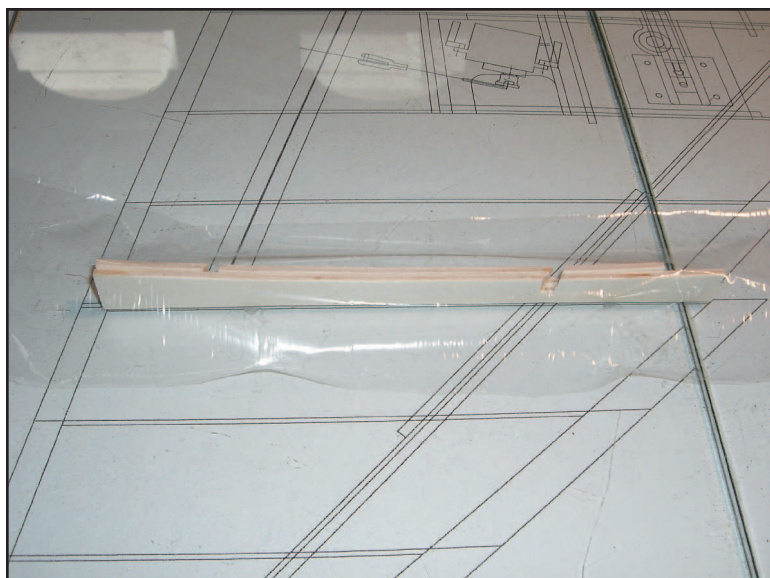


Photo 57

- □ 57. Lay some clear sandwich wrap over WJ-2 and WJ-5. (Photo 57)

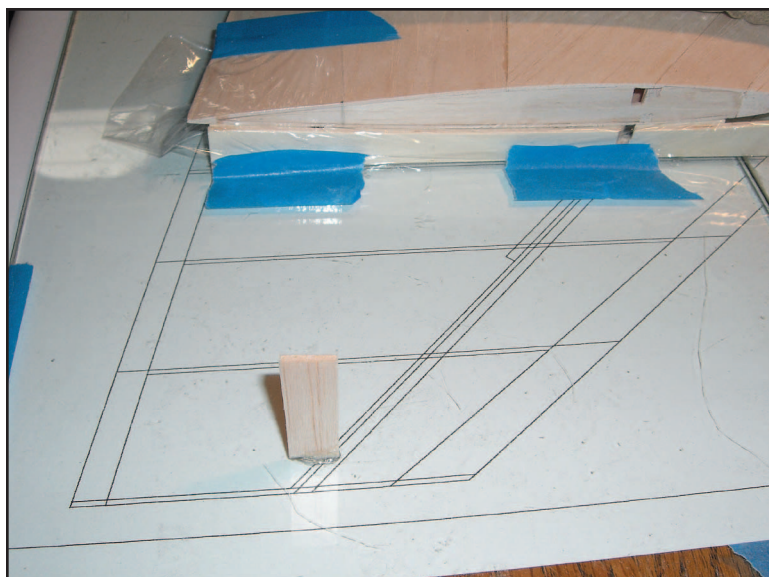


Photo 58

- □ 58. Use some masking tape to secure the clear sandwich wrap to WJ-2/WJ-5. Put the inner wing panel into the jig and align the aft face of the leading edge sheeting with the front corners of WJ-1 and WJ-2. Temporarily place the outer wing panel into the place so the aft face of the leading edge is aligned with the front corner of WJ-5 and raise the wing panel so the W7 rib is flush with W6 rib. Measure and cut a piece of scrap balsa to hold the wing panel in place. Secure this piece to the building board. (Photo 58)



Photo 59

- □ 59. Use a sand baggy to weight down the inner wing panel so it doesn't move. Apply a thin layer of 30-minute epoxy to the W6 and W7 ribs and position the outer wing panel into place in the wing jigs. Leave the wing in the jig until the glue has dried. Repeat Steps 56-59 for the other side. (Photo 59)



Photo 60

- □ 60. When the glue has dried, remove the wing panels from the jigs. Remove the clear sandwich wrap from between W6 and W7. On the tops and bottom of the inner wing panels, measure and mark the location of the front and rear aileron spars. Repeat for the other side. (Photo 60)





Photo 61

- ☐ ☐ 61. Use a hobby knife and razor plane to cut the ailerons from the inner wing panels. Repeat for the other side. (Photo 61)

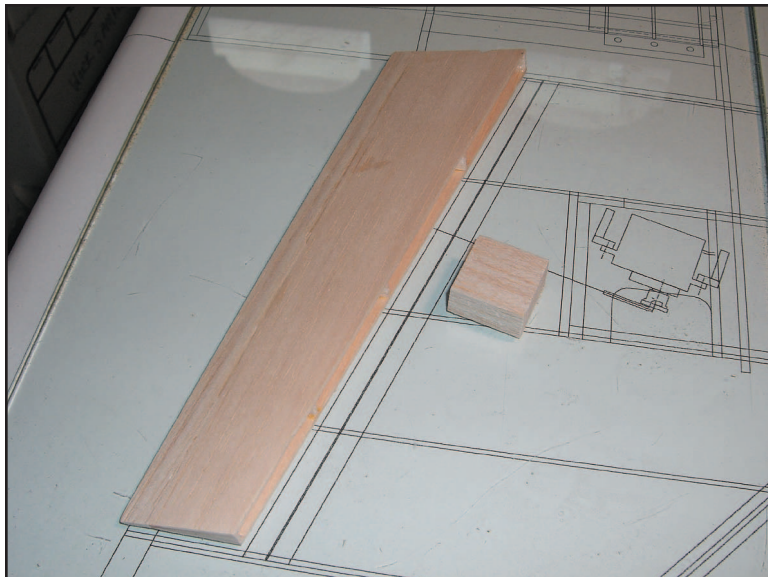


Photo 62

- ☐ ☐ 62. Measure and cut the 3/4" x 3/4" x 1/4" aileron horn filler block from some scrap balsa. Repeat for the other side. (Photo 62)

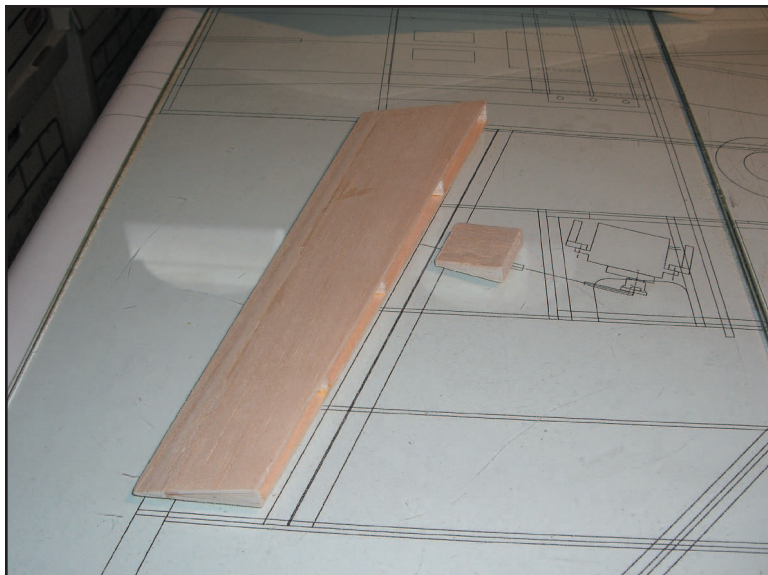


Photo 63

- ☐ ☐ 63. Use a razor plane and sanding block to taper the filler block so it fits into place between W2 and W3 ribs. When you're satisfied with the fit, glue it into place with carpenter's glue or medium CA. Repeat for the other side. (Photo 63)

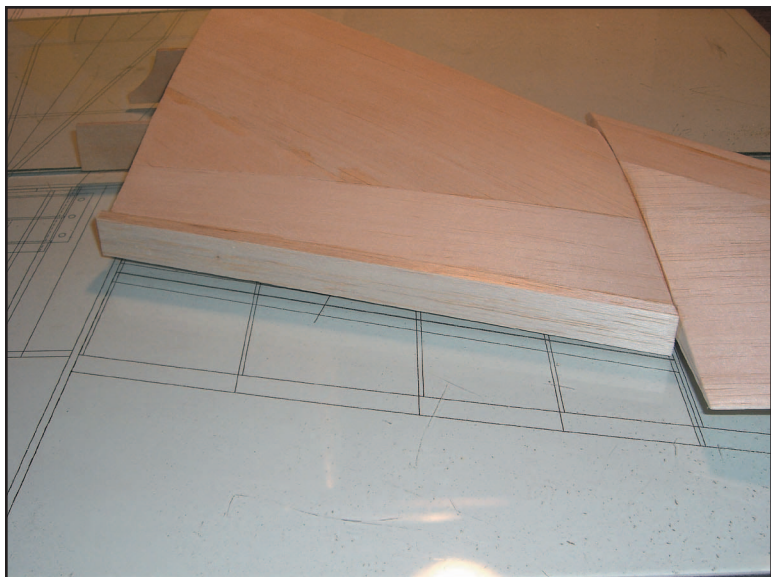


Photo 64

- □ 64. Measure and cut the aileron spars from 1/4" x 3/4" balsa stock. Glue the aileron spars to the trailing edge of the wing. Repeat for the other side. (Photo 64)

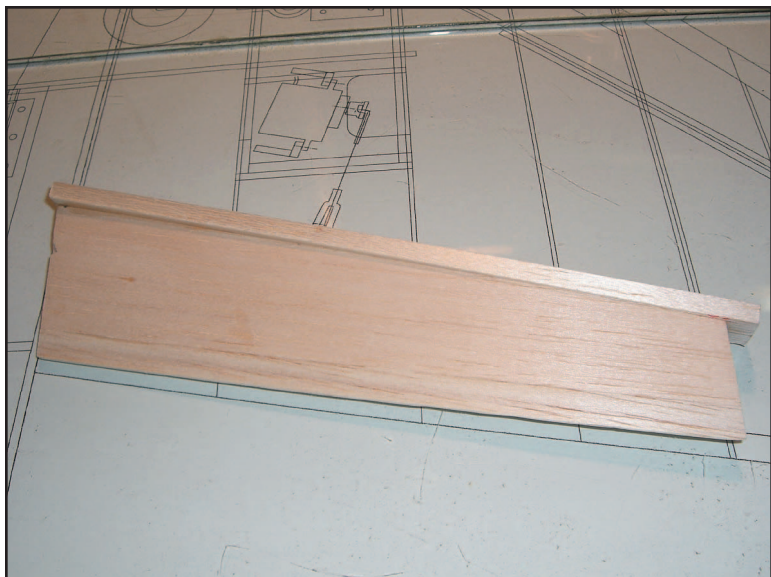


Photo 65

- □ 65. Measure and cut the aileron spars from 1/4" x 3/4" balsa stock. Glue these to the leading edge of the ailerons. Repeat for the other side. (Photo 65)



Photo 66

- □ 66. Use a razor saw, hobby knife and sanding block to trim the aileron spars so they are flush with the ends of the wing and aileron and wing and aileron sheeting. Repeat for the other side. (Photo 66)



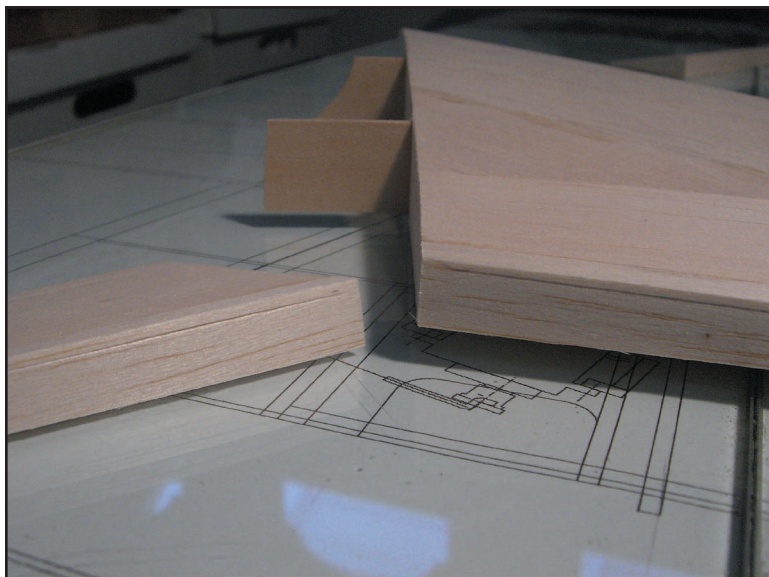


Photo 67

- ☐ ☐ 67. Measure and mark a line 1/16" from the top of the wing onto the aft face of the wing aileron spar and onto the front face of the aileron. Repeat for the other side. (Photo 67)



Photo 68

- ☐ ☐ 68. Mark the locations of the aileron hinges onto the wing and ailerons. Repeat for the other side. (Photo 68)



Photo 69

- ☐ ☐ 69. Use a razor plane and sanding block to bevel the leading edge of the aileron. Repeat for the other side. (Photo 69)



Photo 70

- □ 70. Measure and mark the location of the aileron servo opening on the bottom wing sheeting. Use a hobby knife to open the hole and trim it so it is flush with the aileron servo opening doublers and W2 and W3 ribs. Repeat for the other side. (Photo 70)



Photo 71

- □ 71. Assemble the ball joint onto aileron servo wheel and slide it into place onto the aileron servo. Do not screw it into place, yet. Install the aileron servo into the wing. Measure and mark the location of the aileron horn on the aileron spars. Repeat for the other side. (Photo 71)

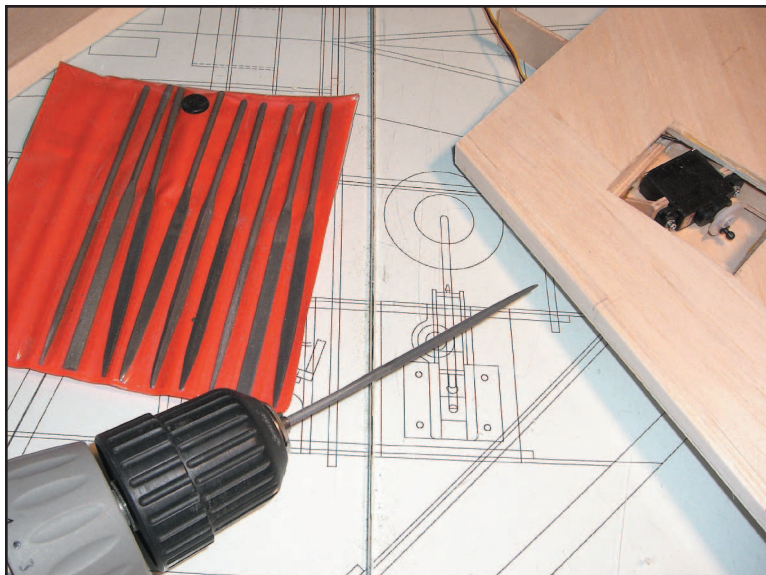


Photo 72

- □ 72. Install a triangular jeweler's file into an electric drill. This will be used to bore a hole into the aileron spar. Repeat for the other side. (Photo 72)



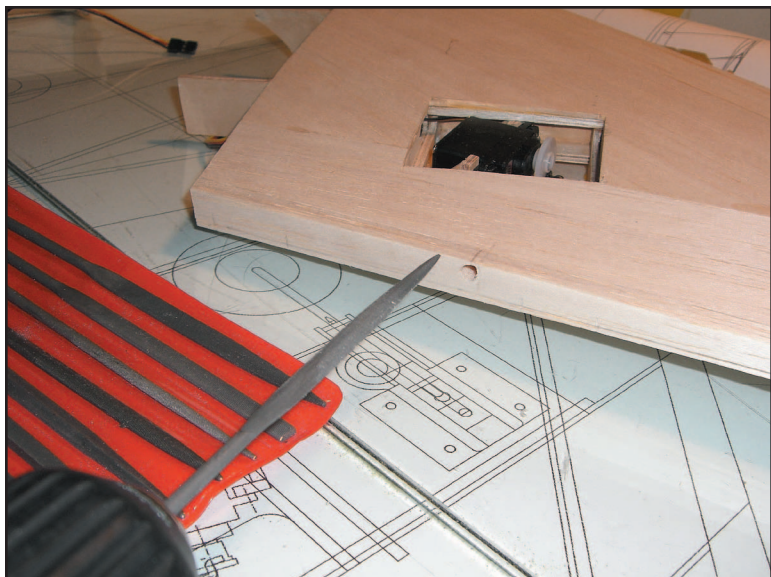


Photo 73

- □ 73. Mark a location on the wing aileron spar that is 1/8" above the bottom of the wing and use the jewelers file to bore a 1/4" hole. Make sure the hole is aligned between the ball joint on the servo wheel and the mark you just made. Repeat for the other side. (Photo 73)

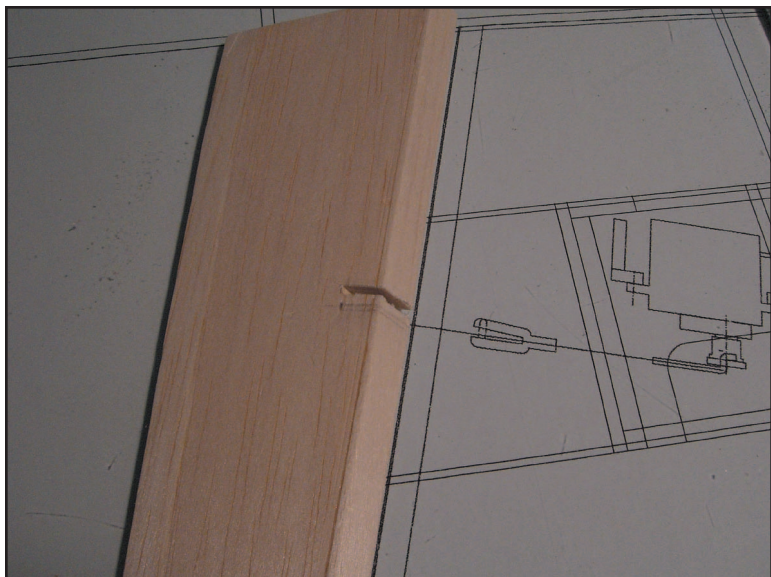


Photo 74

- □ 74. Use a razor saw and hobby knife to cut a 1/16" slot in the leading edge of the aileron. Repeat for the other side. (Photo 74)

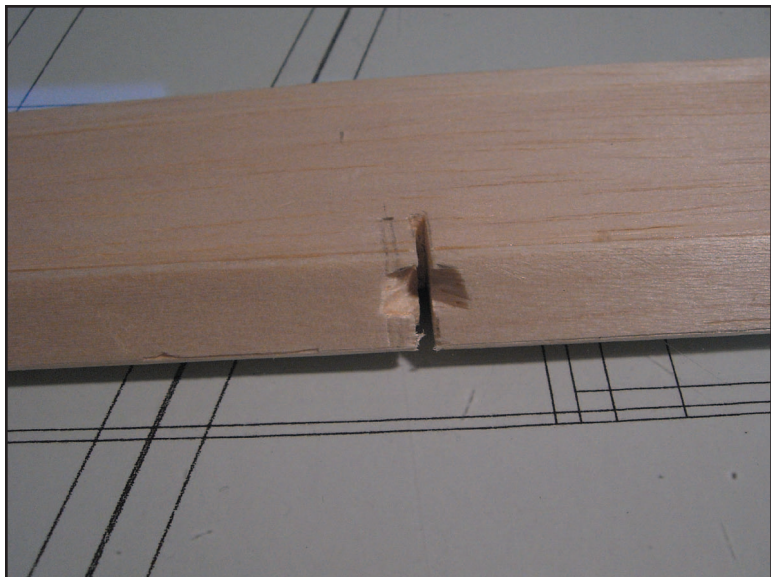


Photo 75

- □ 75. Use a hobby knife to open a pocket in the leading edge of the aileron spar near the bottom of the wing so the clevis can be installed and removed from the aileron horn once the aileron has been glued to the wing. Repeat for the other side. (Photo 75)

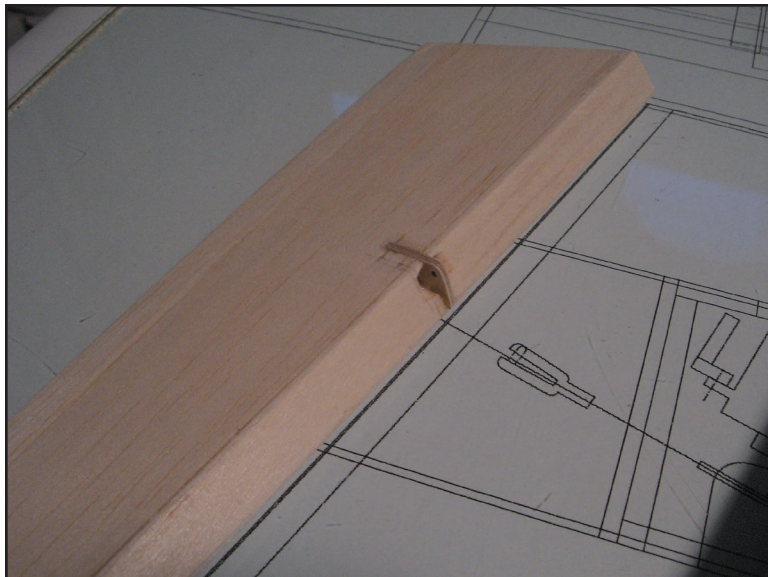


Photo 76

- □ 76. Position and glue the aileron horn into the slot in the ailerons. Test-fit the clevis and make any adjustments to the pocket so the clevis can be easily installed and removed. Repeat for the other side. (Photo 76)



Photo 77

- □ 77. Enlarge the hold in the trailing edge of the wing so the clevis can be installed and removed once the aileron is glued to the wing. Repeat for the other side. (Photo 77)



Photo 78

- □ 78. Install, but don't glue the aileron onto the wing. Make up the aileron pusrod and install it into the wing. Repeat for the other side. (Photo 78)



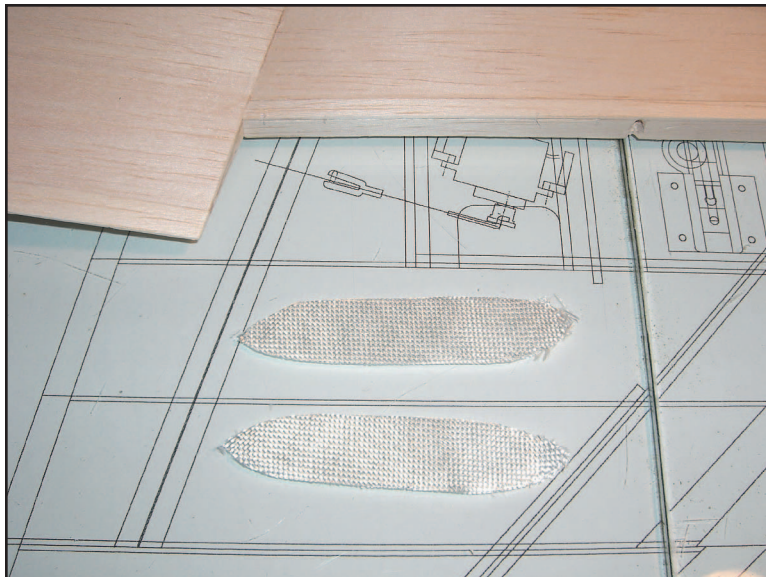


Photo 79

- □ 79. Cut two small pieces of 4 oz. fiberglass cloth to reinforce the inner and outer wing joints. Repeat for the other side. (Photo 79)

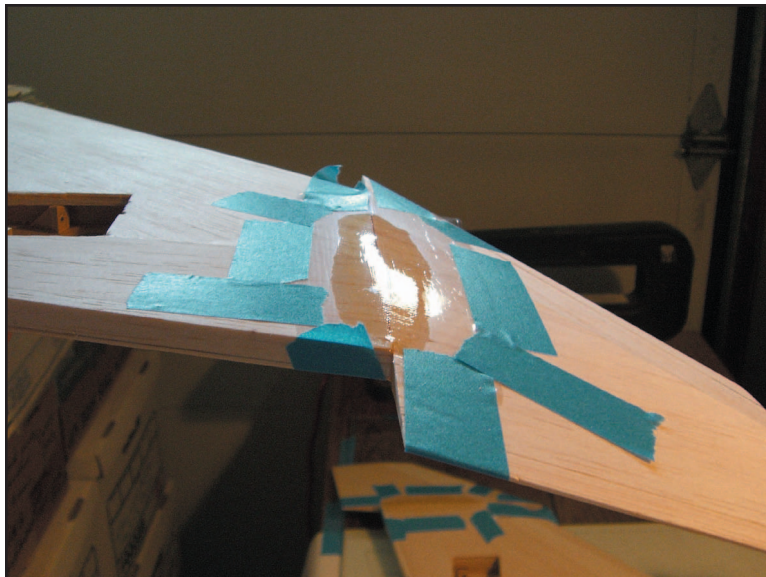


Photo 80

- □ 80. Place the fiberglass cloth over the wing joints. Mix a small quantity of laminating epoxy and wet out the cloth. Tape a small piece of clear sandwich wrap over the joint. Use your finger to feather the edge of the resin. Leave to dry overnight. Repeat for the other side. Make sure to reinforce the tops and bottoms of the wing joints. Set the wing panels aside for now. (Photo 80)

