



First appearing in August 1944 as a result of a special Air Ministry requirement, the FW190D9 was an attempt to produce a high-altitude fighter based heavily on an existing fighter, the FW190A8. The BMW radial engine was replaced with the Junkers Jumo 213 inverted V-12 liquid cooled engine. The rounded nose shape was retained by placing an annular radiator in front of the engine, although the nose was reshaped and lengthened to accommodate the new engine. A 19.7 inch plug was inserted in the aft fuselage forward of the tail to restore the center of gravity, and several modifications were attempted, including cockpit pressurization, in the various prototypes, the D-1 through D-8. The D-9 was the first production variant, and the majority of the approximately 700 Ds built were D-9s. The D-9, like its predecessors, proved to be a superb fighter. The unusual paint scheme depicted for your D-9 was known as "Rote 13" or Rote 1", translated as Red 13 or Red 1. Four FW190D-9s were assigned to JV-44, Adolph Galland's ME-262 squadron, as field defense fighters to protect the jets during their vulnerable takeoff and landing phases. The red undersurfaces with white striped were designed to alert the flak gunners around the fields to a friendly aircraft.

The 12 cylinder Jumo 213 engine was rated at 1770 horsepower, with an additional methanol boost to 2400 HP available. The Wingspan of the 190 was 34

ft. 5 ½ in, with a length of 33 ft. 5 in. Gross weight was over 7,600 pounds. Armament varied greatly, but the standard included two Mg131s in the fuselage, and four Mg151s in the wing. A variety of cannons, rocket pods, and bombs could also be carried. Standard crew was one pilot, though there was room in the aft fuselage to carry another person, usually a downed pilot picked up during an emergency. A two seat trainer was introduced in the latter stages of the war.



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Thank you for purchasing the FW 190D-9 from Skyshark R/C Corporation. For the first time, R/C enthusiasts have a choice in scale aircraft designs. Our goal, through computer technology and state-of-the-art production techniques, is to offer aircraft which in the past have not been modeled simply because they weren't popular enough to justify mass production. Our production techniques allow us to produce aircraft which, though not as popular and well known as P-51s and P-47s, still offer historical significance (good or bad!), Good looks and flying characteristics, and a uniqueness that is sure to turn heads wherever you take your airplane!

Your airplane has many unique features in its design:

CAD Design

CAD design allows strength to be built into the airplane without sacrificing weight. Accurate parts design and placement ensures a perfect fit.

CAD Drawn Plans

The plans in this kit are not copied from a master set! They are originals drawn directly from the CAD program where the airplane was designed. We do this because it allows us to use color, which helps you better visualize the various components of the airplane, and we can use better quality paper, which greatly reduces the possibility of shrinkage. Since you're going to build directly on the plans, they ought to be the proper size! Also, parts placement is guaranteed to be accurate, so you can build a better, straighter model.

Laser Cut Parts

The same program that generates the design and plans also drives the laser, so every part is reproduced exactly as it was designed. Laser cutting also allows us to fit more parts on each sheet of wood, reducing the waste, and low-

ering the cost to you. Since laser cutting does not have the same limitations that mechanical cutters do, small and hard-to-produce parts are simply a computer file away, so you get a more accurate airplane.

Plastics and Fiberglass

The cowl is accurately reproduced high quality fiberglass. The canopy is accurately reproduced in clear plastic, and is molded in two pieces. The wing fillets and other accessories are molded in plastic to ease the building and finishing chores!

A Word About the Building Options

Engine Options

Engine choices range from .60 to .68 2-strokes, or .60 to .90 4-strokes. There's plenty of room in the cowl to mount the engine in any direction you desire, and you can, with a little extra thought, completely cowl in the engine; the extra thought is needed for adequate engine cooling.

Electric Options

Electric conversion on a kit this size is very easy and straightforward. You will simply need to plan for a battery hatch in order to save having to remove the wing for battery changes. The gun hood on the FW190 makes this very easy!

Retract Options

Retract installation is shown on the plans and explained in these instructions for Spring Air or Robart 85 degree retracts. Of course, you are free to use any retract you wish. The 85 degree units will not truly reproduce the "canted in" look of the FW, but will Come very close. Actually, with the gear canted in scale, the ground handling characteristics are not as good as if the gear legs are closer to vertical.