## Fuselage Construction

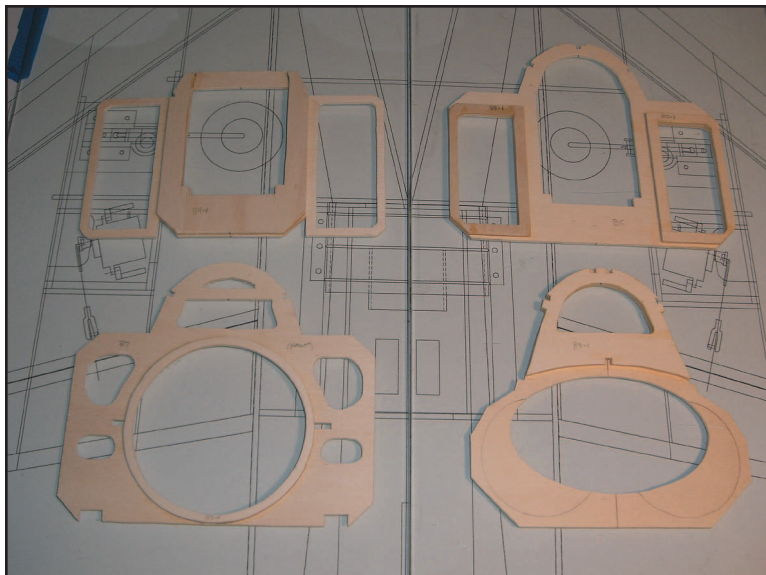


Photo 81

- 81. Cut from their sheets, one B4, B4-1, B5, two B5-1, one B7, B7-1, B9 and B9-1 (1/8" lite ply). Glue B4-1 to the front of B4, both B5-1 to the front of B5, B7-1 to the front of B7 and B9-1 to the back of B9. Insert two 1/4" round magnets into the holes in the bottom of B9. Make sure the magnets are flush with the back face of B9. and glue them into place. (Photo 81)

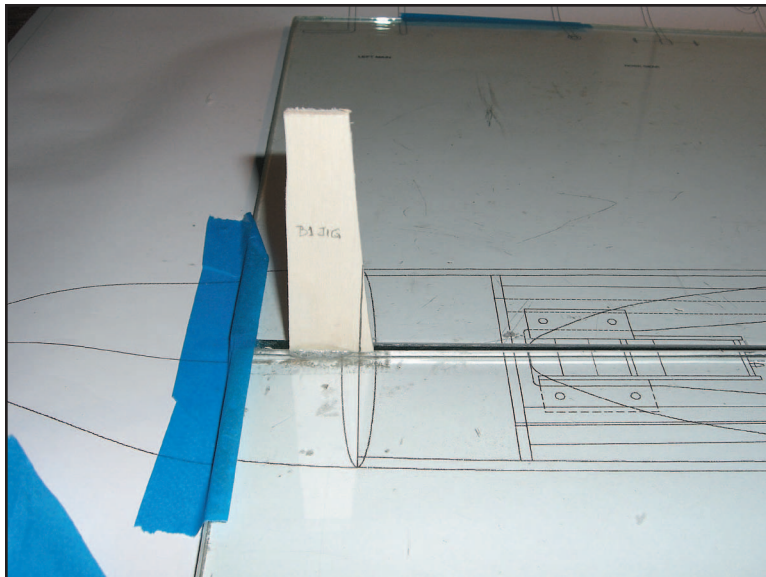


Photo 82

- ☐ 82. Cut from its sheet one B1 jig. Use the building square to position it so the alignment mark is even with the centerline of bulkhead B1 and secure it to the building board. (Photo 82)

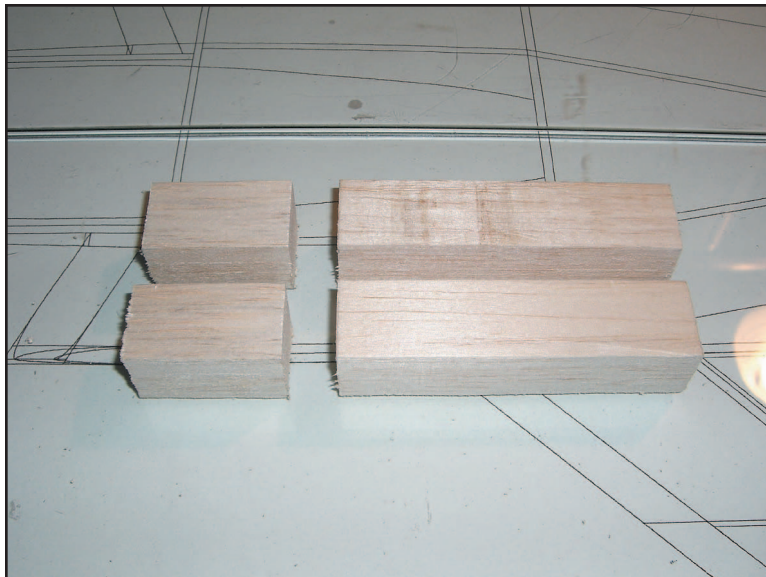


Photo 83

- ☐ 83. Measure and cut the lower corner blocks from 1" triangle stock. You will need two front and two rear corner blocks. (Photo 83)

**NOTE:** The front and rear corner blocks are shown in Photo 83 as being square stock. This has been updated in the kit to be 1" triangle stock.

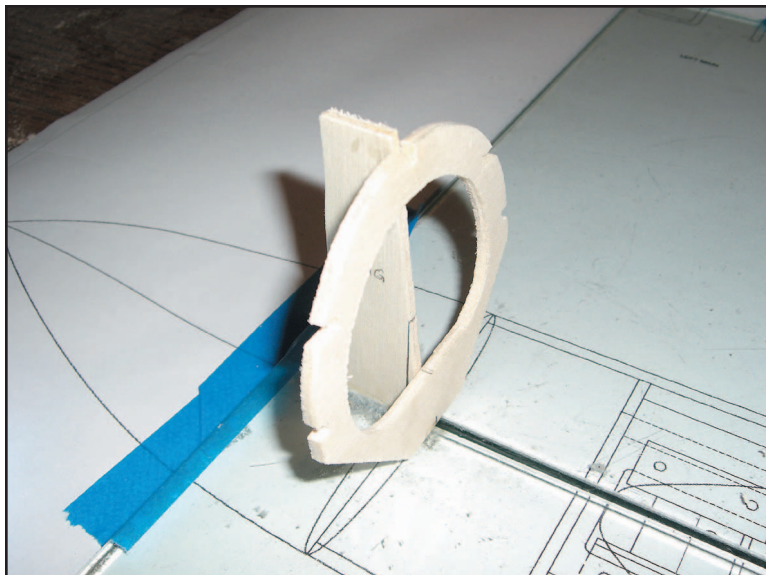


Photo 84

- ☐ 84. Position B1 over the plans so it is touching the B1 Jig. Tack glue it to the B1 Jig and secure it to the building board. (Photo 84)



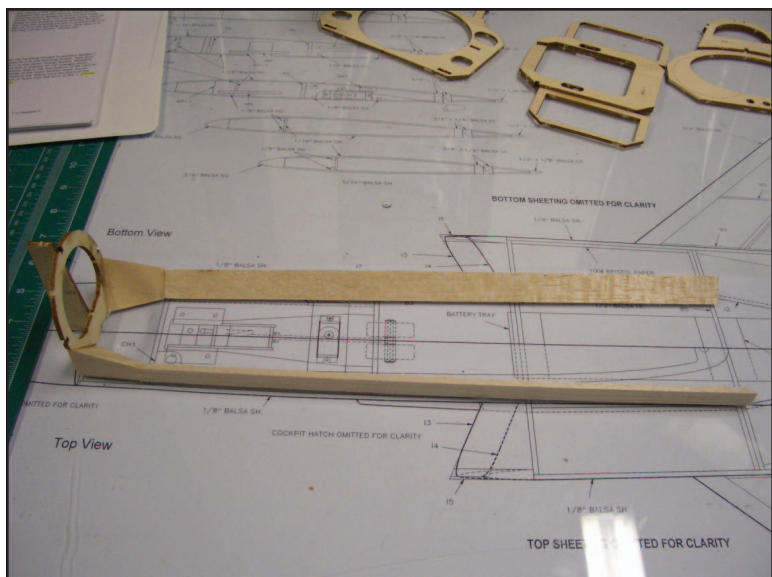


Photo 85

- 85. Cut from its sheet one B2 (1/8" lite ply). Use a razor plane and sanding block to taper the inside of the front corner blocks so they will fit between B1 and B2. When satisfied, secure the front corner block to the building board and tack glue it to B1. Measure and cut two lower corner blocks from 1/2" triangle stock. Secure it to the building board between B2 and B5. (Photo 85)

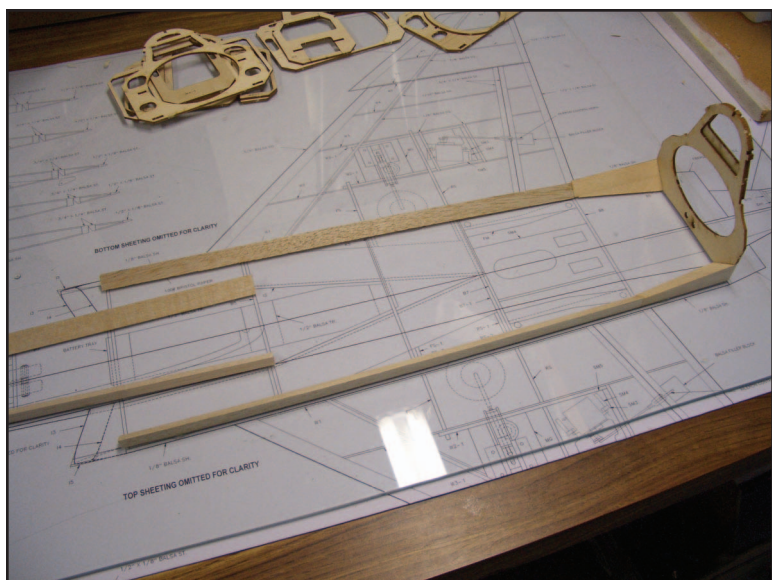


Photo 86

- 86. Use a razor plane and sanding block to taper the inside of the rear corner blocks so they fit between B8 and B9. Secure these to the building board. Measure and cut two lower corner blocks from 1/2" triangle stock. Secure these to the building board between B4 and B8. Use the building square to position B9 and secure it to the building board. Tack glue it to the rear corner blocks. (Photo 86)

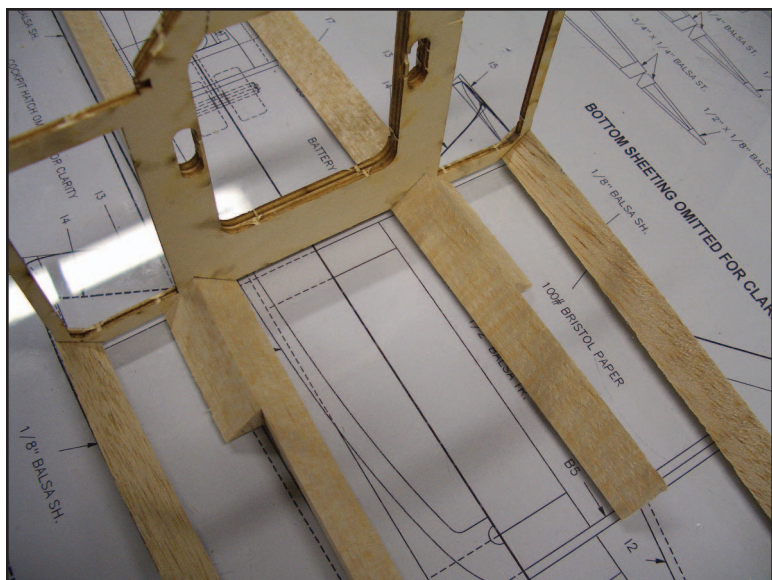


Photo 87

- □ 87. Use the building square to position B4/B4-1 and secure it to the building board. Tack glue B4/B4-1 to the lower corner blocks. Measure and cut two 2" pieces of 1/2" triangle stock filler blocks. Slip it into the bottom of B4 next to the outside of the nose section lower corner blocks behind B4. Make sure the front of the filler block is flush with the back of B4. (Photo 87)

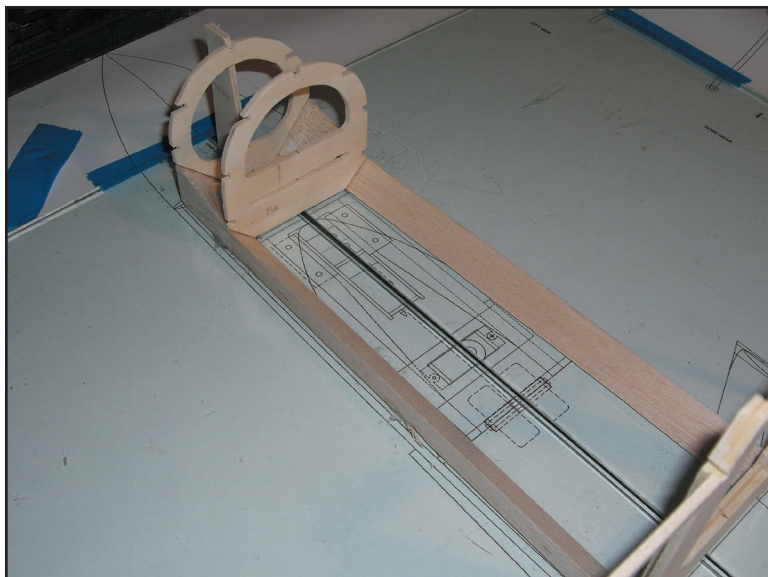


Photo 88

- ☐ 88. Use the building square to position B2 and secure it to the building board. Tack glue B2 to the lower corner blocks. (Photo 88)

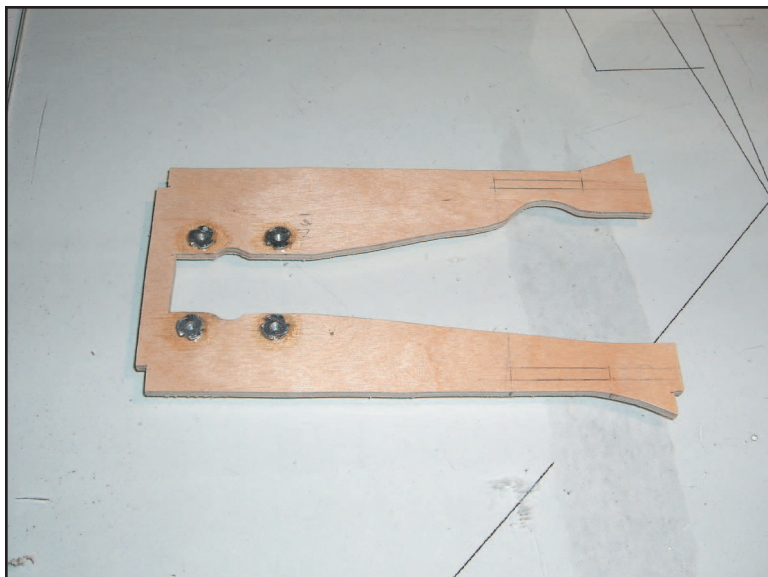


Photo 89

- ☐ 89. Cut from its sheet one NG mount (1/8" birch ply). Using your nose landing gear retract as a guide, drill 4 1/8" holes in NG. Press a 2-56 blind nut into each hole on the top side of the MG and secure them with glue. (Photo 89)

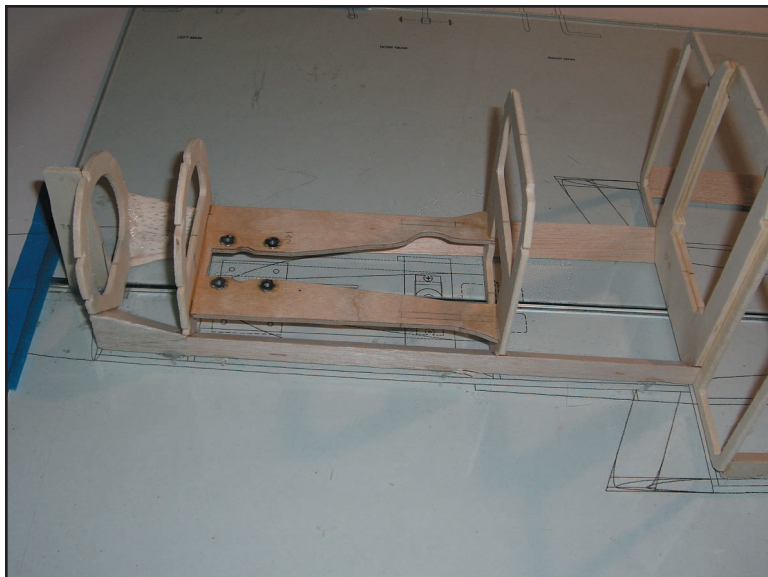


Photo 90

- ☐ 90. Cut from its sheet one B3 (1/8" lite ply). Slip the front of NG into the slot in B2. Use the building square to position B3 and slip the back of NG into the slots in B3. Secure B3 to the building board and tack glue it to the lower corner blocks. (Photo 90)



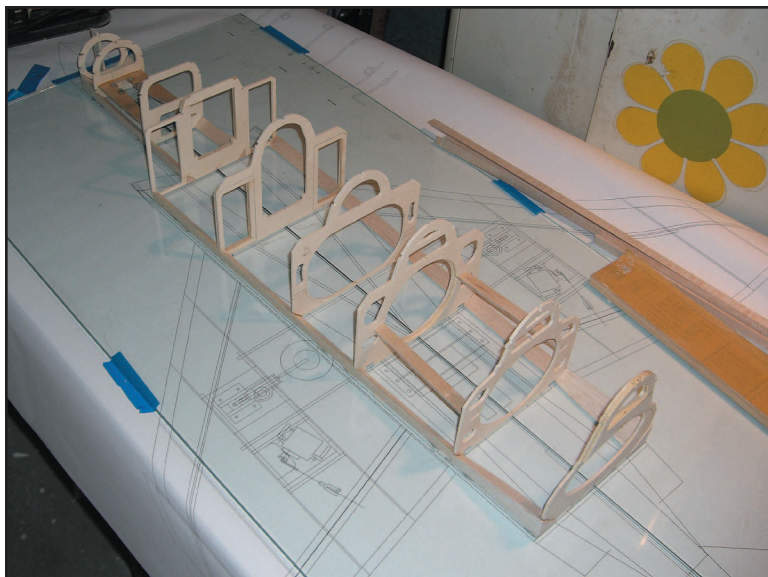


Photo 91

- 91. Cut from their sheet, one B6 and one B8 (1/8" lite ply) and two FM fan mounts (1/8" birch ply). Use the building square to position B5, B6 and B7/B7-1 and secure them to the building board. Tack glue B5, B6 and B7/B7-1 to the lower corner blocks. Slip the front of each FM into the slots in B7, but do not glue them at this time. Use the building square to position B8 and slip the back of each FM into the slots in B8, but do not glue them at this time. Secure B8 to the building board. Tack glue B8 to the lower corner blocks. (Photo 91)



Photo 92

- 92. Place the wings between B6 and B7 to verify that the FS front stub spars are flush with the back of B6 and that the RS stub spars are flush with the front of B7. If they are not, you will need to carefully remove the bulkheads from the building board and lower corner blocks and reposition the bulkheads so the spars do fit flush. (Photo 92)

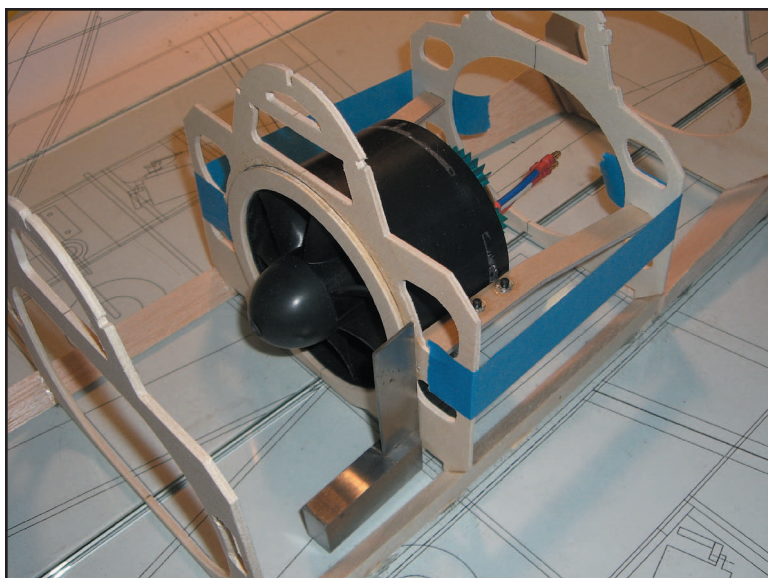


Photo 93

- 93. Slip the fan unit into place in the back of B7. Mark the locations of the mounting holes on each FM. Remove the fan unit and each FM and drill 1/8" holes in each FM. Press a 2-56 blind nut into the top of each FM and secure them with glue. Slip each FM into the slots in B7 and B8. Slip the fan unit into place in the back of FM and insert a 2-56 screw into each blind nut from the top to act as alignment pins to prevent the fan unit from moving. Use the building square to make sure B7 is perpendicular to the building board. Tack glue each FM to B7 and B8. (Photo 93)



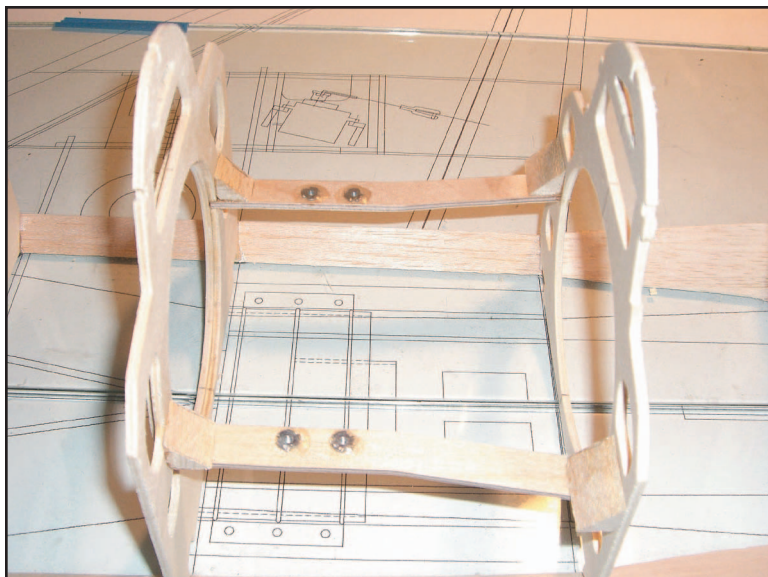


Photo 94

- ☐ 94. Remove the 2-56 screws from the blind nuts and remove the fan unit. Cut four joint doublers from 1/2" triangle stock and glue these to the top joints of each FM and B7 and B8. (Photo 94)

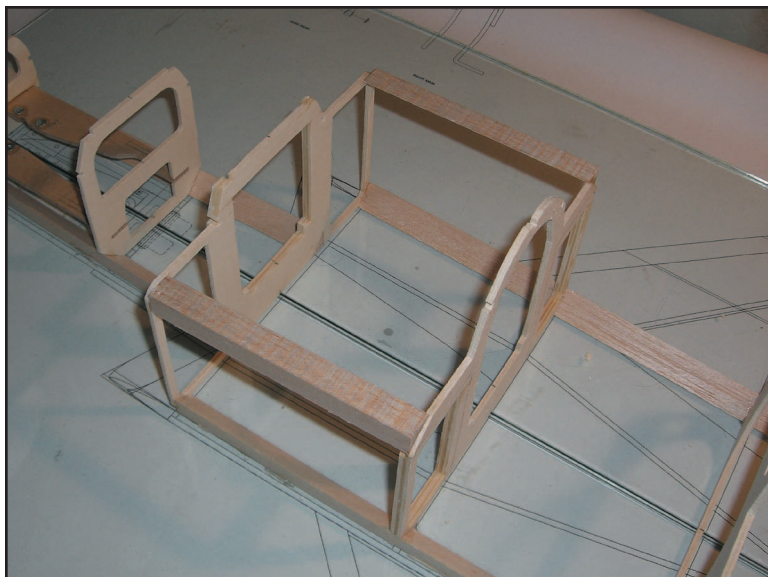


Photo 95

- ☐ 95. Measure and cut two top corner blocks from 1/2" triangle stock. Position the top corner blocks so that it is only glued to the front half of B5 and tack glue these to the tops of B4 and B5. (Photo 95)