Flaps

Flaps on an aircraft this size add more weight and complexity than are offset by any aerodynamic gain, so we elected to not incorporate flaps into the design of the Focke-Wulf. Flaps can be added if you wish, but the design and engineering is up to you!

General Building Information

The FW190 can be built by a person with average building skills. It is designed for someone who has built a trainer or low wing sport plane. No unusual building techniques are required, although more difficult areas are explained in detail where necessary. Certain steps in the building process must be followed as depicted, or you might find yourself digging back into the structure to redo something. These areas are outlined when necessary.

Occasionally hints will be included at certain building steps. These are not required for completion, rather they are tips intended to ease a particular process.

The laser does not cut through the wood, it burns its way through. As a result of this, occasionally there will be scorching on the surface of the wood. This is normal, and is only a surface discoloration, and does not affect the wood in any other way. Similarly, the laser settings are optimized for wood density averages, so occasionally, due to variations even in individual sheets, some areas might not cut through completely. This is apparent mainly with the plywood. Simply use care in removing the parts from the sheets; most of the time, the parts will literally fall out of the sheets!

The Wing Section building steps are shown for both Fixed Gear and Retractable installation. Decide which gear installation you want to go with, and use the appropriate building section.

Hardware and a motor mount are not included in the kit. There are so many choices for quality hardware that these choices are left to the individual preferences of the builder, rather than include something in the kit that you'll probably throw away anyway. A vibration-dampening motor mount is recommended for use regardless of engine choice, so select a mount suited to your particular engine.

This aircraft is not a toy. It must be flown in a responsible manner according to the rules set forth by the Academy of Model Aeronautics. The builder assumes the responsibility for the proper assembly and operation of this product. Skyshark R/C Corporation shall have no liability whatsoever, implied or expressed, arising out of the intentional or unintentional neglect, misuse, abuse, or abnormal usage of this product. Skyshark R/C Corporation shall have no liability whatsoever arising from the improper or wrongful assembly of the product nor shall it have any liability due to the improper or wrongful use of the assembled product. Skyshark R/C Corporation shall have no liability for any and all additions, alterations, and modifications of this product.

Having said that mouthful, turn the page and start building the best airplane on the market!

Accessories needed to finish the FW190:

Sullivan Gold-N-Rods, 48" (Part no. 504) or other appropriate pushrods

Sullivan RST-10 or -12 Fuel Tank or other 10 - 12 ounce fuel tank

Motor mount for appropriate engine

Skyshark FW190A-8 Spinner

3-1/4" Main Wheels (Robart #134)

1-1/2" Tailwheel (Dubro 150TW)

3/16" Gear Straps for gear covers (Dubro #811)

Hinges - We normally use CA hinges for ease.

Control Horns, Clevises, Bolts, Nuts, Screws, etc. (consult our website)

1/7th Scale Pilot Full or Bust Figure

Engine, Muffler, Radio, Covering, Paint, etc.

Electric Conversion:

Brushless Outrunner Motor 400-500Kv
Skyshark Lightning 75 or E-flite Power 60

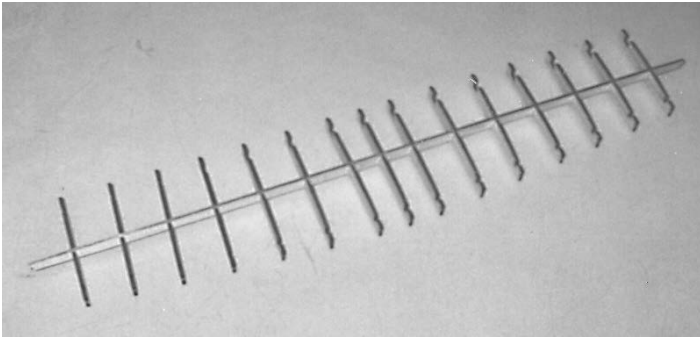
ESC: OS70, Cobra 80 or E-flite 80

Battery: Ulti-Power 6-8 cell 5200mAh

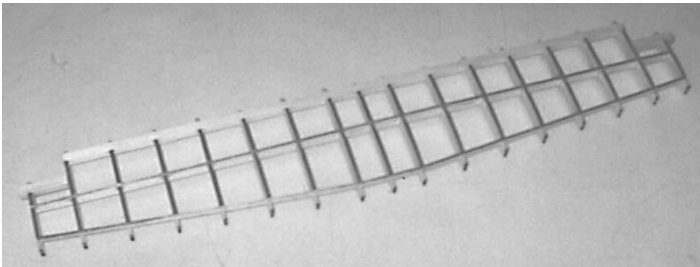
Rare Earth Magnets for battery hatch.

Notes:

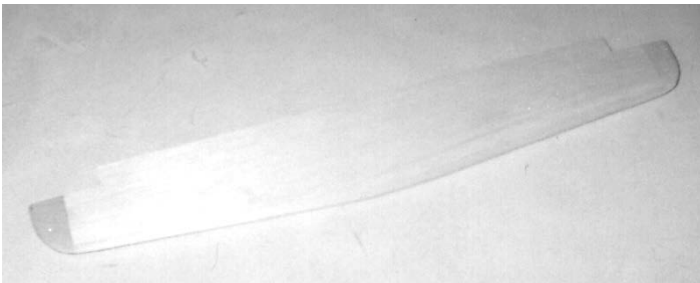
Horizontal Stabilizer Assembly



1. Slide H1 thru H8 into the slots in H10. Turn this assembly over (carefully!) And pin to the board. Glue all the pieces.
2. Glue H9 to the ends of H10.



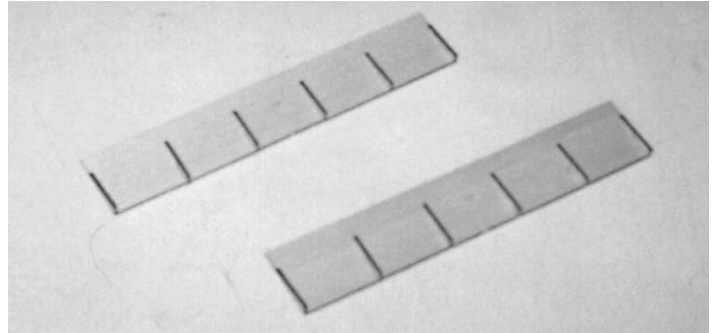
3. Cut a piece of $\frac{1}{4} \times \frac{1}{4}$ balsa stock to size and slide it into the slots in the aft end of the rib jigs to for the trailing edge. Glue in place.
4. Cut additional $\frac{1}{4} \times \frac{1}{4}$ balsa pieces to fit between H8 and H9. Glue to the rib only. Do not glue side that touches the guide.
5. Slide H11 into the slots in the leading edge and glue. Slide H12s into place and glue. Note the direction of the taper. The wider end should go toward the center.



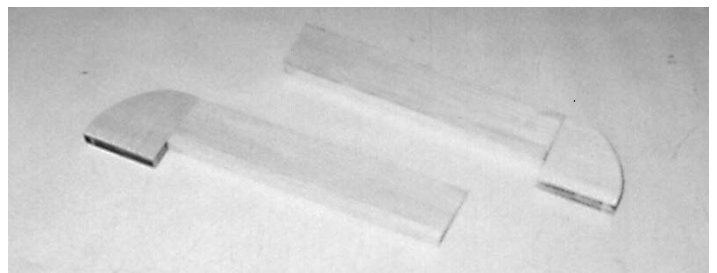
6. Carefully remove the tabs on the rib jigs forward of H11 and H12, and aft of the trailing edge.
7. Cut a $\frac{1}{16} \times 4 \times 48$ balsa sheet into two 20" pieces. Using one piece, sheet the stab upper surface.
8. Remove the stab from the board, remove the jigs, and sand the ribs smooth. Sheet the bottom of the stab. Trim and sand the sheeting at the trailing edge, leading edge, and at H9 and the notches.