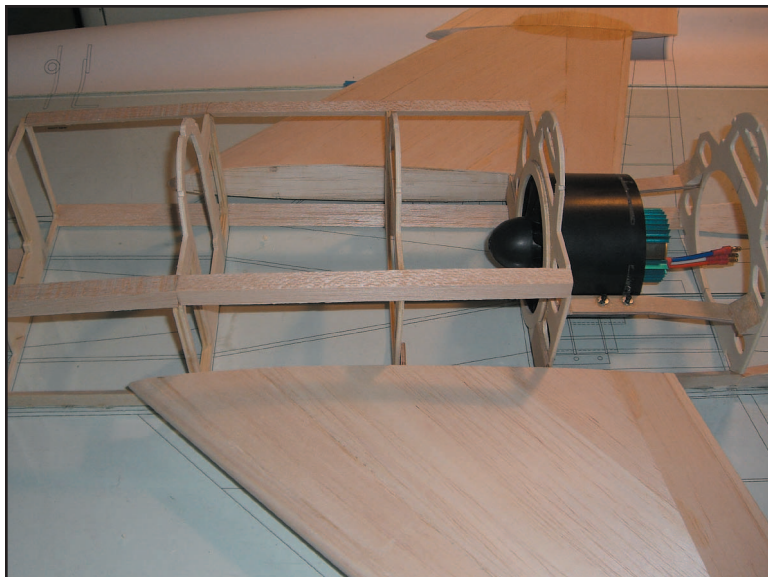


Photo 96

- ☐ 96. Measure and cut two top corner blocks from 1/2" triangle stock between B5 and B7. Position the top corner blocks so that it is only glued to the front half of B7. Place the wings into place between B6 and B7 and the fan into place into the back of B7. Insert the 2-56 screws to act as alignment pins to keep the fan from moving. Make sure B6 and B7 are flush with the stub spars and that B7 is still perpendicular to the building board. When satisfied, tack glue the corner blocks to the tops of B5, B6 and B7. (Photo 96)



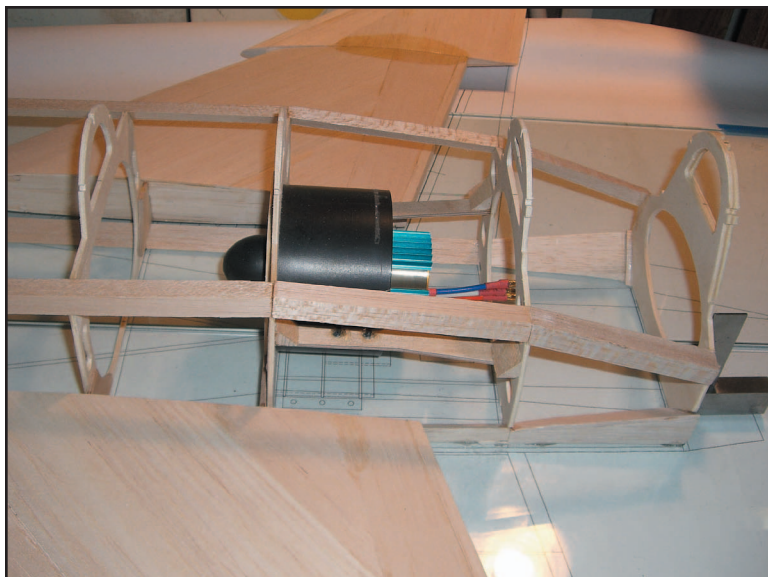


Photo 97

- ☐ 97. Measure and cut two top corner blocks from 1/2" triangle stock between B7 and B9. Position and tack glue these to the tops of B7 and B8. (Photo 97)

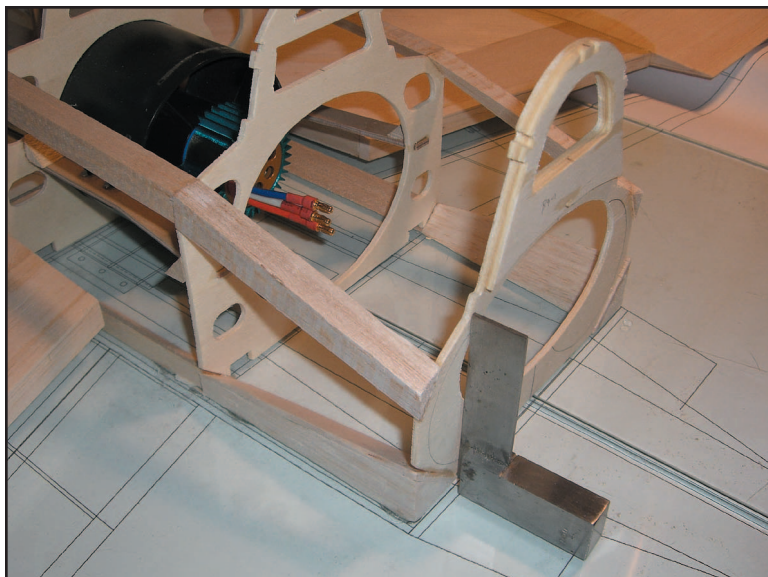


Photo 98

- ☐ 98. Use the building square to make sure that B9 is perpendicular to the building board, then tack glue the top corner blocks to B9. (Photo 98)

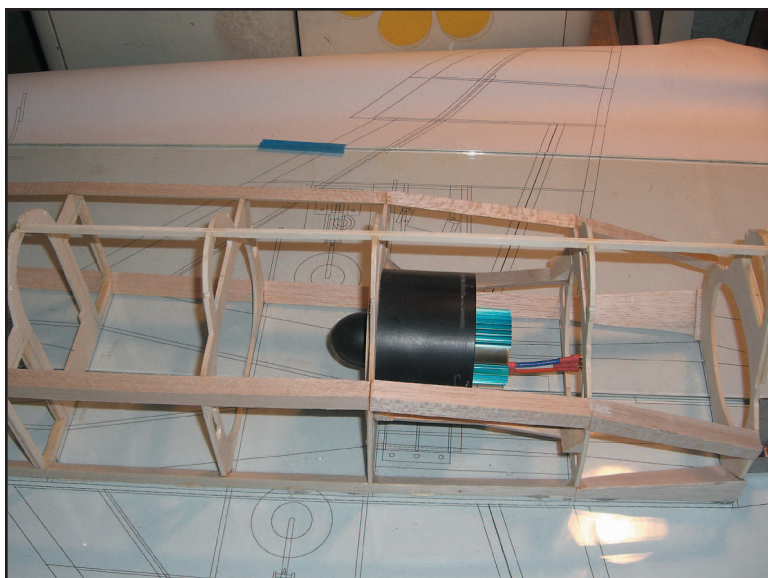


Photo 99

- ☐ 99. Cut from its sheet K1 top keel (1/8" lite ply) and slip it into place in the slots in the top of B4, B5, B6, B7, B8 and B9. Do not glue it at this time. (Photo 99)

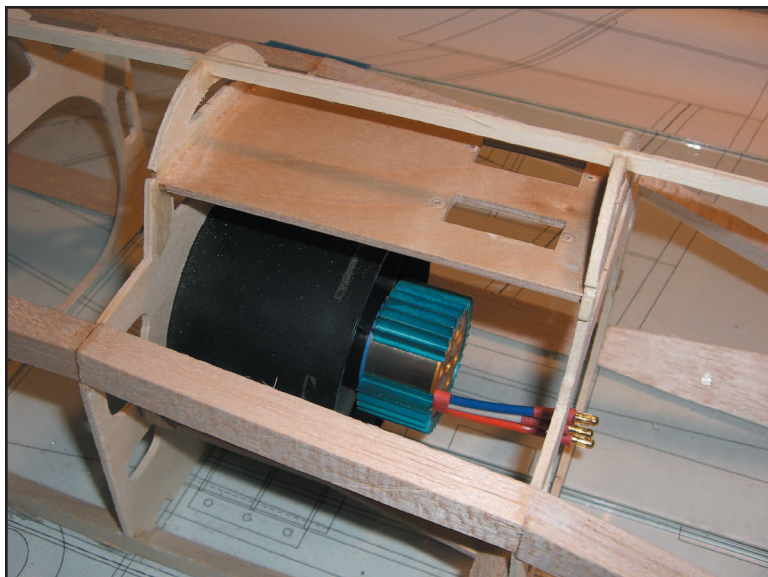


Photo 100

- 100. Cut from its sheet the SM4 servo mount (1/8" birch ply). Slip SM4 into place between B7 and B8. Tack glue SM4 to B7 and B8. Tack glue K1 to B5, B6, B7, B8 and B9. (Photo 100)

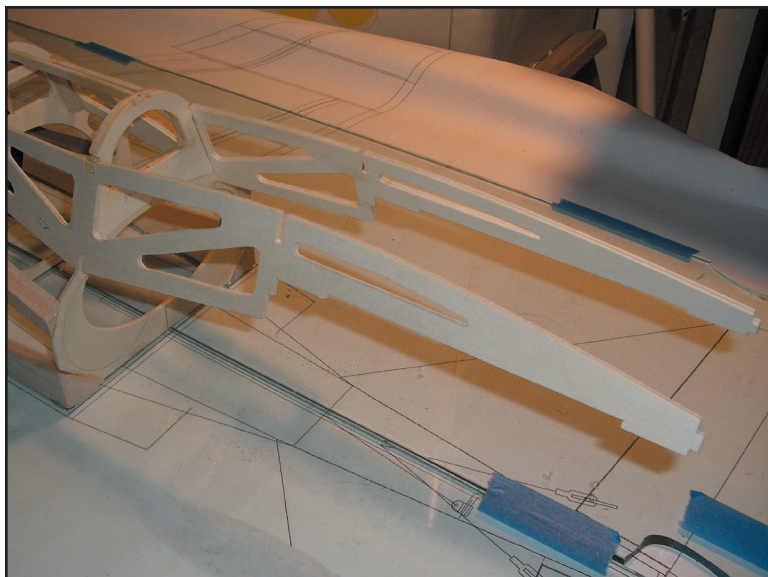


Photo 101

- □ 101. Cut from their sheets, two K2 and two K3 (1/8" lite ply). Position and tack glue K2 to the slots in B8 and B9. Glue K2 to the bottom of the slots in B8 and B9. This is to leave room at the top of K2 to install a 1/8" balsa stringer later on. Position K3 to the slots in B9-1. Measure the front and back of the elevator mount slot in K3 to verify that it is level with the building board. When satisfied that K3 is level, tack glue it to the building board. Repeat for the other side. (Photo 101)

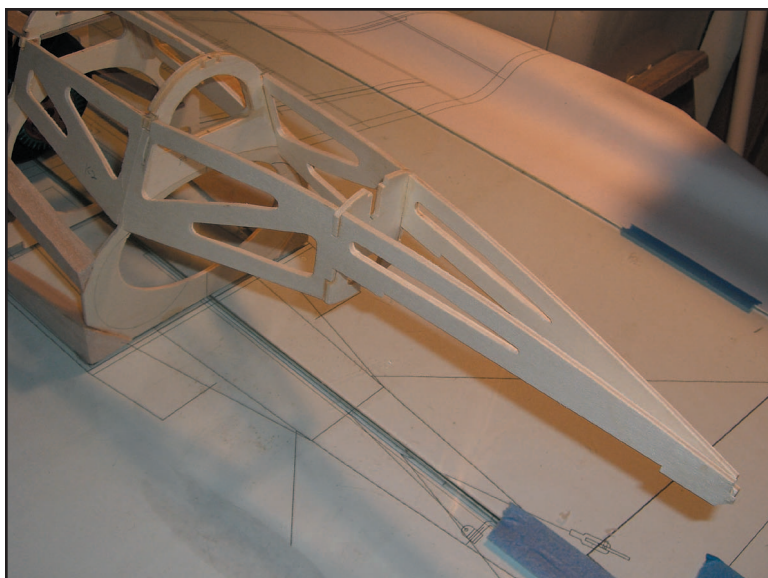


Photo 102

- 102. Cut from its sheet one B10 (1/8" lite ply). Position B10 into the slots between the right and left K3 keels. Measure the front and back of the elevator slot in K3 keels to verify that they are still level to the building board and even with each other. When satisfied, tack glue both K3 keels to B10. (Photo 102)



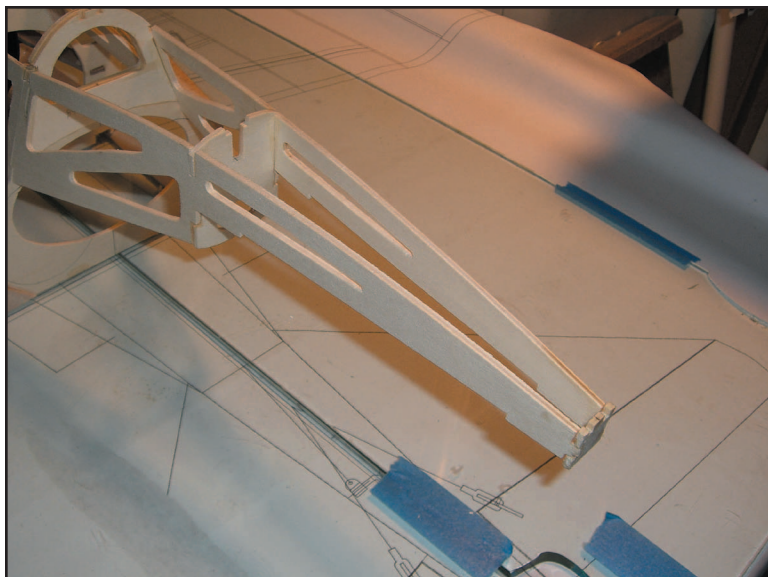


Photo 103

- 103. Cut from its sheet one B12 (1/8" lite ply). Position B12 in the slots at the back of both K3. Verify that both K3 keels are level to the building board and that B12 is square. When satisfied, tack glue B12 to both K3 keels. (Photo 103)



Photo 104

- 104. Cut from its sheet one EM elevator mount (1/8" lite ply). Position EM into the elevator mount slots in the bottom of both K3 keels and tack glue EM to both K3 keels and to B10 and B12. Cut from their sheets one B11 (1/8" lite ply). Insert a 1/4" round magnet into the hole in B11 so it is flush with the front face and glue the magnet into place. Position B11 on the stab mount so it is centered and the front face is flush with the notch in K3. When satisfied, glue B11 to the stab mount and to K3. (Photo 104)

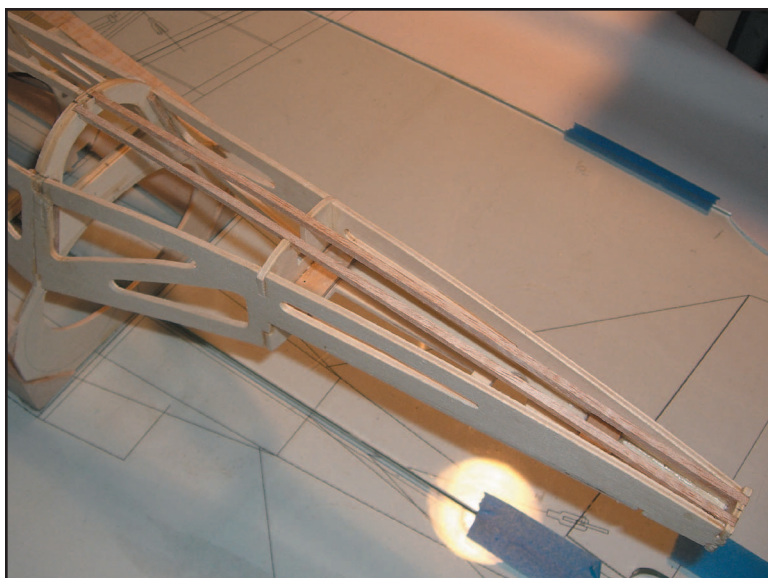


Photo 105

- □ 105. Cut from its sheet two K4 rudder keels. Position K4 into the slots in the top of B9, B10 and B12. Make sure that the vertical stab is able to fit in the slot formed by the rudder keels. Make sure the vertical stab sits flush on the top of EM. If necessary, trim the tab in the bottom of the vertical stab so the tab fits into the slot in EM so the vertical stab does sit flush on EM. When satisfied, glue the rudder keels into place. Repeat for the other side. (Photo 105)



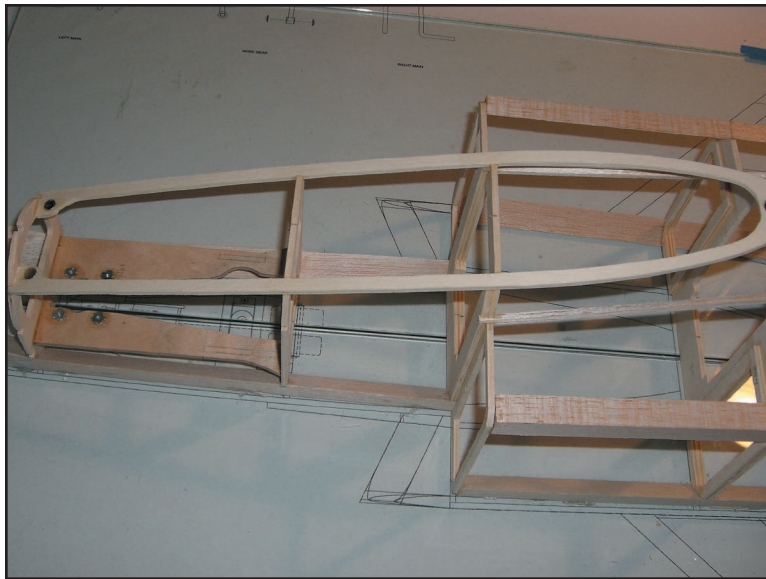


Photo 106

- 106. Cut from its sheet one CH1 (1/8" lite ply). Insert a 1/4" round magnet into each hole and glue the magnet to CH1 so it is flush with the top of CH1. When the glue is dry, position and glue CH1 into the slots in B2, B3 and B4 and to the top of K1. Once the glue has dried, use a high-speed rotary sander to bevel the outer edges of CH1 so it matches the profile of the bulkheads.(Photo 106)

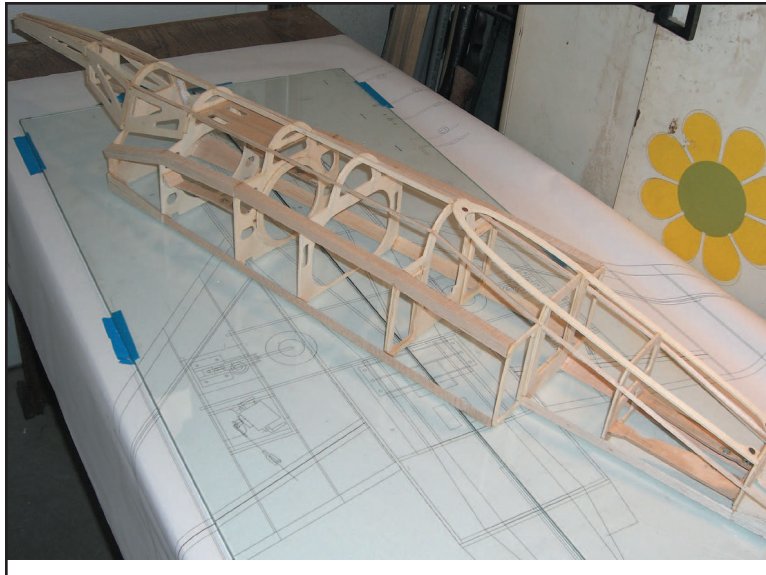


Photo 107

- 107. At this point, the basic construction of the fuselage skeleton is complete. Reinforce all glue joints so they are solid. Once the glue has dried, carefully remove the fuselage skeleton from the building board. Use a razor plane and sanding block to shape the corner blocks to match the profile of the bulkheads. Do not round the corner blocks at this time. These will get rounded after the fuselage is sheeted. Sand the entire skeleton so all the outer joints are smooth and framework is ready for sheeting. (Photo 107)

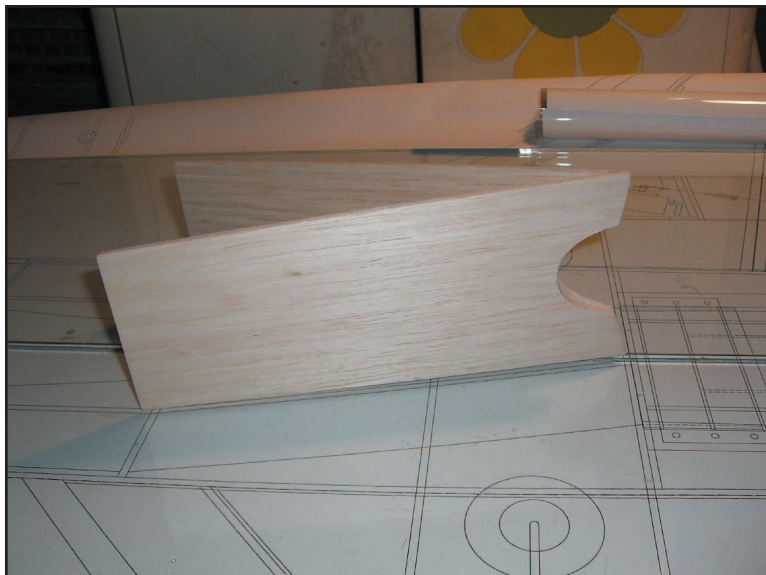


Photo 108

- 108. Cut from their sheets two I2 inner inlet walls. Position each I2 over the plans. Using a sanding block bevel the aft inboard edges of each I1 so that the bevel forms a smooth, sharp joint. If you are using the "A" fan unit parts, trim the top and bottom of I2 so it fits into the front of B7-1. Decide now if you are going to run the fan unit with or without the spinner. If you are going to run the spinner, Install the fan unit into the fuselage skeleton and cut a semi-circle from each of the I2 to clear the spinner. When satisfied with the fit, position each I1 over the plans and tack glue each I2 together. (Photo 108)





Photo 109

- 109. Finish the outer walls using your favorite method. Be careful to leave the top, bottom and front edges of each I2 unfinished so you get a good glue joint when installing I2 into the fuselage and gluing the outer inlet walls to I2. (Photo 109)

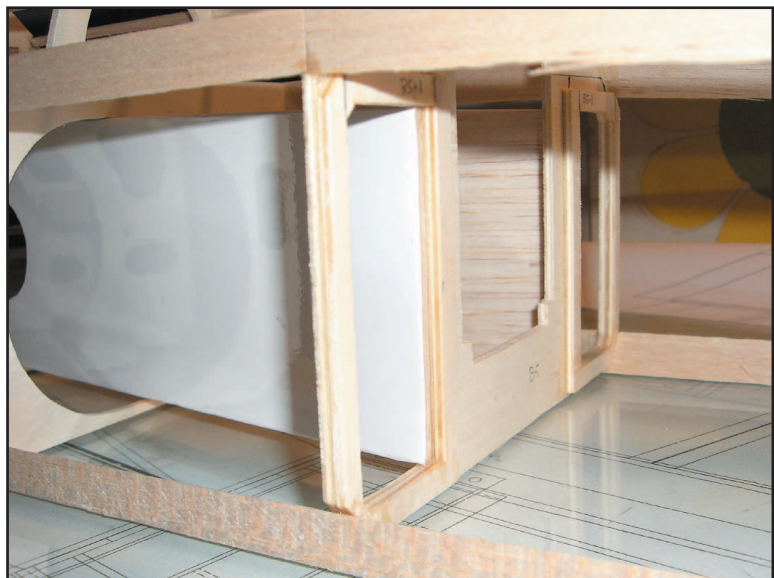


Photo 110

- □ 110. If the fan unit is still installed in the fuselage skeleton, remove it. Slip the assembled I2 through the back of the fan unit opening and into place between B5, B6 and B7-1. Make sure that I2 does not go forward past B5. If the front of I2 does not fit flush with the back of I1, then use a hobby knife and sanding block or emory board to bevel B5. (Photo 110)

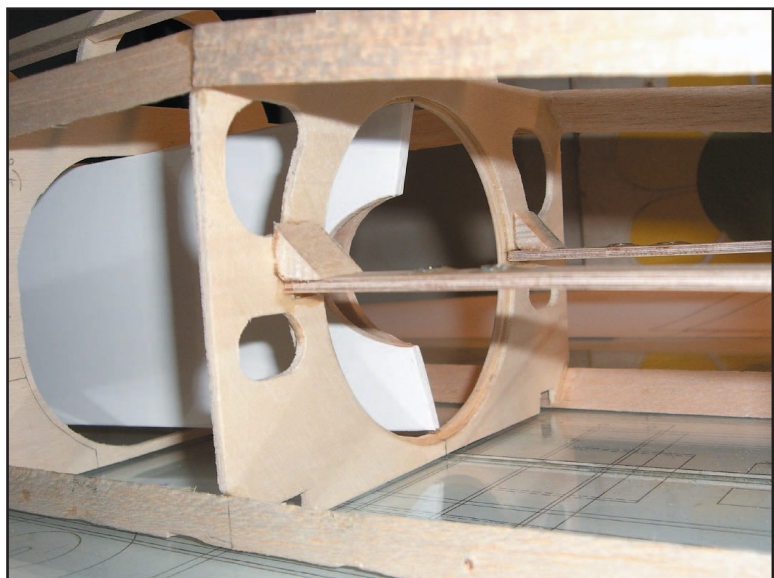


Photo 111

- □ 111. The recess formed by the joint between B7 and B7-1 creates a pocket for the front of the fan. This pocket is what seals the fan and inlet together. Make sure that I2 does not go back past B7-1 otherwise the front of the fan might not sit flush against the back of B7-1. When satisfied with the fit inside B7-1 and B5, tack glue I2 to B5 and B7-1. Repeat for the other side. (Photo 111)



Photo 112

- □ 112. Use the templates in the back of the construction guide to cut out the rear outer inlet walls from 100# smooth bristol paper. Curl the rear part of the outer inlet wall so it fits smoothly into the opening between B7-1 and I2. Verify that the front of the inlet wall fits smoothly inside B5. Curl the front corners of the inlet ducts over a 3/16" dowel. Repeat for the other side. (Photo 112)

**NOTE:** Because you'll need to cut out the templates to trace them onto the bristol paper, we recommend making photocopies of the template sheets and using the copies as the templates.