9. Cut $\frac{3}{8} \times \frac{1}{4}$ balsa stock to fit the leading edge, and glue in place. Sand the leading edges to match the rib contour and sand to an airfoil shape.
10. Glue two H13s together and glue to the end of the stab at H9. Sand to shape. Repeat for the other side.
11. Mark bottom side for future reference.

Elevator Assembly

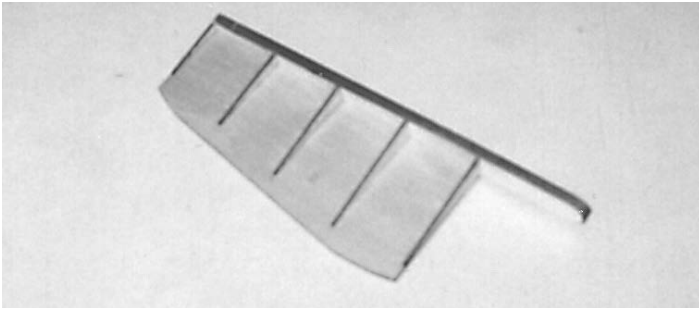


1. Glue E2s into the slots in E1. Notice that the inside edge of the stab is angled slightly, while the outside edge is straight.
2. Fill the inside bay of the elevator with scrap balsa, to add support for the control arm and elevator joiner wire. Sand to match the rib contour.
3. Bevel the trailing edge of E1 to match the rib contour.

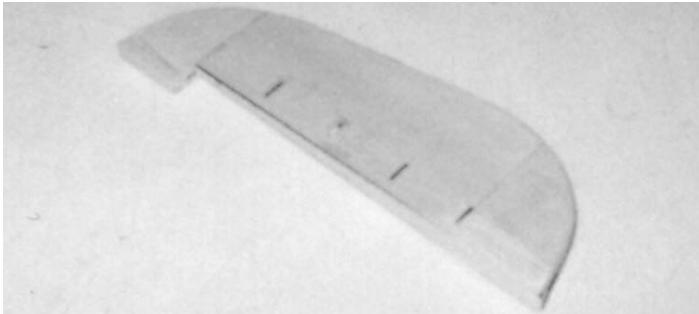


4. From a $\frac{1}{16} \times 3 \times 36$ balsa sheet, cut a piece to serve as the upper sheet. Glue this piece in place, matching the edge with the ribs. Sand the leading edges square
5. Cut a piece of $\frac{3}{8} \times \frac{1}{4}$ balsa stock to size. Test fit and glue to the leading edge. Sand the elevator at the leading edge, trailing edge, and sides.
6. Glue two E3s together, and glue to the outer end of the elevator. Remember that the elevator has an inner and outer end!. Sand to match the taper, and match the forward portion (control horn) to the stabilizer. Repeat for the other elevator.

Rudder Assembly

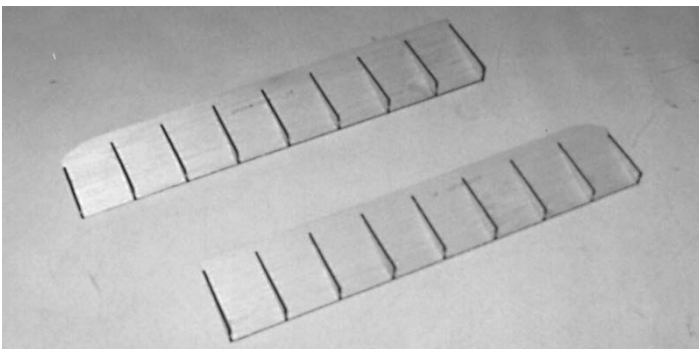


1. Slide R3 thru R7 into the slots in R2. Line them up with the scribed lines and glue.
2. Glue R1 to this assembly, aligning R1 to the top at R7.

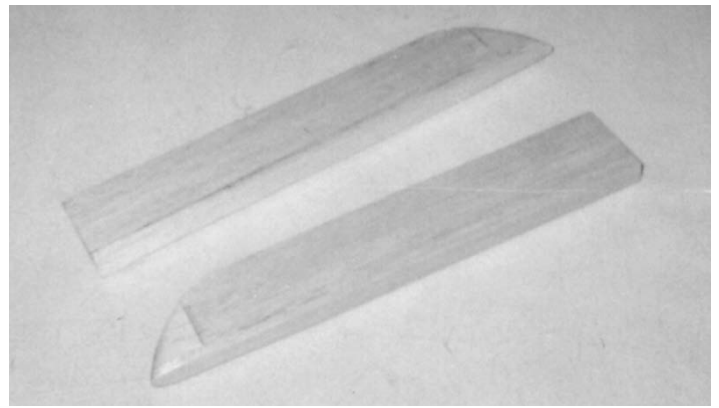


3. Using the same technique as with the elevators, sheet the remaining side of the rudder. Sand the leading edges, sides, and trailing edge of the rudder.
4. Glue two R8s together, then center and glue into the notch between R1 and R3. Add small pieces of 1/16 balsa to the sides of R8 for fill, and sand to match the rudder taper.
5. Glue two R9s together, and glue to the top of the rudder, aligning the trailing edges. Sand to match the taper, but do not sand the control horn yet. This will be matched to the vertical when it is built.

Aileron Assembly

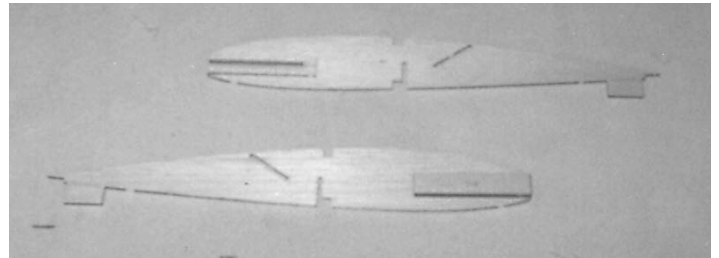


1. Glue A2 thru A10 into the slots in A1.
2. Fill in the third bay (between A4 and A5) with scrap balsa for support for the control arm. Sand to match the rib taper.

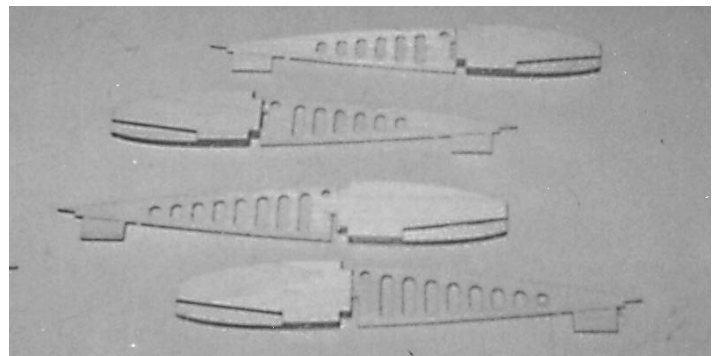


3. Cut a piece of 1/4 x 3/4 balsa stock to 13-1/4" and place the aileron assembly on this piece. Align the assembly so that most of the extra length is toward the portion of the aileron with the rounded end. Also center the aileron to allow for the additional sheeting to be added. Glue in place.
4. Bevel bottom sheeting to match the ribs.
5. Cut the opposite side sheeting from 1/16 x 3 x 36 balsa sheet, and glue in place. Sand the trailing edge, leading edge, and sides.
6. Glue two A11s together, and glue in place to the aileron assembly. Sand to shape.