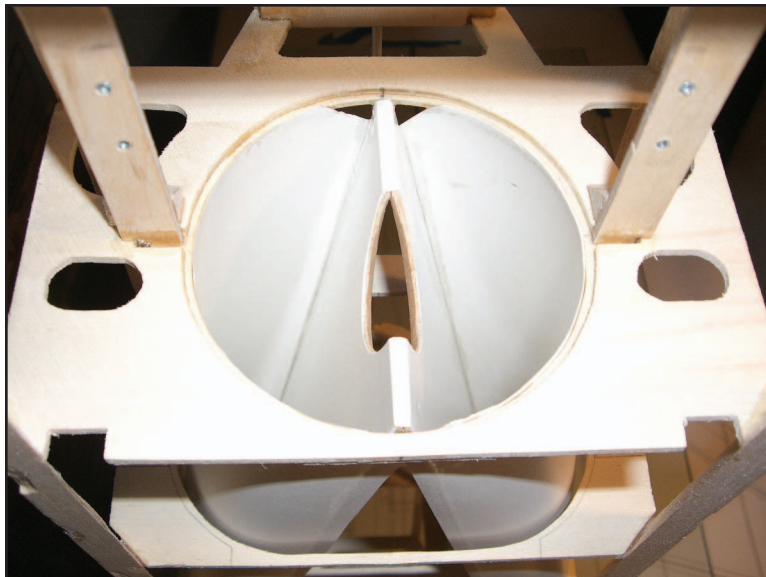


Photo 113

- □ 113. If necessary trim the upper and lower corners of the rear portion so it is easy to remove and install the outer inlet wall. Trim any excess overlap that extends behind B7-1. This will form a pocket that the front of the fan unit will fit when installed. When satisfied with the fit, glue the outer inlet wall to top of I2, then to B7-1, then to B5 and finally to the bottom of I2. Use a scrap piece of 100# Bristol paper to seal any openings. Glue these patches to the outside of the duct using a thin film of carpenter's glue. Repeat for the other side. Run a thin bead of medium CA along the top and bottom inside joints between I2 and the 100# Bristol paper outer walls. (Photo 113)

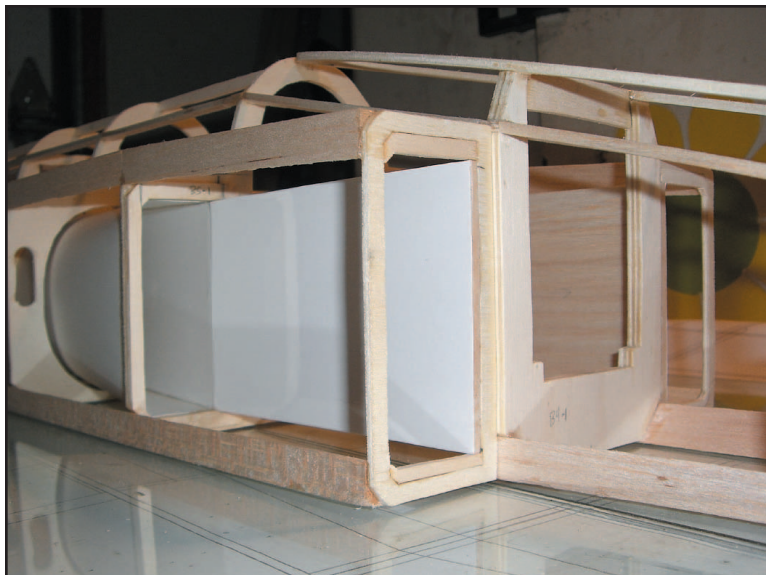


Photo 114

- □ 114. Cut from their sheets two I1 forward inner inlet walls. Fit this into the holes in B4 and B5-1. Curl the inside corners of the inlet duct wall using a 3/16" dowel. When satisfied with the fit, remove I1 from the fuselage skeleton and finish it. Make sure that the top, bottom and back edges of I1 are unfinished to make a good glue joint. Position and glue I1 between B4 and B5-1. Repeat for the other side. (Photo 114)



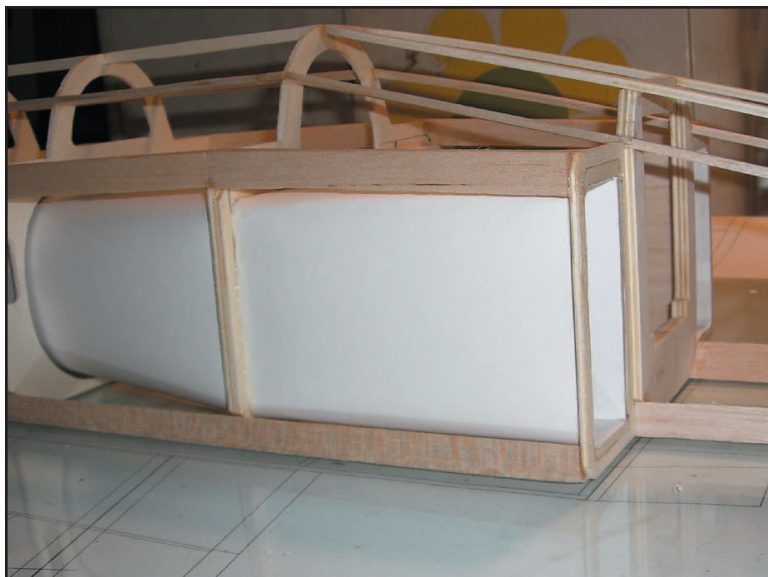


Photo 115

- □ 115. Using the templates on the plans, cut out two forward outer inlet walls from 100# smooth bristol paper. Slip the outer wall into the holes in B4 and B5-1 and verify that the front of the inle wall fits inside B5-1. Trim any excess that overlaps B5. When satisfied with the fit, glue the outer inlet wall to top of I1, then to B5-1, then to B4 and finally to the bottom of I1. Trim the excess outer inlet wall that extends beyond the front of B4. Repeat for the other side. (Photo 115)



Photo 116

- □ 116. Use the templates from the plans to cut out the rear inlet doublers and triplers from 100# smooth bristol paper. Slip the doubler into place in the opening in B6, below the rear duct. Pour some carpenter's glue into a small mixing cup and add a small amount of water to thin the glue. Use a disposable brush and apply a thin layer of glue to the rear duct. Slip the doubler into place and gently press it against the outer duct wall. Be careful not to dent the outer duct wall as the glue will slightly soften the paper. Repeat this procedure for the tripler. The wide part of the rear tripler goes to the front of the duct. Repeat this procedure applying the doublers and triplers to the forward outer duct walls between B4 and B5. Repeat for the other side. (Photo 116)



Photo 117

- 117. Cut from their sheets, one BT1 and two BT2 battery tray mounts (1/8" lite ply). Glue one BT2 to the bottom front and back of BT1. Slip the assembly into place between the inner inlet duct walls on the bottom web of the opening in B6. Make sure that the bottom of this assembly does not extend below the bottom of B6. When satisfied, glue it into place. (Photo 117)



Photo 118

- 118. Cut from its sheet one K5 bottom plate (1/8" lite ply). Position this on the bottom of bulkheads B6 and B7. Make sure that you leave enough of each bulkhead exposed to allow the bottom balsa sheeting to be glued to the front half of B6 and for the fan hatch to rest on the back half of B7. If you are installing retracts, make sure the side with the wheel well marks is facing to the outside of the fuselage. When satisfied with the fit, glue K5 securely to B6 and B7. Do not glue K5 to the bottom corner blocks. (Photo 118)

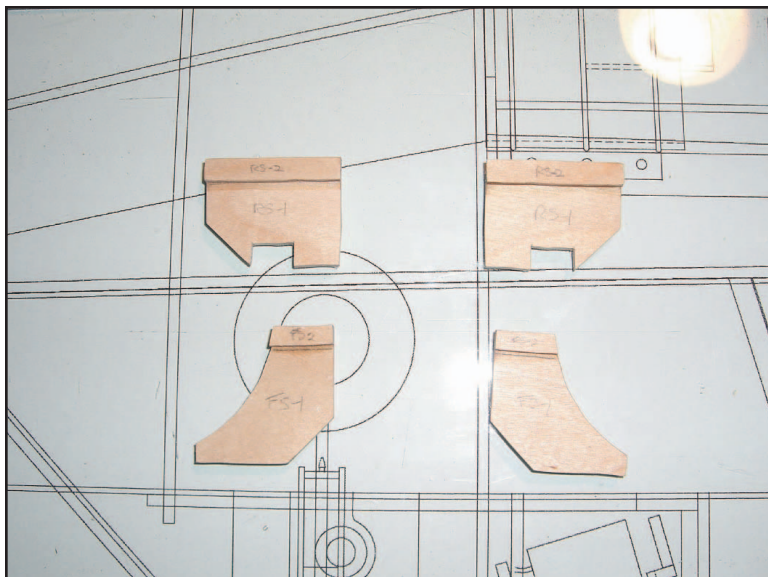


Photo 119

- 119. Cut from their sheets, two FS1, two FS2, two RS1 and two RS2 spar mounts (1/8" birch ply). Glue FS2 to the top front of FS1. Glue RS2 to the top back of RS1. Make sure to make a right side set and a left side set. (Photo 119)

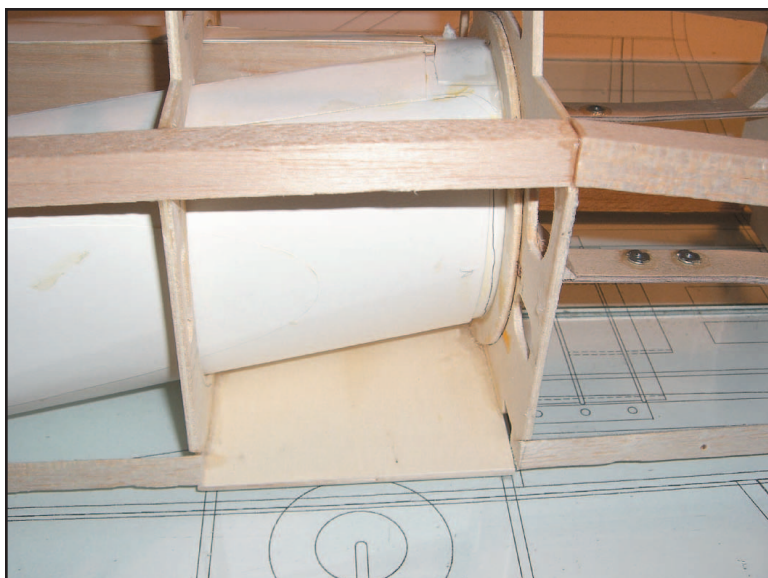


Photo 120

- □ 120. Use a razor saw and hobby knife to cut away the bottom corner block from between B6 and B7 and set it aside for now. Repeat for the other side. (Photo 120)



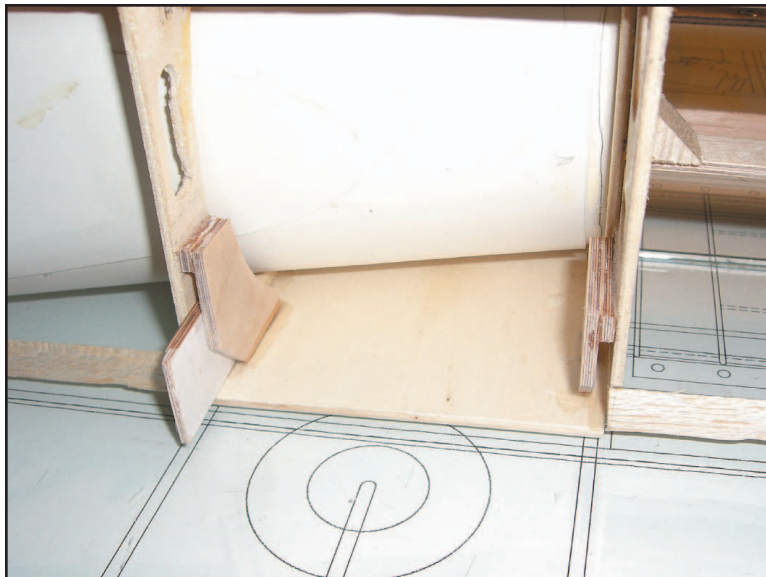


Photo 121

- □ 121. Using a piece of scrap 1/8" birch ply as a spacer, position and glue the FS mount to the back of B6 and K5 and the RS mount to the front of B7 and K5. Be careful not to glue the spacer inside the spar pockets and that no excess glue blocks the top or bottom corners of the pocket. Repeat for the other side. (Photo 121)

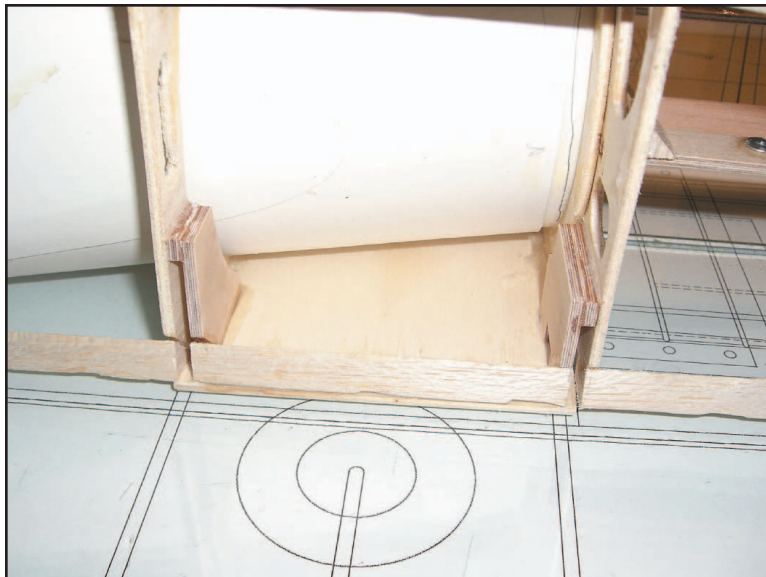


Photo 122

- □ 122. Position the bottom corner blocks from Step 119. Trim the excess to leave the slot in the spar mounts open. When satisfied, glue the bottom corner blocks to the spar mounts and K5. Use the spacer you made in Step 121 to verify that the wing spars will slide easily in and out of the spar pockets. Repeat for the other side. (Photo 122)



Photo 123

- 123. Measure and cut battery tray doublers from 1/2" balsa triangle stock. Position and glue these to the back of bulkhead B4, front and back of B5 and front of BT1. (Photo 123)



Photo 124

- 124. Cut from its sheet one battery tray (1/4" lite ply). Position and glue this to the battery tray doublers and the tops of B4, B5 and BT1. (Photo 124)

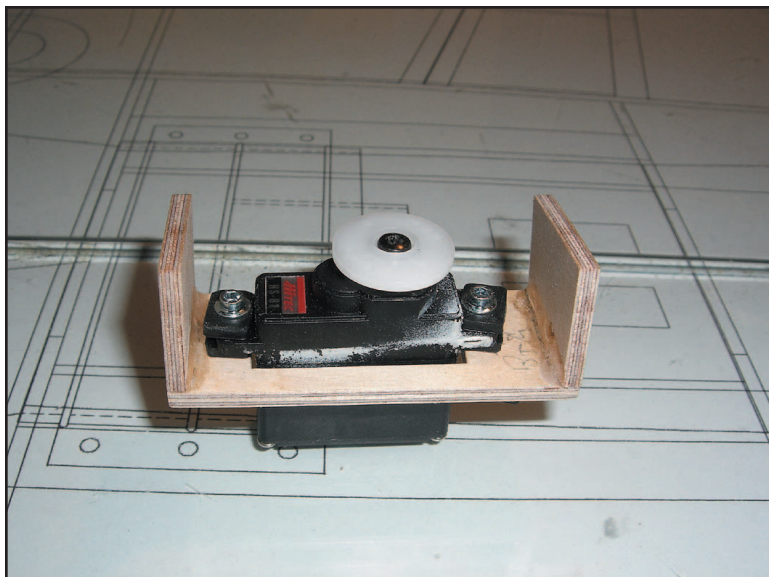


Photo 125

- 125. Cut from their sheet, one SM5 and two SM6 servo mounts (1/8" birch ply). Position and glue both SM6 to the bottom of SM5 as shown. Insert the nose-wheel steering servo into the opening in SM5. Drill mounting holes and screw the servo to the bottom of the mount. (Photo 125)

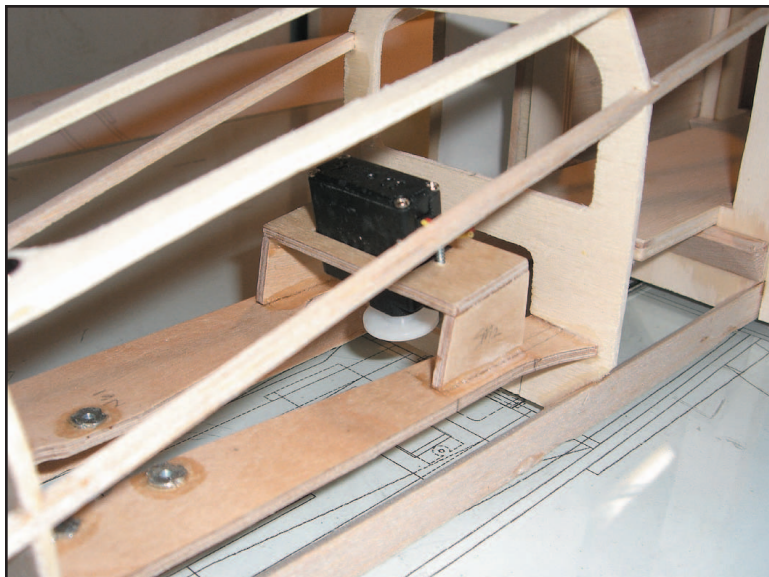


Photo 126

- 126. Position and glue the nose wheel servo mount to the top of NG nose gear mount. (Photo 126)





Photo 127

- ☐ 127. Measure and cut NG doublers from 1/2" triangle stock. Glue these doublers to the bottom of NG. (Photo 127)



Photo 128

- ☐ 128. Assemble the nose gear strut and install it and the steering horn into the nose gear retract. Mount the nose gear retract into the model. Make up the pull-pull cable nose wheel steering and connect the nose wheel steering servo to the nose gear retract. (Photo 128)

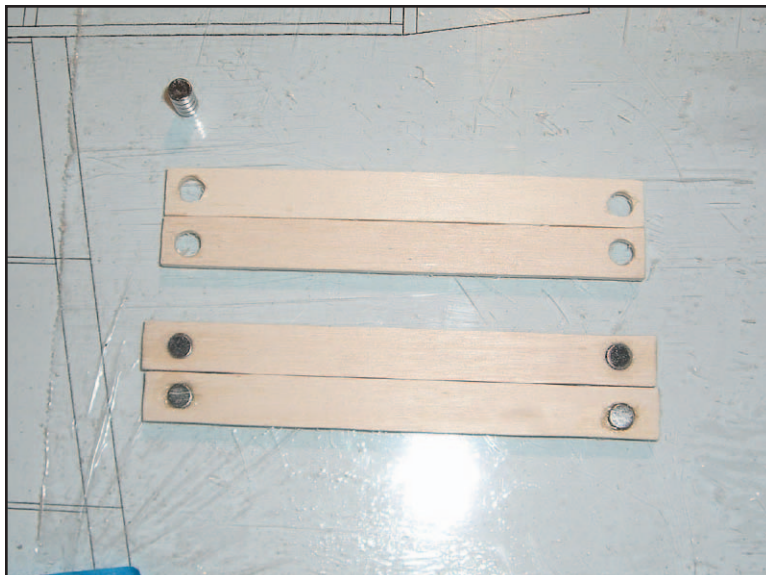


Photo 129

- ☐ ☐ 129. Cut from their sheets two FH1 and two FH2 (1/8" lite ply). Insert a 1/4" round magnet into each hole in FH1. Make sure that the face of the magnet is flush with the bottom of FH1. When satisfied, glue the magnets into place. Repeat for the other side. (Photo 129)



Photo 130

- □ 130. Insert FH1 into the slots in the bottom of bulkheads B7 and B8 and glue FH1 to B7 and B8. Repeat for the other side. Lay a piece of clear sandwich wrap over both FH1 and stick a 1/4" round magnet on top of each of the magnets glued to FH1. (Photo 130)



Photo 131

- □ 131. Position FH2 over FH1 and align the magnets. Push FH2 down so the magnets slip into the round holes. Make sure that FH2 is flush with FH1 and glue the magnets to FH1. Repeat for the other side. (Photo 131)



Photo 132

- 132. Cut two pieces of sheeting from 1/8" sheet stock and edge glue them to form the fan hatch cover. Make sure the grain of the wood runs across the fuselage. Position them over the fan opening. Make sure the clear sandwich wrap is between K5 and the fan hatch sheeting. Make sure that the fan hatch sheeting does not extend past the front half of B8. The bottom sheeting needs to be glued to the back half of B8. When satisfied with the fit, glue the fan hatch sheeting to both FH1. (Photo 132)



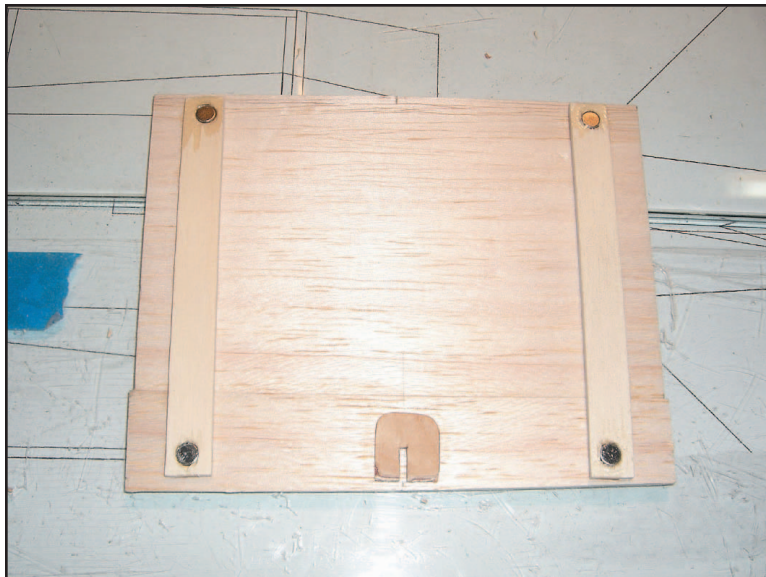


Photo 133

- 133. Cut from their sheets, one FH3 and one FH4 (1/16" birch ply). Measure the front and rear of the fan hatch and on the inside of the hatch, mark the centerline. Measure and mark a line 1/8" forward of the rear edge of the hatch. Position and glue FH3 to the bottom of the fan hatch. (Photo 133)

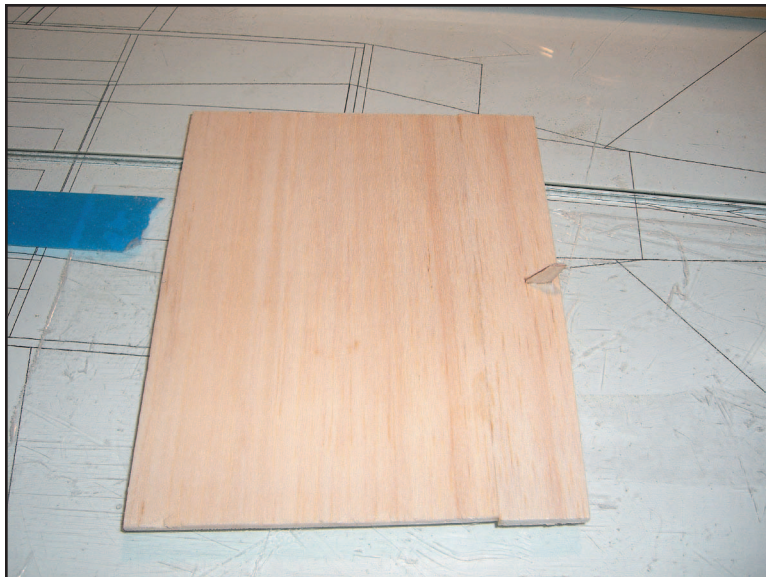


Photo 134

- 134. Use a hobby knife to cut the balsa hatch sheeting from the area of the slot in FH3. Slip FH4 into the slot in balsa and FH1. When satisfied with the fit, glue FH4 to the hatch sheeting and FH3. (Photo 134)

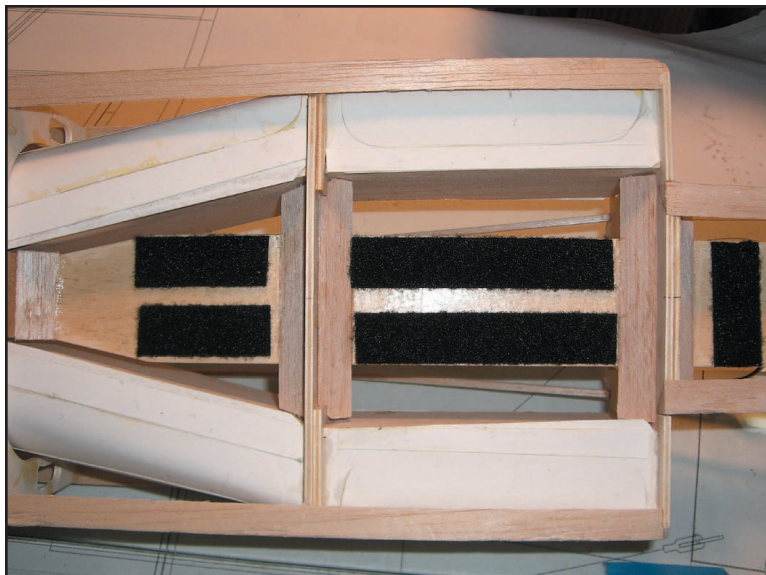


Photo 135

- 135. Cut four pieces of hook and loop fasteners (not supplied). Position and stick each of the loop pieces to the bottom of the battery tray as shown. These will help keep the hook and loop wrap from slipping when wrapped around the flight battery packs. (Photo 135)



Photo 136

- ☐ 136. Cut a stringer from 1/8" balsa stick and glue it into the slots in the bottom of B9-1 and B10. (Photo 136)

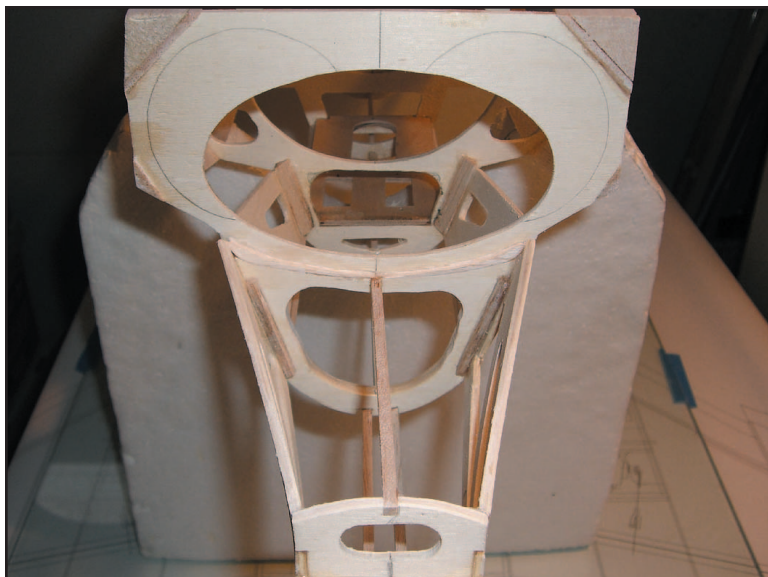


Photo 137

- ☐ 137. Cut keel doublers from 1/2" triangle stock to fit the joints between K2 and B8 and the joints between K3 and B9-1. Position and glue the doublers to K2 and B8 and to K3 and B9-1. (Photo 137)



Photo 138

- ☐ 138. Install the fan hatch to the bottom of the fuselage. Using 1/8" balsa cut the bottom sheet for the area between the back of the fan hatch and B9. Make sure the grain of the wood runs across the fuselage. When satisfied, remove the fan hatch and glue the sheeting to B8, B9 and both of the bottom corner blocks. (Photo 138)





Photo 139

- 139. Using 1/8" balsa, sheet the bottom of the fuselage between bulkheads B4, B5 and B6 and the bottom corner blocks. The sheeting between B4 and B5 should not extend past the front of B4. The nose section sheeting is glued to B4-1. (Photo 139)



Photo 140

- 140. Using 1/8" balsa, sheet the bottom of the fuselage between B1, B2, B3 and B4-1 and the bottom corner blocks. Make sure the grain of the wood runs across the fuselage. (Photo 140)



Photo 141

- □ 141. Using 1/8" balsa, sheet the side of the engine nacelle between bulkheads B4 through B9 and the top and bottom corner blocks. Make sure the grain of the wood runs lengthwise. Measure and cut a piece of 1/8" balsa stringer and slip it into the slots in bulkheads B1 through B5 and in bulkheads B5 through B9. Repeat for the other side. (Photo 141)

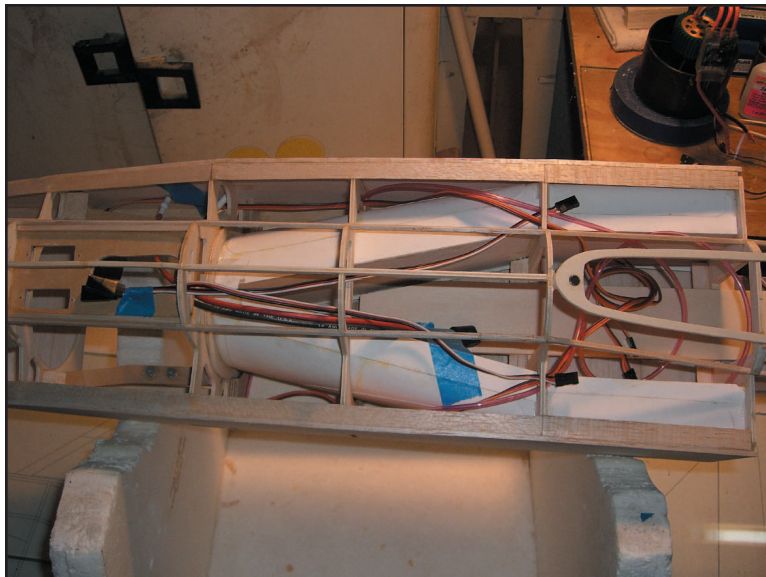


Photo 142

- 142. Measure and mark the location of the front and rear spar pockets on the nacelled side sheeting. Use a hobby knife to cut a 1/8" wide slot in the side sheeting. You will need to cut an opening in the nacelle side sheet to allow the retract air line and aileron servo wire to be routed through the fan compartment. At this point, all of the wiring and air lines should be routed. Once the top of the fuselage is sheeted, it will be much more difficult to do so. (Photo 142)

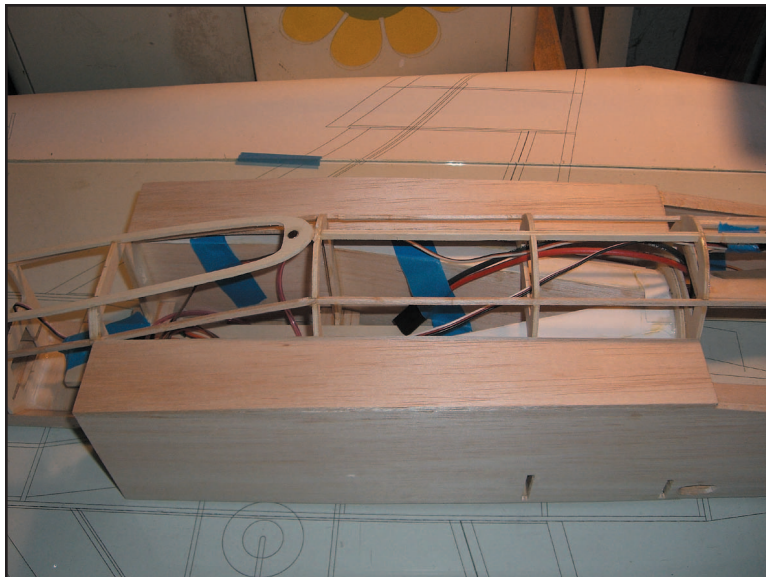


Photo 143

- □ 143. Using 1/8" balsa, sheet the top of the engine nacelle between bulkheads B4 and B7. Repeat for the other side. (Photo 143)

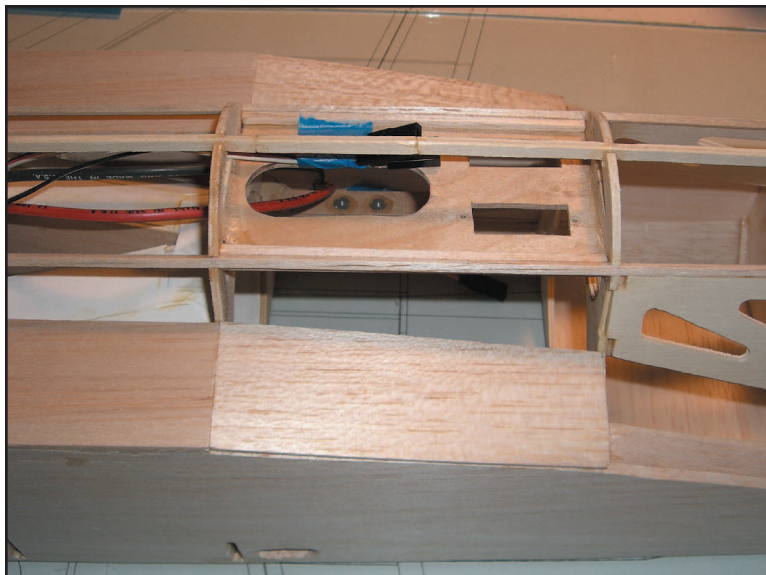


Photo 144

- □ 144. Using 1/8" balsa, sheet the top of the engine nacelle between bulkheads B7 and B8. To help the balsa conform to the curve in B8, wet the inside of the balsa. Repeat for the other side. (Photo 144)



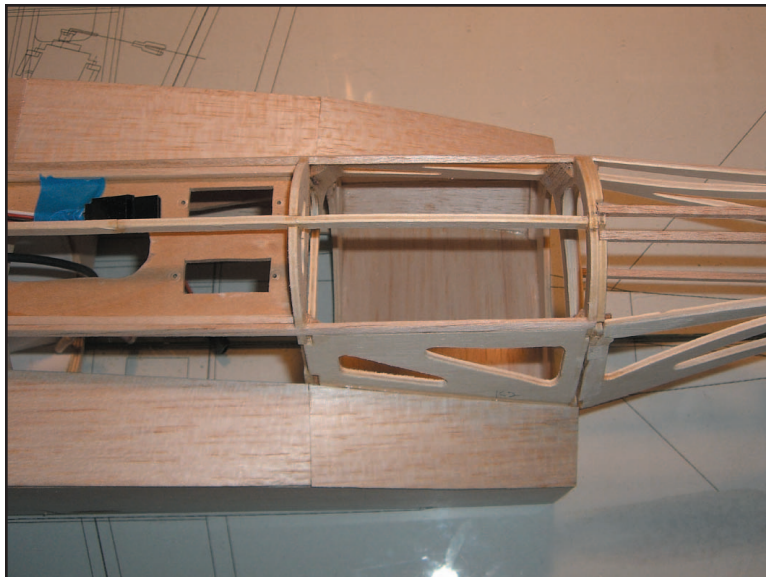


Photo 145

- □ 145. Using 1/8" balsa, sheet the top of the engine nacelle between bulkheads B8 and B9. To help the balsa conform to the curve in B8 and B9, wet the inside of the balsa. Repeat for the other side. (Photo 145)



Photo 146

- □ 146. Using 1/8" balsa, sheet the side of the nose section between bulkheads B1 and B4-1. Repeat for the other side. (Photo 146)

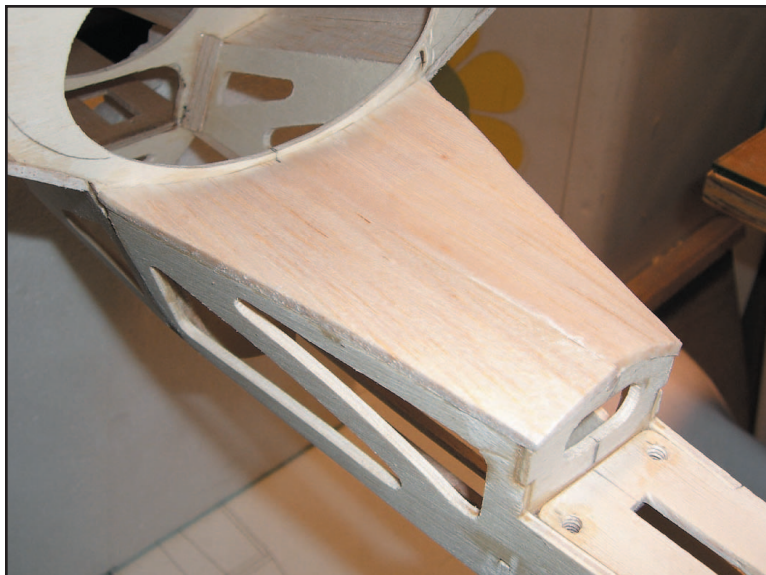


Photo 147

- 147. Using 1/8" balsa, sheet the bottom of the tail cone between bulkheads B9-1 and B10. (Photo 147)

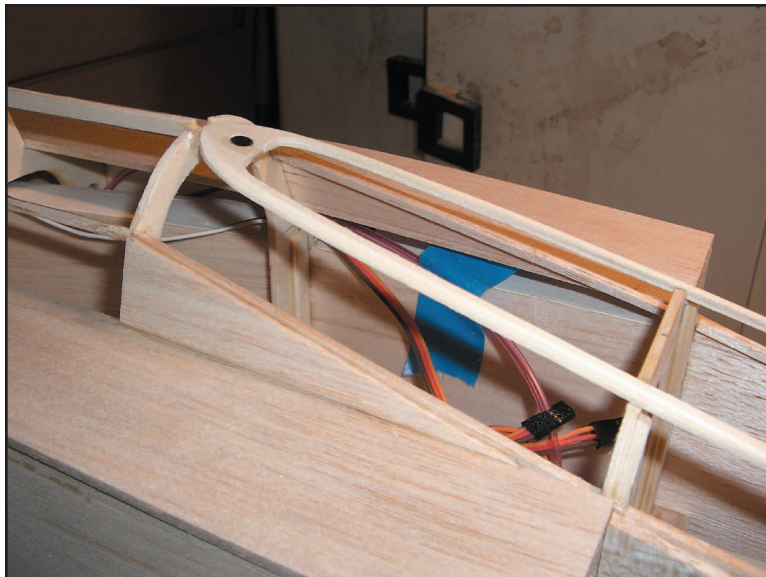


Photo 148

- □ 148. Using 1/8" balsa, sheet the triangular section of fuselage between bulkheads B4 and B5. Make sure to sheet only to the bottom half of the 1/8" balsa stringer to leave enough wood to glue the upper sheeting. Also make sure to only sheet the front half of B5. Repeat for the other side. (Photo 148)

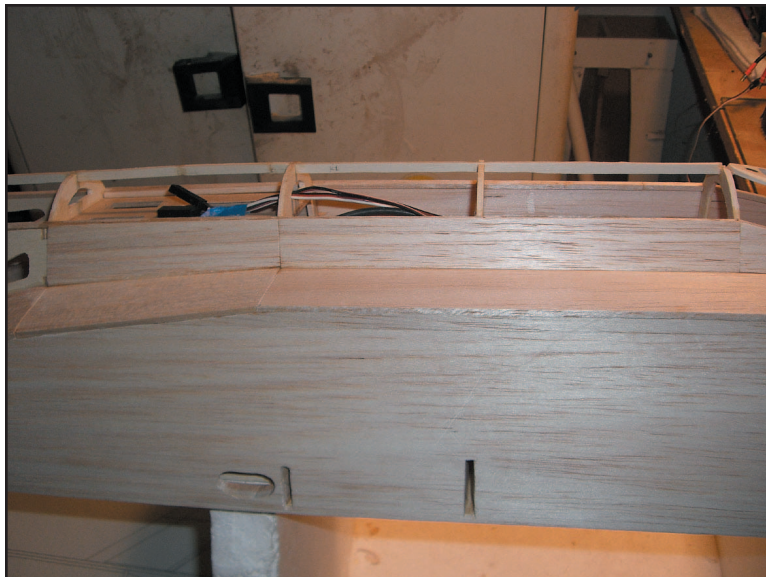


Photo 149

- □ 149. Using 1/8" balsa, sheet the section of fuselage between bulkheads B5 and B7. Make sure to sheet only to the bottom half of the 1/8" balsa stringer to leave enough wood to glue the upper sheeting. Using 1/8" balsa, sheet the section of fuselage between bulkheads B7 and B8. To help the balsa conform to the curve in B8 and B9, wet the inside of the balsa. Repeat for the other side. (Photo 149)

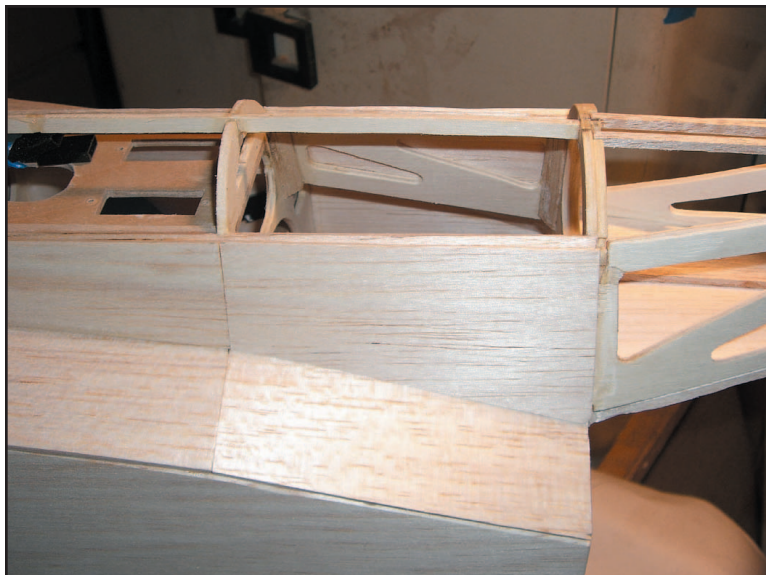


Photo 150

- □ 150. Using 1/8" balsa, sheet the section of fuselage between bulkheads B8 and B9. Make sure to sheet only to the bottom half of the 1/8" balsa stringer to leave enough wood to glue the upper sheeting. To help the balsa conform to the curve in B8 and B9, wet the inside of the balsa. Repeat for the other side.. (Photo 150)



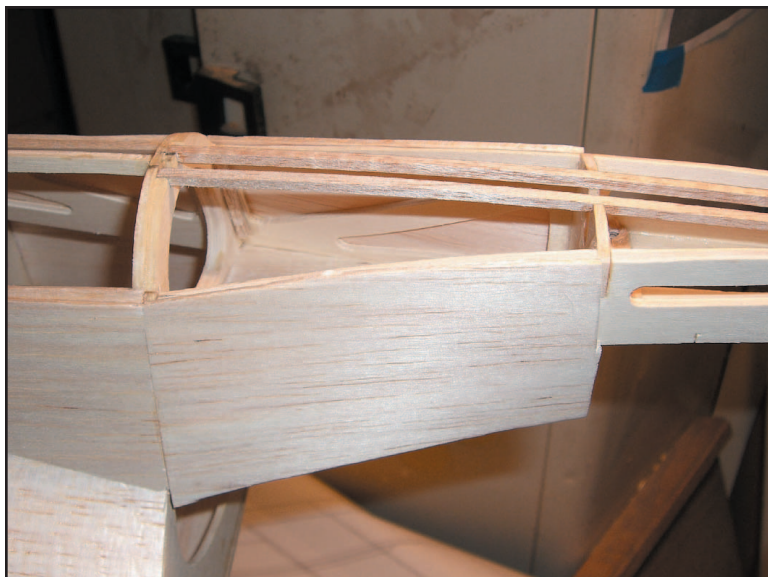


Photo 151

- □ 151. Using 1/8" balsa, sheet the side of the tailcone between bulkheads B9-1 and B10. Sheet all of B10 to make a smooth opening for the elevator hatch. Repeat for the other side. (Photo 151)

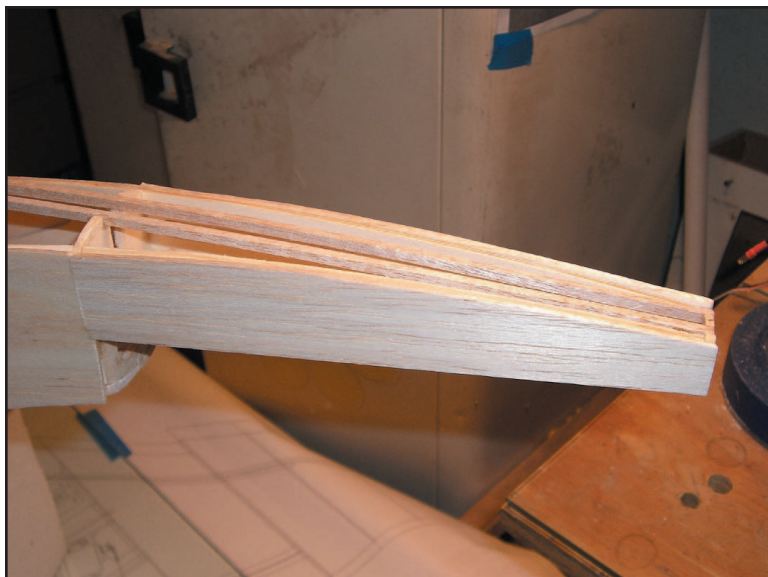


Photo 152

- □ 152. Using 1/8" balsa, sheet the side of the tailcone between bulkheads B10 and B12. Sheet all of B12 to make a smooth joint for the tailcone block. Repeat for the other side. (Photo 152)



Photo 153

- □ 153. Using 1/8" balsa, sheet the top of the tailcone between bulkheads B10 and B12. Make sure to only sheet the back half of B10. Sheet all of B12 to make a smooth joint for the tailcone block. Sheet only up to the rudder keels leaving the rudder slot open. To help the balsa conform to the compound curve, wet the outside of the balsa. Repeat for the other side (Photo 153)

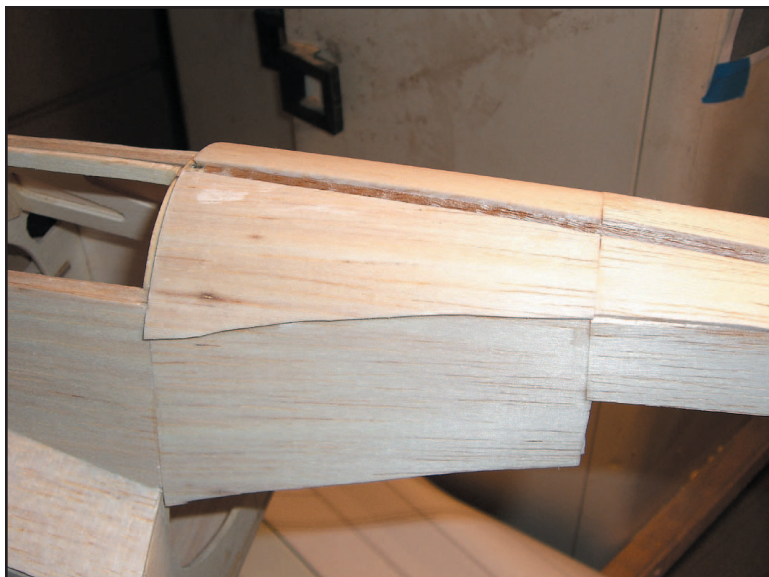


Photo 154

- □ 154. Using 1/8" balsa, sheet the top of the tailcone between bulkheads B9-1 and B10. Sheet only up to the rudder keels leaving the rudder slot open. To help the balsa conform to the curve, wet the outside of the balsa. Repeat for the other side. (Photo 154)

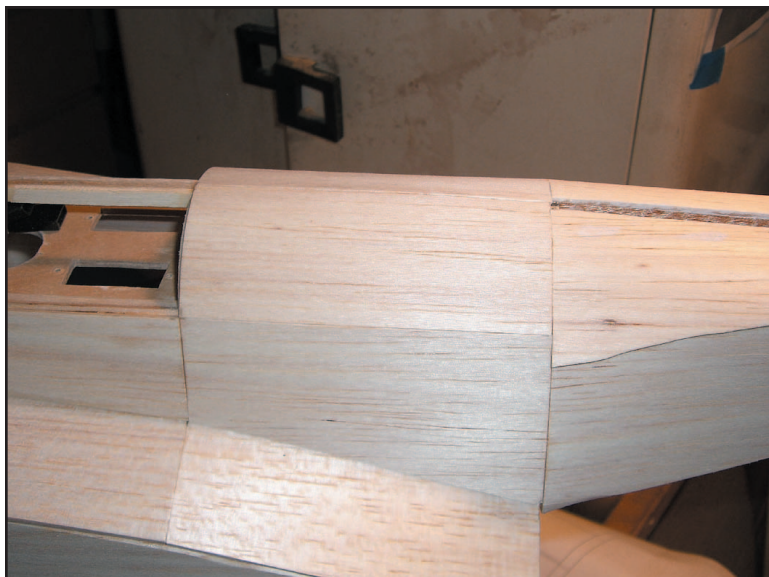


Photo 155

- □ 155. Using 1/8" balsa, sheet the top of the fuselage between bulkheads B8 and B9. Make sure to only sheet the back half of B8. To help the balsa conform to the curve, wet the outside of the balsa. Repeat for the other side. (Photo 155)

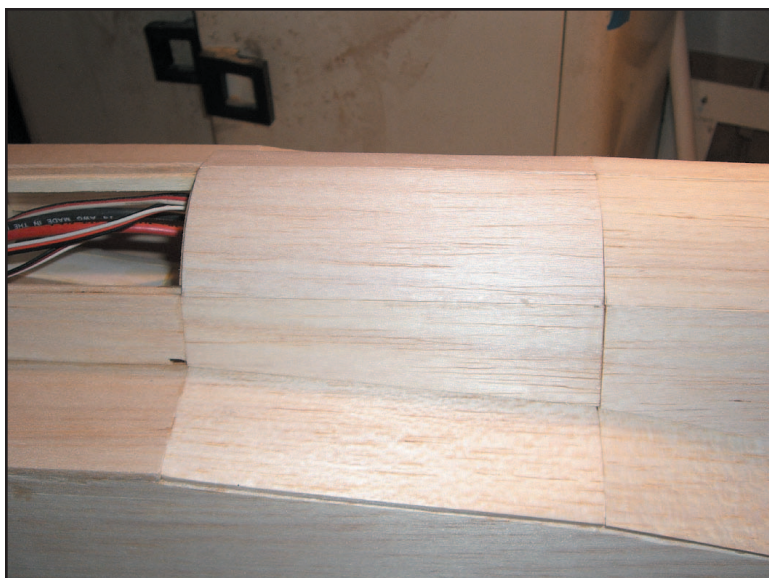


Photo 156

- □ 156. Using 1/8" balsa, sheet the top of the fuselage between bulkheads B7 and B8. Make sure to only sheet the back half of B7. To help the balsa conform to the curve, wet the outside of the balsa. Repeat for the other side. (Photo 156)





Photo 157

- □ 157. Using 1/8" balsa, sheet the top of the fuselage between bulkheads B6 and B7. Make sure to only sheet the back half of B6. To help the balsa conform to the curve, wet the outside of the balsa. Repeat for the other side. (Photo 157)



Photo 158

- □ 158. Using 1/8" balsa, sheet the top of the fuselage between bulkheads B5 and B6. Make sure to only sheet the back half of B5. To help the balsa conform to the curve, wet the outside of the balsa. Repeat for the other side. (Photo 158)



Photo 159

- □ 159. Using 1/8" balsa, sheet the top of the fuselage between bulkheads B4 and B5. Make sure to only sheet the back half of B4. To help the balsa conform to the curve, wet the outside of the balsa. Repeat for the other side. (Photo 159)

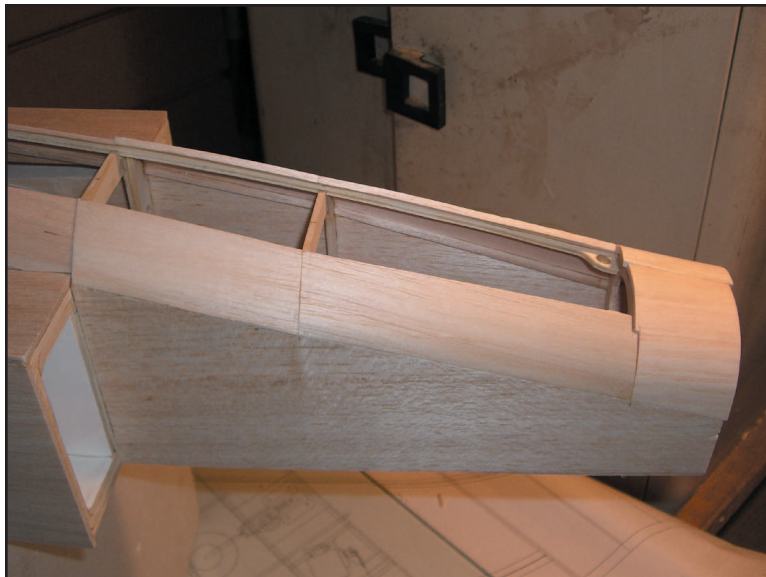


Photo 160

- □ 160. Using 1/8" balsa, sheet the top of the fuselage between bulkheads B3 and B4 and between bulkheads B2 and B3 and between bulkheads B1 and B2. To help the balsa conform to the curve, wet the outside of the balsa. Once the glue has dried, use a razor plane, hobby knife and sanding block to remove the excess sheeting from above the top of CH1. Make sure the sheeting is flush with the back face of B2. Repeat for the other side. (Photo 160)



Photo 161

- 161. Cut from its sheet one B1-1. Bevel B1-1 so it fits snugly inside the fiberglass nose cone. Position and glue it to the front of B1. (Photo 161)

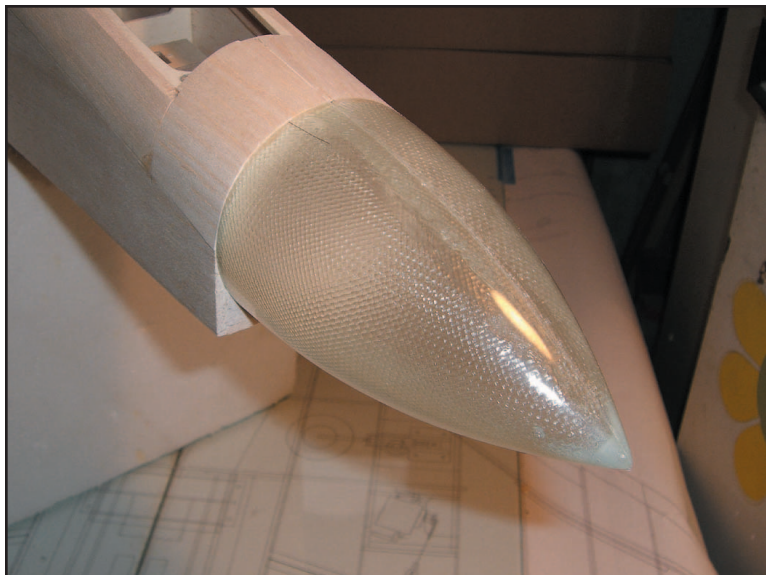


Photo 162

- 162. Place the fiberglass nose cone in position over B1-1 and tape it into place. (Photo 162)



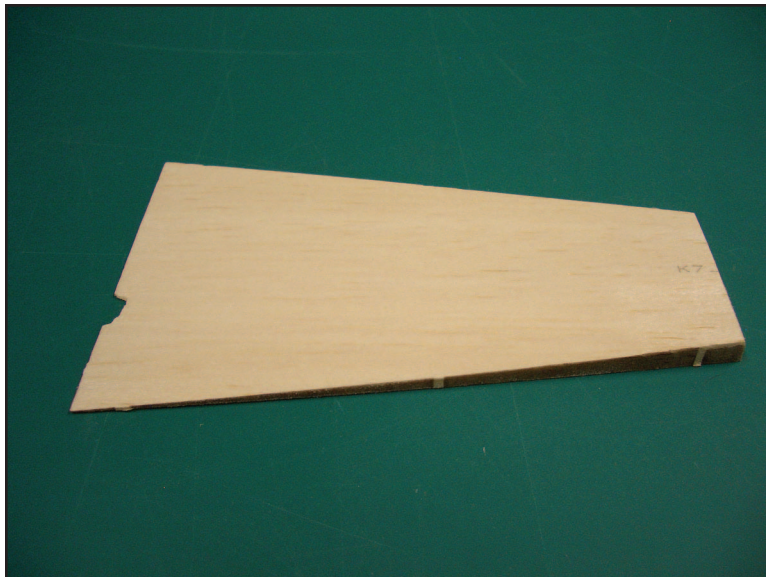


Photo 163

- ☐ 163. Cut from its sheet one K6 (1/4" balsa). Use a razor plane and sanding block to taper K6 from the front to the back. NOTE: The narrow end of K6 is the front. (Photo 163)

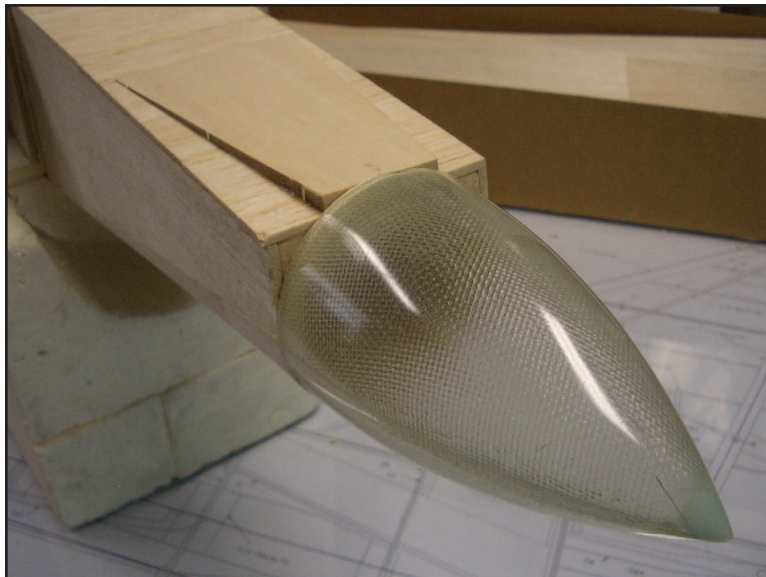


Photo 164

- ☐ 164. Turn the fuselage over so it's upside-down. Position and glue K6 so it is centered and flush against the back of B1-1. Once the glue is dry, use a pencil to trace the outline of the nose cone onto the front of the bottom corner blocks, fuselage sheeting and K6 (Photo 164)

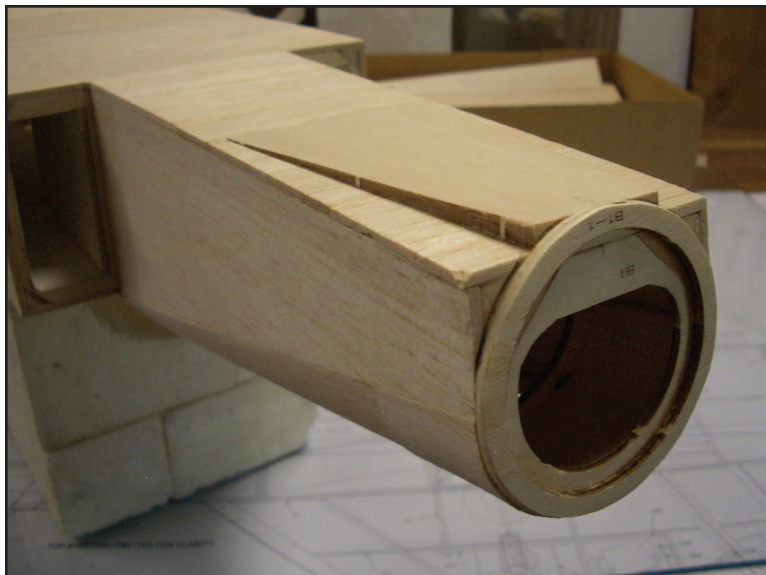


Photo 165

- ☐ 165. Remove the nose cone and set it aside for now. (Photo 165)



Photo 166

- ☐ 166. Use a razor plane and sanding block to round K6 to match the outline of B1-1. (Photo 166)



Photo 167

- ☐ 167. Cut from their sheets two B9-2 (1/8" lite ply). Bevel these so they fit inside the fiberglass engine nozzles. Position and glue B9-2 to the back of B9. Repeat for the other side. (Photo 167)



Photo 168

- ☐ 168. Place the fiberglass engine nozzles in position over B9-2 and tape it into place. Use a pencil to trace the outline of the engine nozzles onto the back of the top and bottom corner blocks and fuselage sheeting. (Photo 168)



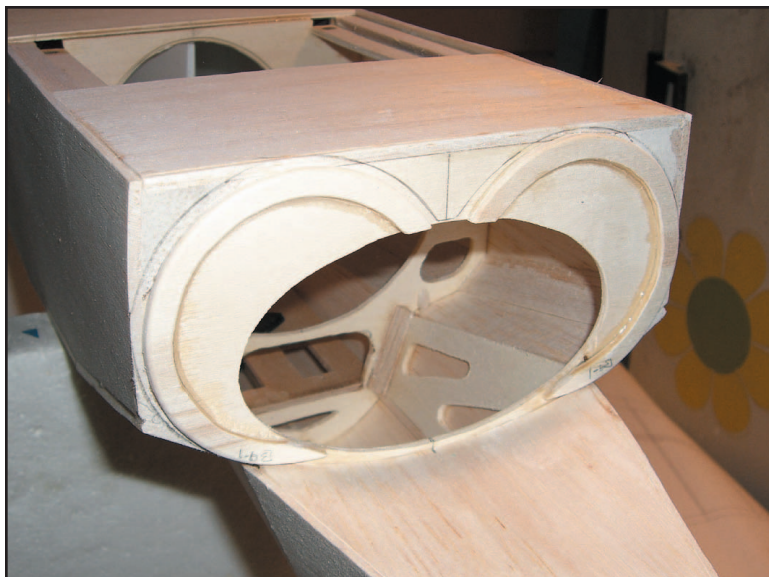


Photo 169

- ☐ 169. Remove the engine nozzles and set them aside for now (Photo 169)



Photo 170

- ☐ 170. Turn the fuselage on its side and slip one wing into place so it is flush with the side fuselage sheeting. Use a pencil to trace the shape of the bottom of the front and back half of the root rib outline onto the side fuselage sheeting. (Photo 170)



Photo 171

- ☐ 171. Remove the wing. Flip the fuselage over onto the other side and repeat steps 170 and 171 for the other side. (Photo 171)



Photo 172

- □ 172. Remove the wing. Flip the fuselage over onto the other side and repeat steps 170 and 171 for the other side. (Photo 172)

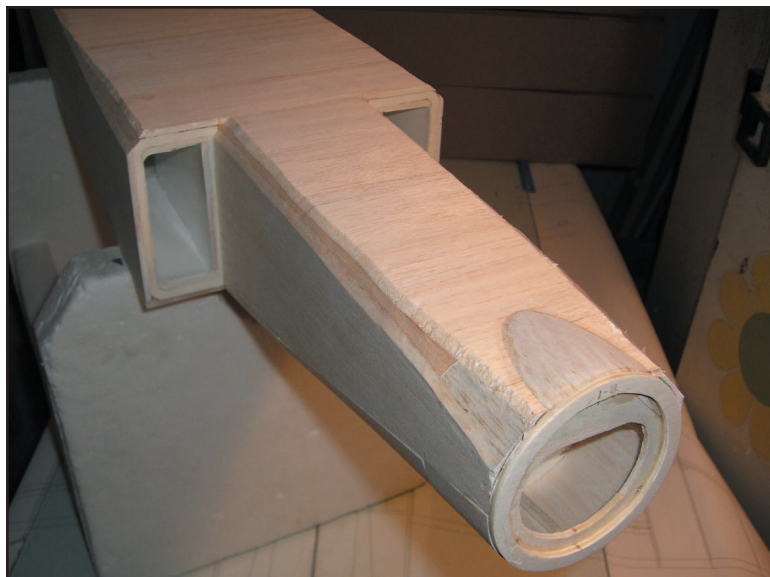


Photo 173

- □ 173. Use a razor plane to bevel the bottom corner blocks and fuselage sheeting of the nose section. Use the razor plane to make a tapered bevel on the bottom of the front half of the engine nacelles between bulkheads B4 and B6. Make sure that the bevel does not touch the lines you drew in Step 164 or the lines you drew in Step 171. Repeat for the other side. (Photo 173)



Photo 174

- □ 174. Use a razor plane to make a tapered bevel in the bottom corner blocks and fuselage sheeting of the back half of the fuselage between bulkheads B7 and B9. Make sure that the bevel does not touch the lines you drew in Step 169 or the lines you drew in Step 171. Repeat for the other side. (Photo 174)



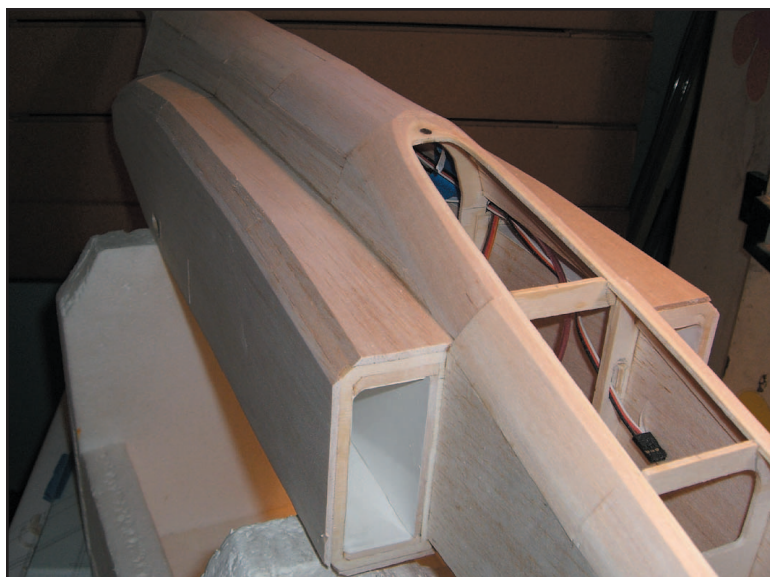


Photo 175

- □ 175. Use a razor plane to bevel the top half of the engine nacelle. Repeat for the other side. (Photo 175)



Photo 176

- □ 176. Use a razor plane to round the bevel you made in the bottom of the nose section and the front half of the bottom of the engine nacelles. Make sure the rounding does not touch the lines you drew in Step 164 or the lines you drew in Step 171. Repeat for the other side. (Photo 176)



Photo 177

- □ 177. Use a razor plane to round the bevel you made in the bottom of the back half of the engine nacelles. Make sure the rounding does not touch the lines you drew in Step 169 or the lines you drew in Step 171. (Photo 177)



Photo 178

- ☐ ☐ 178. Use a razor plane to round the bevel you made in the top half of the engine nacelles. (Photo 178)

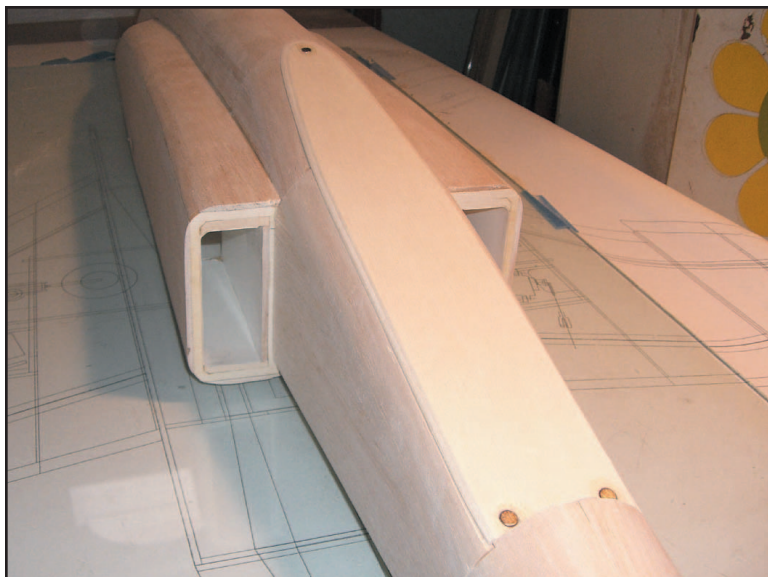


Photo 179

- ☐ 179. Use a sanding block to finish the rounding on the bottom of the nose section and on the top and bottom of the engine nacelles. Cut from its sheet one CH2 (1/8" balsa). Insert and glue three 1/4" round magnets into the holes in CH2. Make sure that the bottoms of the magnets flush with the bottom of CH2. Place CH2 onto CH1 and use a razor plane and sanding block to bevel the edge of CH2 so it matches the profile of the fuselage. (Photo 179)



Photo 180

- ☐ 180. Cut from its sheet one CH3 (1/8" balsa). Bevel the back of CH3 to match the inside of the canopy along the molded cut line. Position and glue CH3 to the top of CH2. (Photo 180)





Photo 181

- 181. Once the glue has dried, remove CH2 from the fuselage and cover CH1 with a piece of clear sandwich wrap. Place CH2 onto the top of CH1. (Photo 181)



Photo 182

- 182. Cut from its sheet one CH4 and one CH5 (1/8" lite ply) Position CH4 and CH5 so they are centered on CH2 and glue them into place. Measure and cut a piece of 1/8" balsa stick and slip it into the slots in CH4 and CH5 and glue it into place. (Photo 182)



Photo 183

- □ 183. Use 1/8" balsa to sheet the cockpit hatch between CH4 and CH5. To help the balsa conform to the curve, wet the outside of the balsa. Repeat for the other side. (Photo 183)



Photo 184

- 184. Cut out the clear plastic canopy using the molded cut line. Using a sanding block or emory board, final sand CH3 to match the profile of the canopy. Trim the canopy so it sits flush with CH2 and CH3. When satisfied, set the canopy aside for now. (Photo 184)

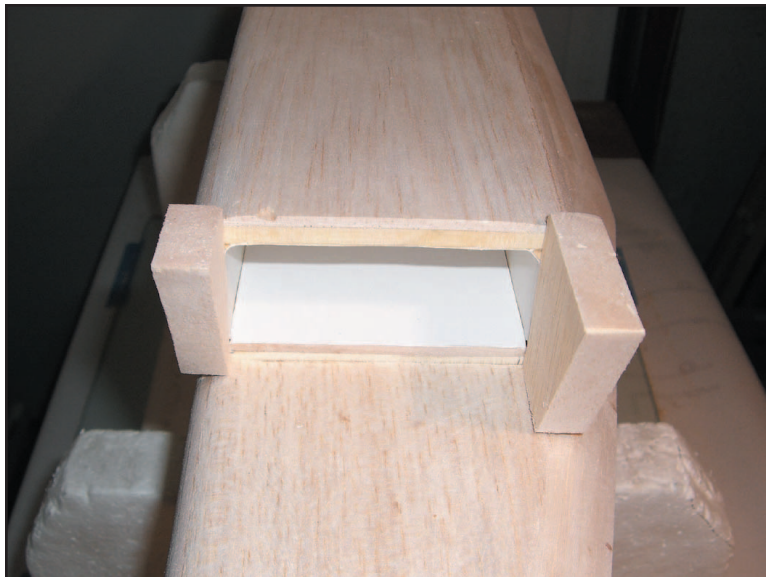


Photo 185

- □ 185. Cut from their sheets two I3, two I4 and two I5. Position I3 so the bottom face is flush with the inside top wall of the inlet duct. When satisfied, tack glue I3 to the fuselage. Position I4 so the top face is flush with the inside bottom wall of the inlet duct. When satisfied, tack glue I4 to the fuselage. Repeat for the other side. (Photo 185)



Photo 186

- □ 186. Position I5 so the inside face is flush with the inside side wall of the inlet duct. When satisfied, tack glue I5 to the fuselage and permanently glue it to I3 and I4. Repeat for the other side. (Photo 186)



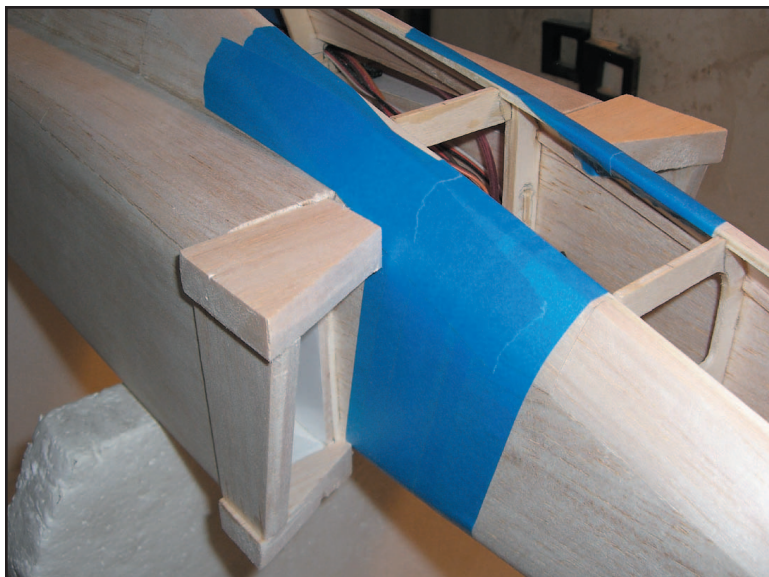


Photo 187

- □ 187. Use low-tack masking tape cover the sides of the fuselage nose section to protect it while you shape the inlet lips. Repeat for the other side. (Photo 187)

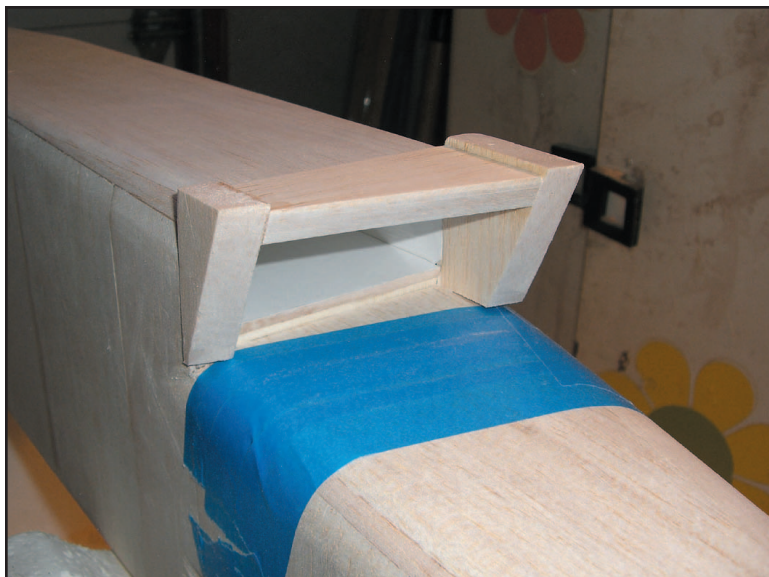


Photo 188

- □ 188. Use a sanding block to sand and angle into I3, I4 and I5 so the leading edge is flush with each other. Repeat for the other side. (Photo 188).



Photo 189

- □ 189. Using a razor plane and sanding block round the outside of I3, I4 and I5 so they match the profile of the fuselage. Repeat for the other side. (Photo 189)

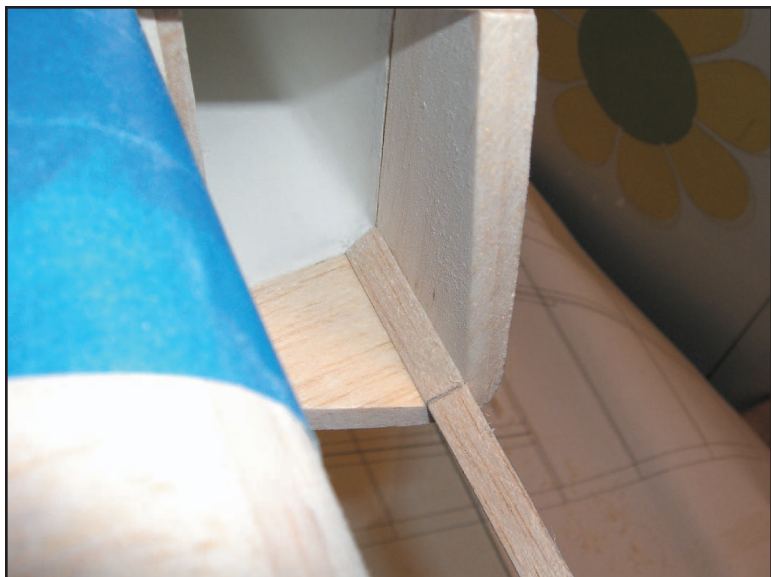


Photo 190

- □ 190. Measure an inlet filler block from 1/4" balsa triangle stock. Measure a similar filler block for the top inside corner of the inlet lip. Repeat for the other side. (Photo 190)

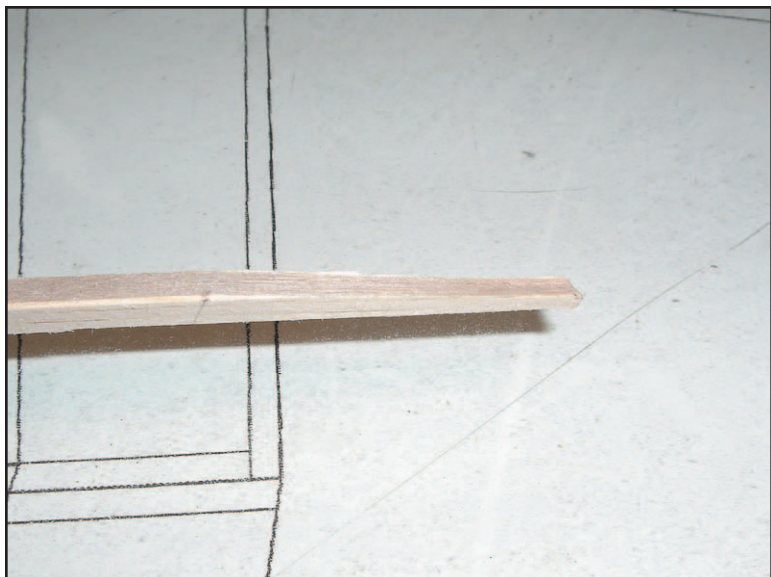


Photo 191

- □ 191. Use a razor plane to bevel the triangle stock. Make sure that the small end of the bevel is flush with the inside corner of the inlet wall. When satisfied with the fit, cut the corner filler block free. Repeat for the other side. (Photo 191)



Photo 192

- □ 192. Position and glue the corner filler blocks to the inside corners of the inlet lips. Repeat for the other side. (Photo 192)



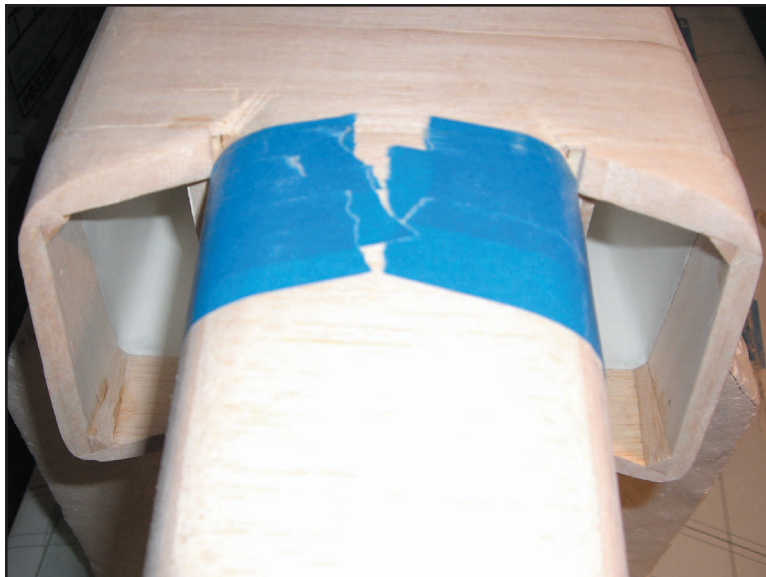


Photo 193

- □ 193. Using a sanding block or emory board to sand the front of the filler blocks flush with the front edge of the inlet lips. (Photo 193)



Photo 194

- □ 194. You are now ready to begin shaping the inlet lip. The most efficient shape for the inner wall of the inlet lip is a 2:1 ellipse. When you're done, you want the inside of the inlet lip to look airfoil-shaped. Use a pencil to draw the leading edge centerline onto the front edge of the inlet lips. Repeat for the other side. (Photo 194)

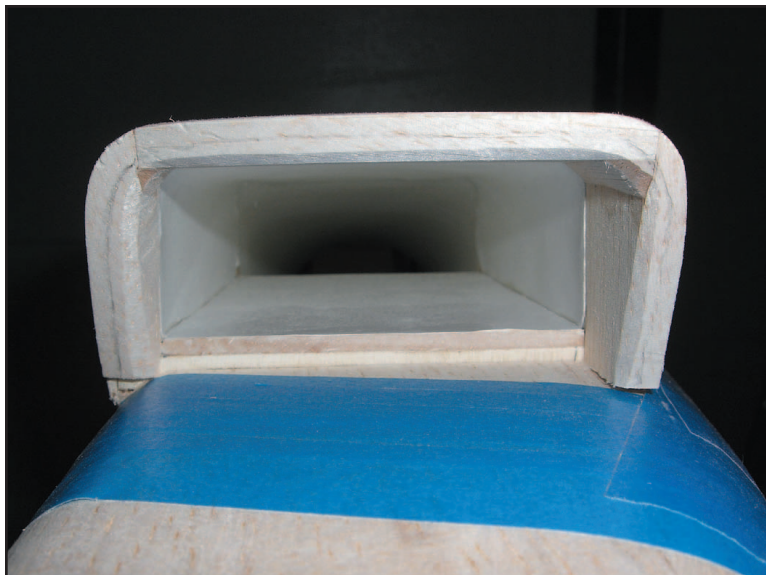


Photo 195

- □ 195. Use a hobby knife to bevel the inside of the inlet lips. Make sure the bevel does not touch the centerline you drew in Step 193. Repeat for the other side. (Photo 195)



Photo 196

- □ 196. Use a razor plane and hobby knife to bevel the outside of the inlet lip. Make sure the bevel does not touch the line you drew in Step 193. Repeat for the other side. (Photo 196)



Photo 197

- □ 197. Use an hobby knife to round the inside and outside bevels in the inlet lips. Repeat for the other side. (Photo 197)

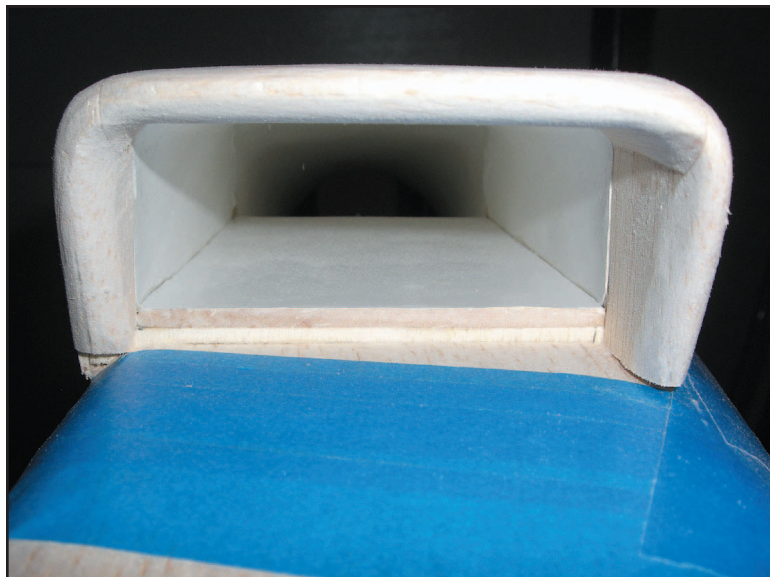


Photo 198

- □ 198. Use an emory board and sandpaper to smooth the inside and outside of the inlet lips. When satisfied, remove the masking tape.. Repeat for the other side. (Photo 198)





Photo 199

- □ 199. Cut from its sheet two I7 inlet ramps (1/4" balsa). Use a razor plane and sanding block to bevel the inside face of I7 so it tapers from 1/4" thick at the back to 1/8" thick at the front. Make sure that the back is flush with the inside wall of the inlet duct. Do not glue the inlet ramps to the model until after it is finished. Repeat for the other side. (Photo 199)



Photo 200

- □ 200. Place a piece of clear sandwich wrap over the elevator mount. Use spray glue to temporarily stick the clear sandwich wrap to the back face of B10 and to the front face of B11. (Photo 200)

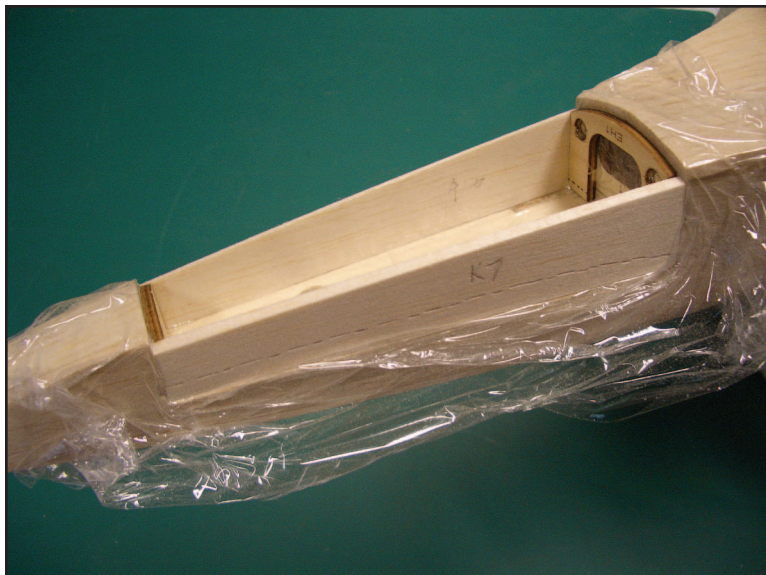


Photo 201

- □ 201. Cut from its sheets one EH1 and one EH2 (1/8" lite ply) and two K7 (1/8" balsa). EH1 and EH2 are both longer than what will be needed. Cut these to match your airfoil. Position EH1 so it is flush with the back and bottom of B10. Position EH2 so it is flush with the front and bottom of B11. Use spray glue to temporarily stick EH1 and EH2 to the clear sandwich wrap. Position K7 so it fits between B10 and B11. When satisfied, glue K7 to EH1 and EH2. Repeat for the other side. (Photo 201)

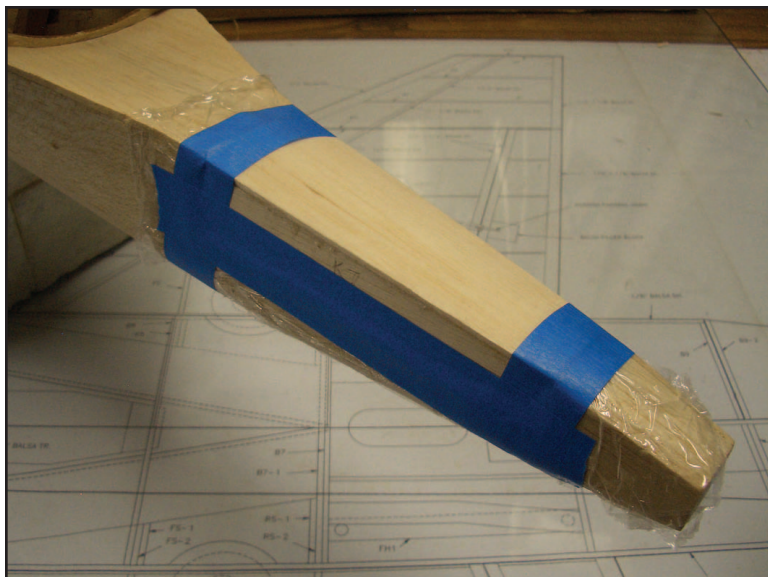


Photo 202

- 202. Using 1/8" balsa, sheet the bottom of the elevator hatch and the tailcone between B11 and B12. To help the balsa conform to the curve, wet the outside of the balsa. Use low-tack masking tape to prevent the wet balsa from distorting the elevator hatch while it dries. (Photo 202)

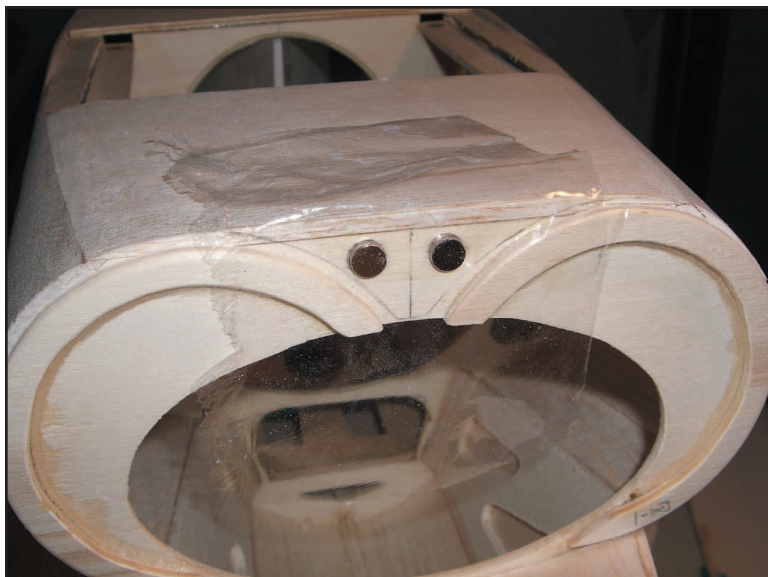


Photo 203

- 203. Lay a small piece of clear sandwich wrap over bottom and back of B9 where the magnets are located. Place two more 1/4" round magnets to these, trapping the clear sandwich wrap between them. (Photo 203)



Photo 204

- 204. Cut from its sheet one TH2 (1/8" lite ply). Position TH2 so that the magnets slip into the holes in TH2 and glue the magnets into TH2. (Photo 204)



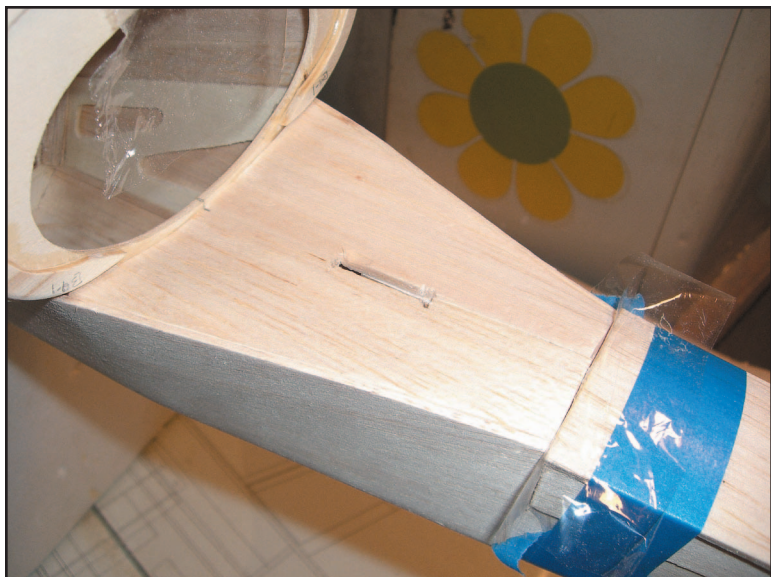


Photo 205

- ☐ 205. Measure and mark a line 1-1/2" back from the back face of B9. Cut a slot in the bottom tailcone sheeting that is 1" long by 1/8" wide. (Photo 205)

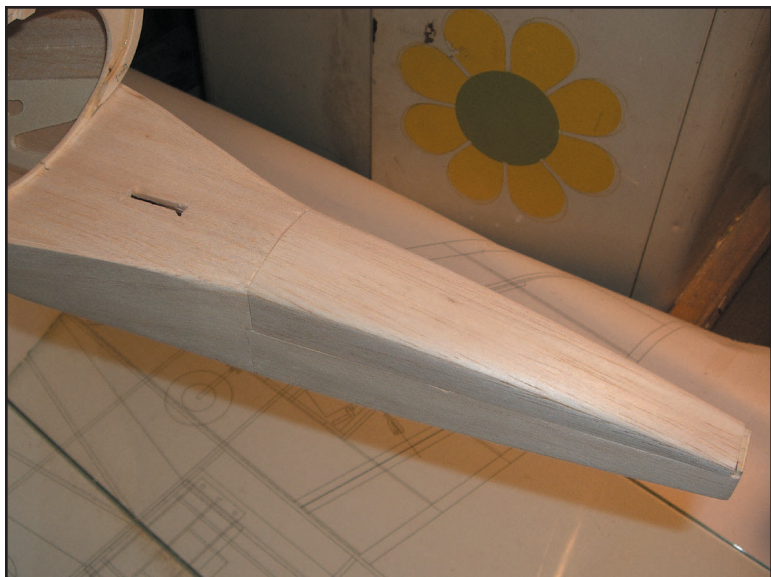


Photo 206

- ☐ 206. Remove the masking tape from the elevator hatch. Use a sanding block or emory board to round the corners of the elevator hatch and tail cone slightly. Do not round the corners of the tailcone in front of the elevator hatch. Use a razor saw or hobby knife to cut the bottom sheeting between EH2 and B11 to free the elevator hatch from the fuselage. (Photo 206)

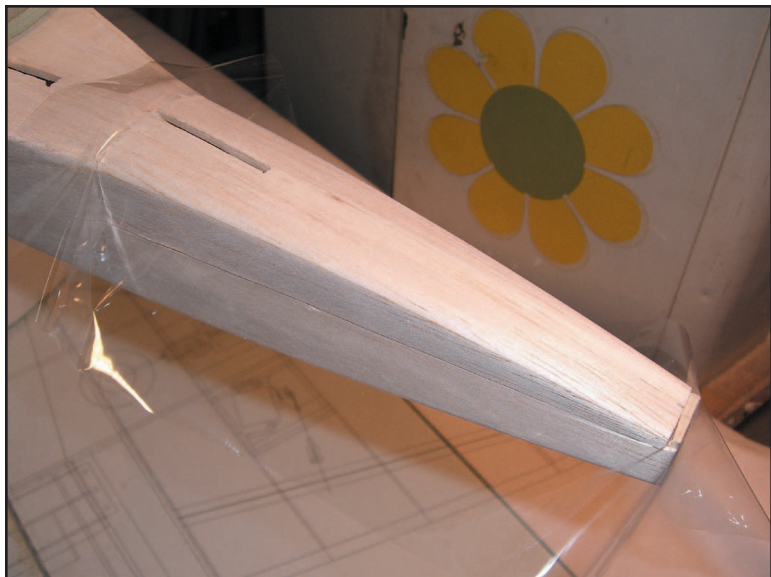


Photo 207

- ☐ 207. Remove the elevator hatch from the fuselage. Lay a piece of clear sandwich wrap over the stab mount and replace the elevator hatch. (Photo 207)

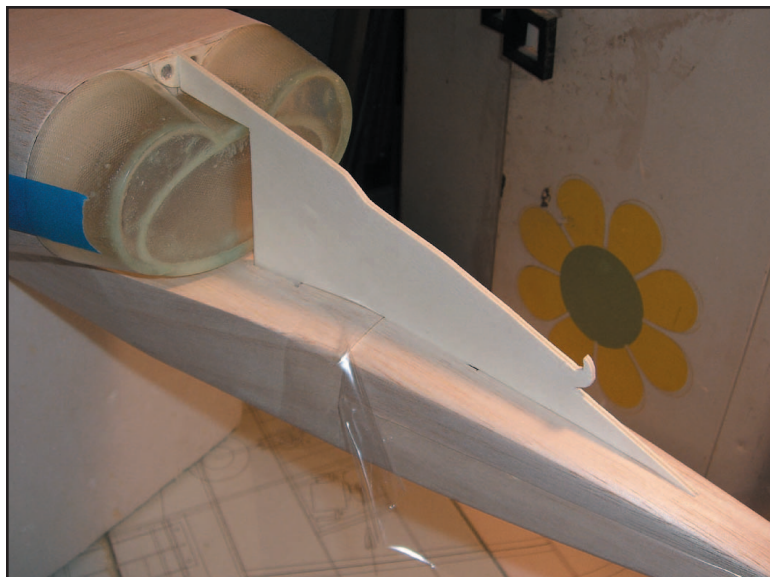


Photo 208

- ☐ 208. Cut from its sheet one TH1 (1/8" balsa). Make sure the clear sandwich wrap is folded toward the front of the model. Slip the front of TH1 into the slot in TH2 and into the slot you cut into the bottom of the tailcone. Make sure that TH1 is centered over the elevator hatch and square with the fuselage and aligned with the center line. When satisfied, glue TH1 to TH2 and to the elevator hatch. (Photo 208)

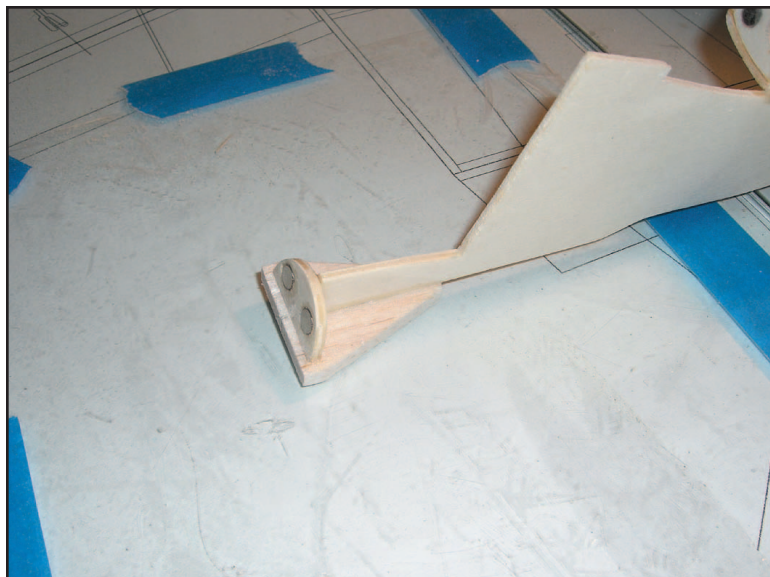


Photo 209

- ☐ 209. Remove the elevator hatch from the fuselage. Use a sanding block to sand the bottom of TH1 and TH2 so they are flush with each other. Cut from its sheet one TH3 (1/4" balsa). Position TH3 on the bottom of TH1 and TH2. Make sure that it overhangs the front of TH2 by 1/8". When satisfied, glue TH3 to TH1 and TH2. (Photo 209)



Photo 210

- ☐ 210. Use a sanding block or emery board to sand the front of TH3 so it is flush with the front face of TH2. (Photo 210)





Photo 211

- ☐ 211. Use a pencil to mark a line along the bottom fuselage sheeting on the front edge of TH3. (Photo 211)



Photo 212

- ☐ 212. Remove the elevator hatch from the fuselage. Use a sanding block to sand the bottom of TH3 so it is flush with the line you drew in Step 210. Round the bottom of TH3 so it fair smoothly between this line and the bottom edge of TH1. (Photo 212)



Photo 213

- ☐ 213. Cut from their sheet four TC (1/4" balsa). Glue these together to make a 1" thick tailcone block. Position and glue this to the back face of B12. (Photo 213)

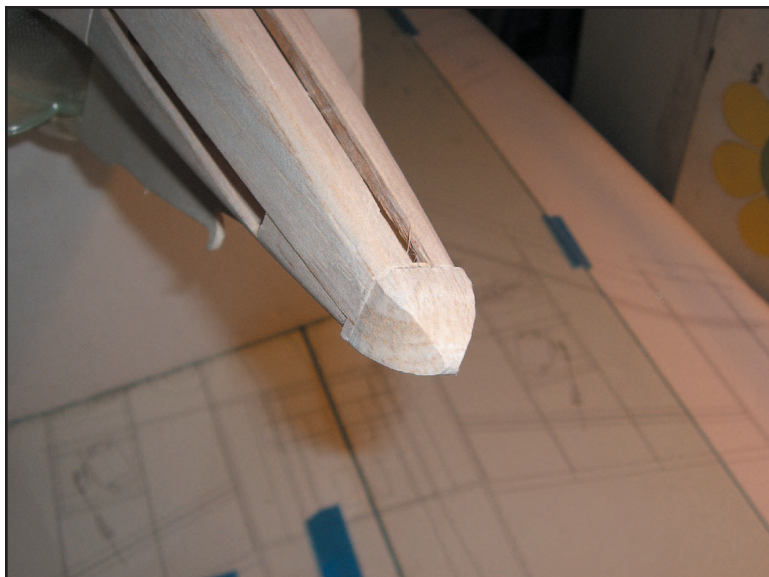


Photo 214

- □ 214. Use a razor plane to cut a rounded taper into the sides of the tailcone block. Repeat for the other side. (Photo 214)

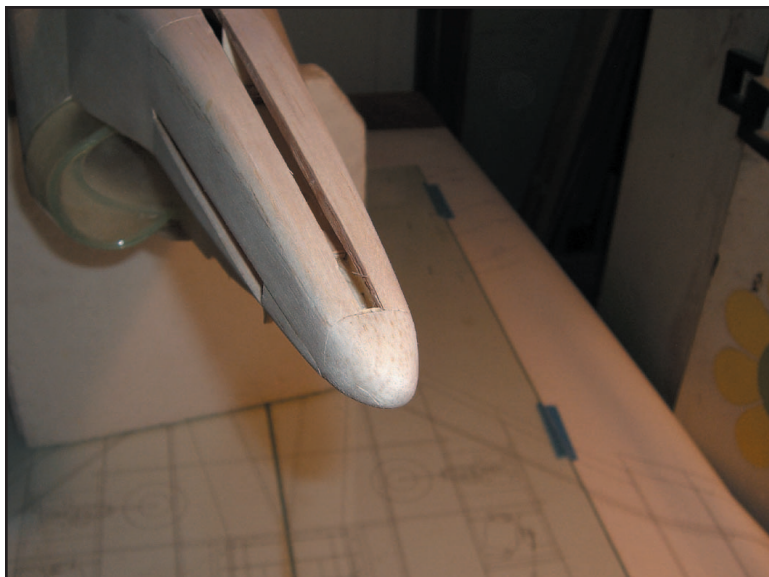


Photo 215

- □ 215. Use a razor plane and sanding block to round the corners of the tailcone block to match the shape of the tailcone. Repeat for the other side. (Photo 215)

## Final Assembly



Photo 216

- □ 216. While it is not necessary, you may find it easier to finish the inside of the inlet lips while they are off the model. If you decide to do this, gently break the tack glue joints used to secure the inlet lip. Once the inside is finished, carefully replace the inlet lip and glue it securely to the fuselage. Repeat for the other side. (Photo 216)



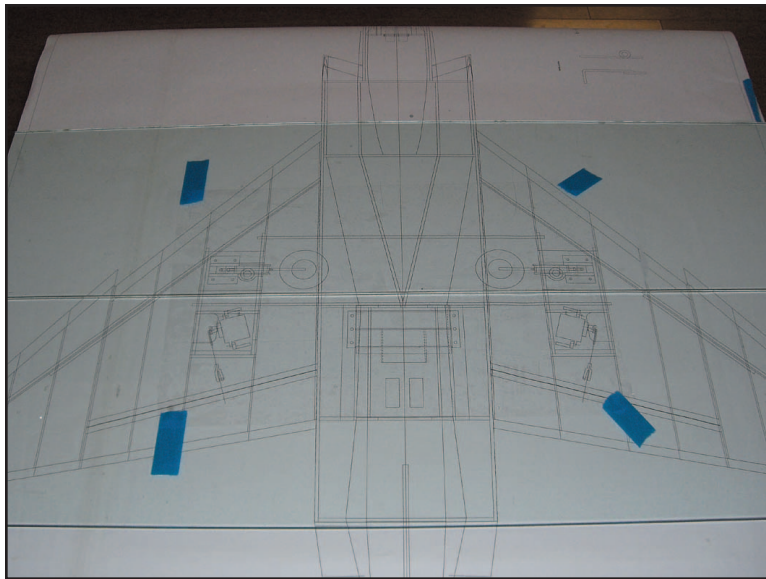


Photo 217

- ☐ 217. Use low-tack masking tape to secure a piece of clear sandwich wrap to the building board over the wing to fuselage joints. (Photo 217)



Photo 218

- ☐ 218. Position the fuselage over the plans and place some weight on it like the sand baggies shown. Remove the ailerons from the wing panels. Insert a wing panel into the spar slots. Repeat for the other side. (Photo 218)



Photo 219

- ☐ 219. Slip a piece of scrap balsa block under the joint between the inner and outer wing panels. Repeat for the other side. (Photo 219)



Photo 220

- 220. Measure and cut a small piece of scrap 1/8" balsa stick. Place it against the leading edge of the wing panel and make a mark that is even with the leading edge of the wing. Compare this measurement against the other wing panel. If one wing's leading edge is higher than the other, remove the high wing and use a hobby knife or sanding block to remove a little bit of the bottom of the front stub spar. Insert the wing panel back into the fuselage and measure again. Repeat as necessary until the leading edges of both wing panels are even with each other. (Photo 220)



Photo 221

- 221. Use the 1/8" measuring stick you cut in Step 219. Place it against the trailing edge of the wing panel and make a mark that is even with the top of the wing sheeting. Compare this measurement against the other wing panel. If one wing's trailing edge is higher than the other, remove the high wing and use a hobby knife or sanding block to remove a little bit of the bottom of the rear stub spar. Insert the wing panel back into the fuselage and measure again. Repeat as necessary until the trailing edges of both wing panels are even with each other. Once both root ribs are even, use the measuring stick to make sure that the top sheeting of the trailing edge sheeting at the joint between the inner and outer panels is at the same height as the root rib. When satisfied, remove the wing panel and apply a thin coat of 30-minute epoxy to the stub spars and to the inside of the spar pockets and insert the wing into the spar pockets. Repeat for the other side. Use the 1/8" balsa measuring stick to make sure the wings are still even with each other at the root rib and inner/outer wing joints. (Photo 221)

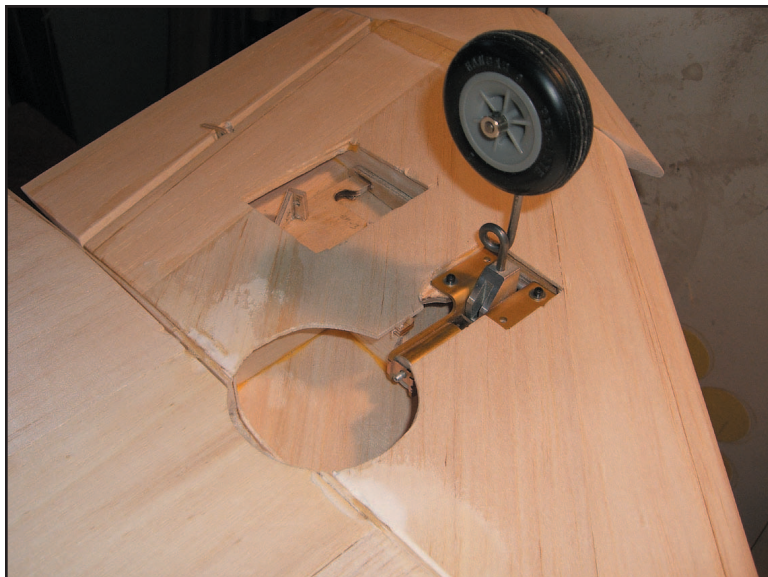


Photo 222

- □ 222. Once the glue is dry, fit the ailerons to the wing making sure that it does not rub against the fuselage or outer wing panel. If you're using retracts, cut out the wheel well from the wing. Fit the main landing gear into the wing and cut the wheel well opening in K5. Repeat for the other side. (Photo 222)



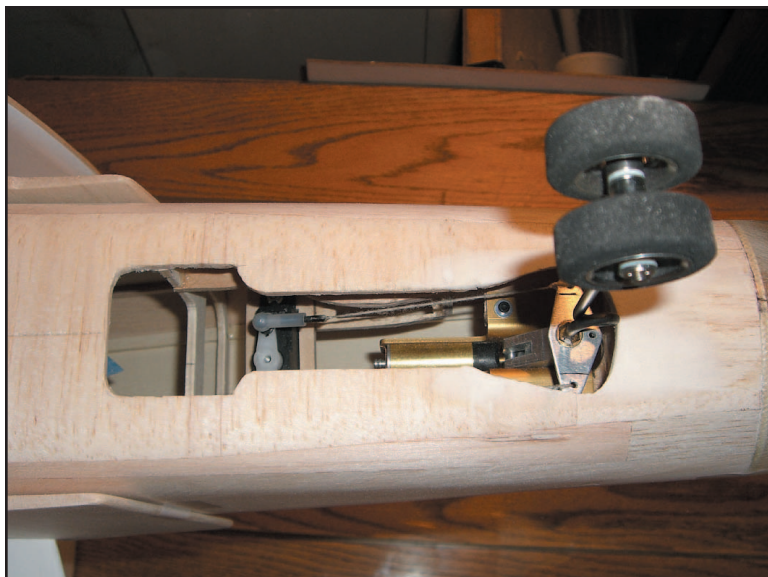


Photo 223

- ☐ 223. If you're using retracts, cut the nose gear wheel well opening into the bottom of the nose section. Install the nose gear retract and make sure that it operates freely. (Photo 223)

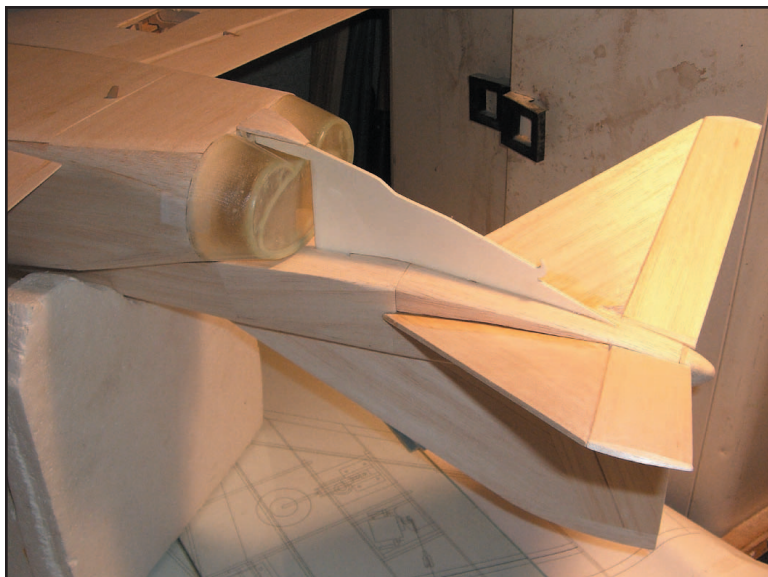


Photo 224

- ☐ 224. Remove the elevator hatch from the fuselage. Place the horizontal stabilizer on the stab mount. Use a 36" long balsa stick or hardwood dowel to make sure the tips of the horizontal stabilizer is square to the wing. Verify that the horizontal stabilizer is level to the wing. When satisfied, glue the horizontal stabilizer to the stab mount using 30-minute epoxy. When the glue has dried, cut the balsa away from the elevator hatch so it sits flush with the bottom sheeting of the tailcone. (Photo 224)

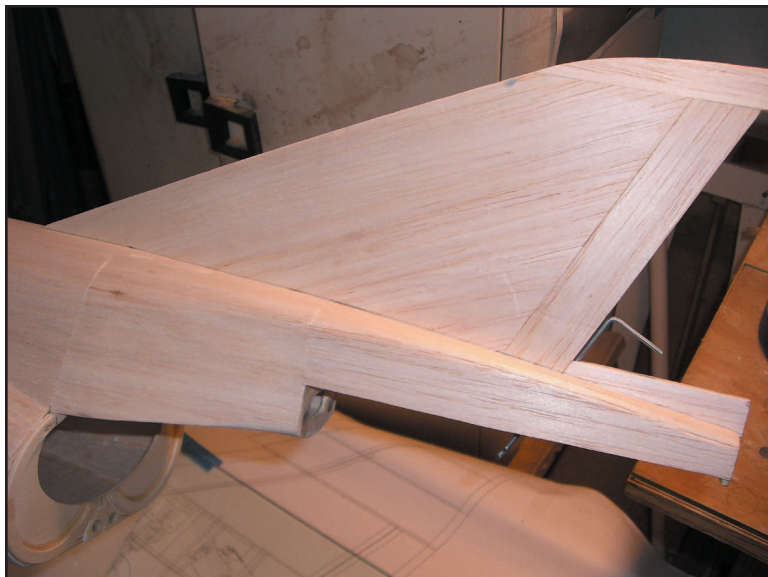


Photo 225

- ☐ 225. If it is not already, install the rudder onto the vertical stab. Make sure the torque rod is inserted in the hole in the rudder. Lay the vertical stab on the building board and position F5 so the top of F5 is aligned with the bottom of the rudder. When satisfied, carefully glue F5 to the back of the vertical stab. Slip the vertical stab into the rudder slot in the top of the tailcone. If you're planning to streamline the vertical fin/rudder, use a pencil to mark a line to show the top of the fuselage on the rudder. Repeat for the other side. (Photo 225)





Photo 226

- 226. If you're going to streamline the tail feathers, then remove the vertical stab from the fuselage. Use a razor plane and sanding block to shape the vertical stab and rudder. If it is not already, slip the rudder hinges into the rudder and vertical fin. Then, slip the entire vertical fin into the fuselage. Measure the distance between the top of the fin and the tips of the horizontal tail to make sure the fin is square. Sight down the length of the fuselage to make sure the fin is in line with the fuselage center line. Make any adjustments. When satisfied, glue the vertical fin to the fuselage at the top slot and to the elevator mount. (Photo 226)

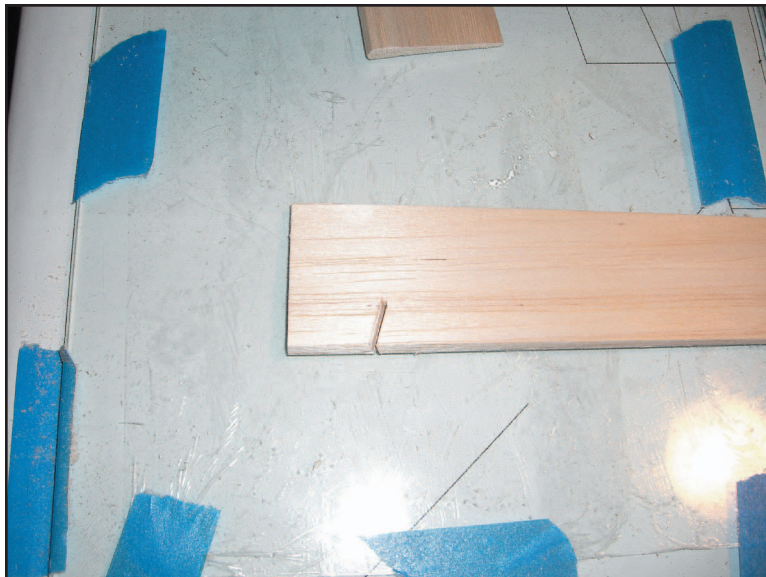


Photo 227

- □ 227. Cut from their sheet, two elevator horns (1/16" birch ply). Using the top view on the plans measure and mark the location and angle of the elevator horns onto the elevator. Use a hobby knife to cut a 1/16" slot into the elevator. Remember that the slots should be angled inward slightly and not perpendicular to the surface of the elevator. Insert the elevator horn into the elevator and glue it into place. Repeat for the other side. (Photo 227)



Photo 228

- 228. Install, but do not glue the elevator into the horizontal stabilizer. Mount the elevator and rudder servos into the SM3 servo mount. Install, but do not glue the elevator into the horizontal stabilizer. Install but do not glue the rudder into the vertical stabilizer. Make a "Y" pushrod for the elevator. Connect the elevator pushrod to the elevator servo and elevators. Make a regular straight pushrod for the rudder. Connect the rudder pushrod to the rudder servo and rudder torque rod. (Photo 228)





Photo 229

- □ 229. Position and align the elevator hatch over the tailcone. Use a pencil and mark the location where the elevator pushrods contact the sides of the elevator hatch. Use a hobby knife and sandpaper to make an notch for each pushrod in the sides of the elevator hatch. Make sure the notches are large enough that the pushrods do not touch the hatch. (Photo 229)

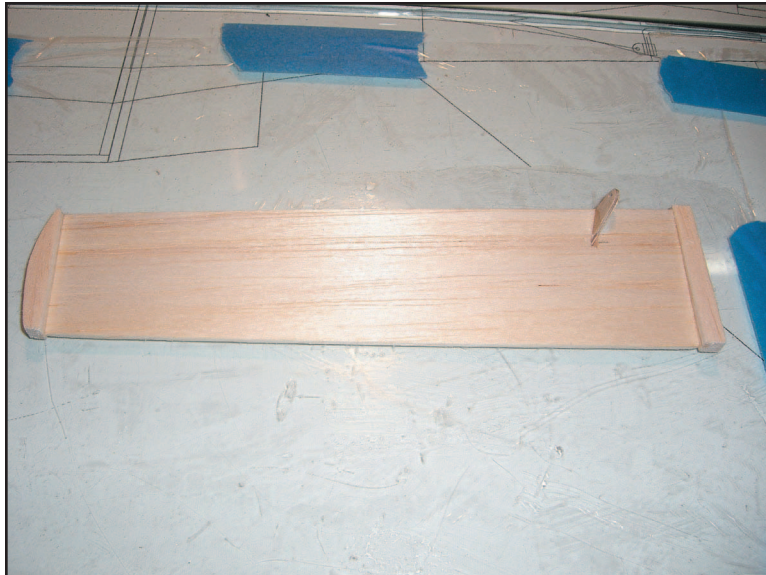


Photo 230

- □ 230. Remove the elevator from the horizontal stabilizer. Cut from their sheets two E5 and two E6 elevator stiffeners (1/4" balsa). Glue E5 to to the tip of the elevator and E6 to the root. Use a razor plane and sanding block or emory board to shape E5 and E6 so they are flush with the top and bottom of the elevator. Use a sanding block or emory board to round E5. Repeat for the other side. (Photo 230)

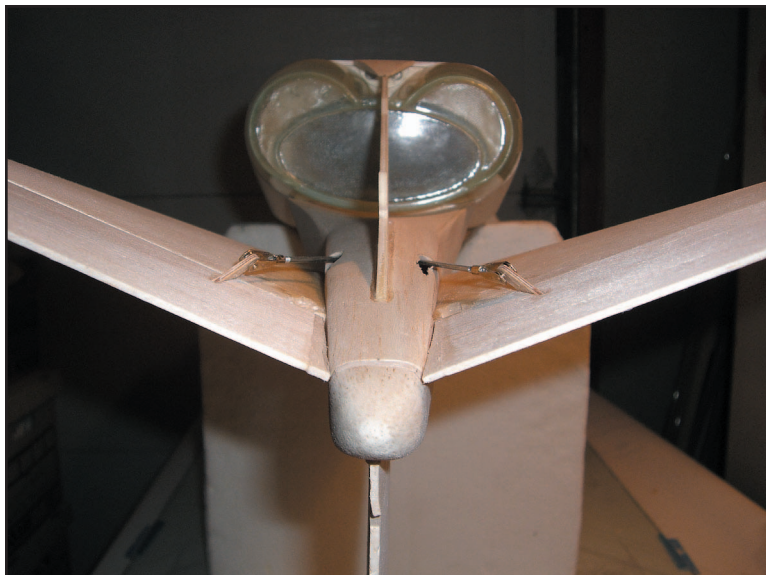


Photo 231

- □ 231. Use a hobby knife and sandpaper or emory board to fit the E6 to the tailcone. When satisfied, glue the elevator hinges to secure the elevator to the horizontal stabilizer. Repeat for the other side. (Photo 231)

**This concludes the basic construction of the model.**

## Finishing

Use a high speed rotary tool and sandpaper to cut out the oval opening in the fiberglass engine nozzle. Use the clear plastic sheet and the template on the plans to make the tailpipe. Make sure the front of the tailpipe fits over the back of the fan unit and that the back of the tailpipe fits into the oval exit in the fiberglass engine nozzle. Once satisfied, install the fan unit into the fuselage. Insert the tailpipe into the fuselage through the opening in B9 and slip it over the back of the fan unit and tape it to the fan unit using low-tack masking tape. Sighting from behind the fuselage, verify the alignment of the tailpipe to make sure it's parallel to the centerline of the fuselage. Once satisfied, slip the engine nozzles over the tailpipe and into place onto B9/B9-2. Make sure it doesn't distort the tailpipe and alter it's alignment. If it does, then carefully sand the leading edge of the engine nozzle until the opening is centered and doesn't distort the tailpipe.

Fit the nose cone to B1/B1-1 and temporarily tape into place using low-tack masking tape. Sighting from the front and rear, verify that the nose cone is aligned with the centerline of the fuselage. If the nose cone is canted off to one side or the other, carefully sand the trailing edge of the nose cone until it is aligned with the fuselage centerline. Once satisfied with the fit, scuff the inside of the nose cone and engine nozzles and use epoxy to glue the fiberglass nose cone to B1/B1-1 and the engine nozzle to B9/B9-2.

Sand the entire model smooth. The F-4 Phantom II can be finished using a number of different methods. Since the entire model is sheeted, the model can be covered with a plastic film or it can be painted. If painted, then the balsa grain would first have to be filled using either a light sanding filler and/or a lightweight fiberglass job.

The canopy is molded from Vivak, (PETG) so use any compatible glue to attach the canopy to the hatch.

## Control Throws

The throws below describe the movement of the control surface itself.

### Aileron

Measured at the root trailing edge of the controls.

High rate: 3/8" (Up and down)

Low rate: 1/4" (Up and down)

### Elevator

Measured at the root trailing edge of the controls.

High rate: 5/8" (Up and down)

Low rate: 1/2" (Up and down)

### Rudder

Measured at the root trailing edge of the control.

High rate: 5/8" (Up and down)

Low rate: 1/2" (Up and down)



## Balancing and Flying the Model

### **The model must be balanced before attempting flight.**

Failure to properly balance the model will most likely result in the destruction of the model. The model should be balanced upside-down on a balancing stand. It should be balanced at the range shown on the plans, or 13-3/32" to 12-5/8" forward of B9. If the model doesn't balance at this point, try moving the internal components such as the receiver battery until it does balance at the point indicated. We recommend securing the receiver battery pack to the elevator and rudder servo plate in the fan compartment and using a servo extension to the power the receiver in the cockpit area.

Do not get impatient to fly the model. Instead, take your time to make sure everything is perfect before flying. You should work your way up to the first flight by taking the model out to the flying field and performing a good radio range check with the motors off, then again while running at full power. Follow this up with doing some ground taxi tests to verify that the model tracks straight and that it accelerates briskly. Make sure the nose wheel steering isn't too sensitive.

Once you're satisfied with the model, put a fresh charge on the receiver pack and the flight packs and pump up the retracts. Set the control throws to low rates for the initial test flights. Line the model up at the runway threshold and roll on the throttle.

The model will require a take-off run of about 150-200 feet. Do not try to horse the model off the runway. This will only result in a stall and crash. As the model accelerates, apply gentle back pressure and the model should rotate and rise off the runway. The landing gear can be raised at any point after this or may be left down for the first flight. Once airborne, concentrate on flying the model to a safe altitude where it can be trimmed for level flight.

The F-4 is a straight-forward design that is both stable and responsive. Like most jets, raising the nose will increase the amount of drag it produces and really slow the model down. Because it is a very clean design, lowering the nose will allow the model to pick up quite a bit of speed. Be aware of this characteristic when landing the model.

When you're ready to land, fly the model to pattern altitude. You can lower the landing gear at any time. Most pilots like to perform a gear pass immediately after lowering the landing gear to visually verify that all three are down and locked. When the model is on downwind and abeam of the touchdown zone, reduce power to 1/2 - 3/4 throttle. The model should begin to descend. Do not let the model dive as this will only increase the amount of airspeed you'll have to bleed off before landing. Hold the model into a level flight attitude throughout the landing pattern with the elevator and control the rate of descent with throttle. When the model is 45 degrees from the touchdown zone, turn onto base leg, then onto final. At about 3 feet off the runway, reduce power to idle. The model should begin to slow to landing speed. Because the model is relatively lightly loaded, it is capable of remarkably slow flight. Raise the nose to landing attitude to flare and touch down. Allow the model to slow to taxi speed before trying to turn off the runway.

Perform a thorough post-flight check to make sure that no problems have cropped up during the first flight. Once you're satisfied that everything is in order, you may fly the model again. Take your time to get to know the model's handling characteristics. It is a very forgiving and stable model and should present you with no surprises.

Congratulations! You're now a Phantom driver!

## **Materials Required for Construction**

Below is a list of materials which are required for construction, but not included in the kit.

- 1/8" music wire or equivalent for landing gear struts
- 2 - 2-1/4" wheels for the main landing gear
- 2 - 1-1/4" wheel for the nose landing gear
- 1/8" wheel collars or equivalent wheel retainers
- 16 - 2-56 T-nuts to mount the fan units and retracts
- 15 - CYA hinges or equivalent.

Various wood screws to mount the servos, fan hatches and removable battery tray.

- 1 - 90mm fan unit
- 1 - Brushless motors capable of producing 800-1200W of power
- 1 - Brushless speed controllers capable of producing 800-1200W of power
- 1 - 5 to 6 cell or equivalent motor battery pack capable of withstanding 40-50 amps of power draw
- 5 - 2-56 pushrods
- 2 - Dubro 1/16" ball joints
- 1 - Dubro E/Z Adjust Strip Aileron Horn Set (For 4-40 thread)
- 4 to 6 channel radio system.

### **Contact Information:**

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