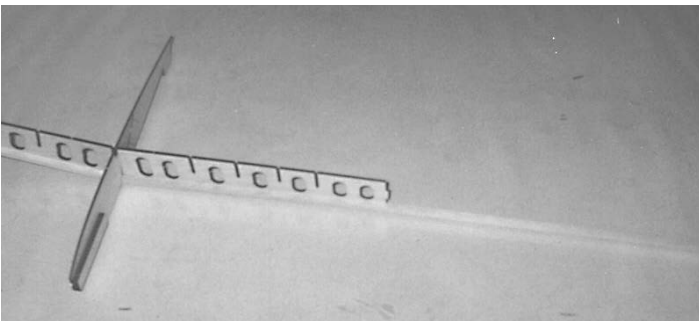
Left Wing Fixed Gear Assembly



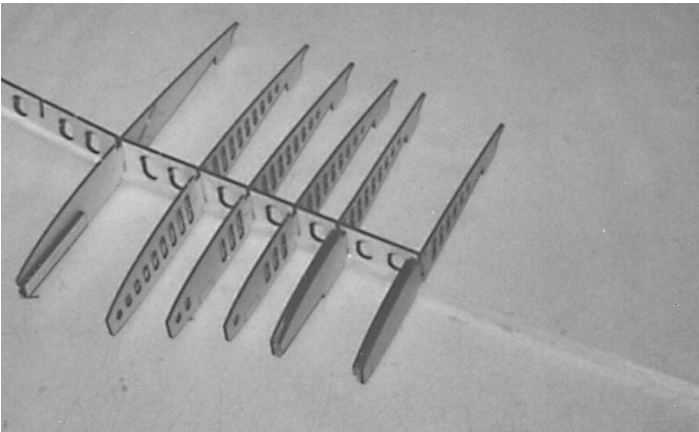
1. Glue W1A to W1, aligning the slot in both pieces. Glue W1B to W1A. Make a left and right side.



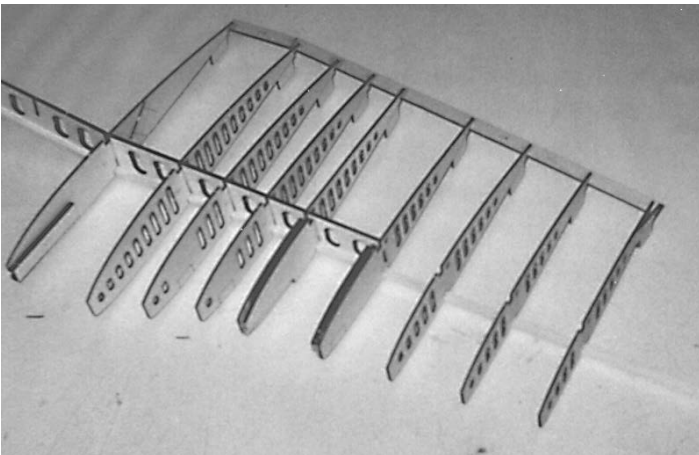
2. Epoxy W3A to W3, aligning the edges. Make a left and right side. Double-check yourself here - it's easy to make two left sides!
3. Epoxy W6A to W6, aligning the edges. Make a left and right side. Repeat the double-check procedure!



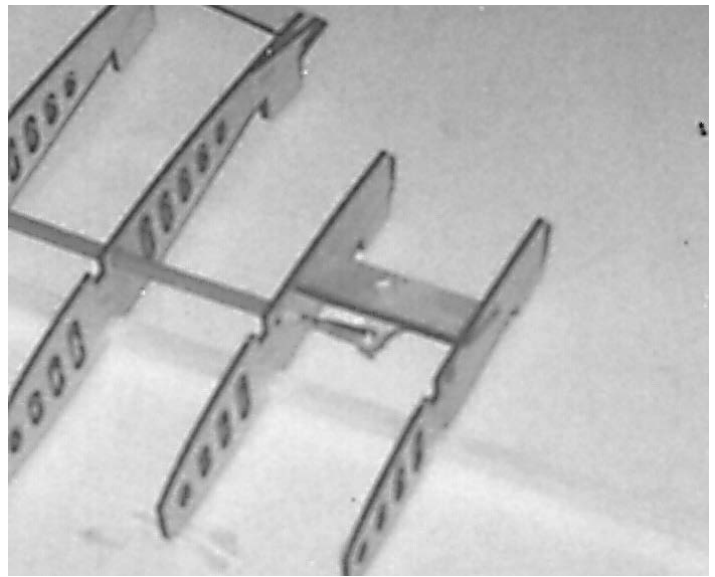
- 4. Glue a 1/4" x 1/4" x 28-1/4" balsa spar to W15 Ply spar, aligning with the bottom edge. For the left side, the balsa spar will glue to the front of W15.
- 5. Slide W1 into the center slot in W15. Temporarily slide the other W1 into the slot as well, but do not glue. Glue only the left side W1 in place.



- 6. Align and glue W2, W3, W4, W5, and W6 in place.

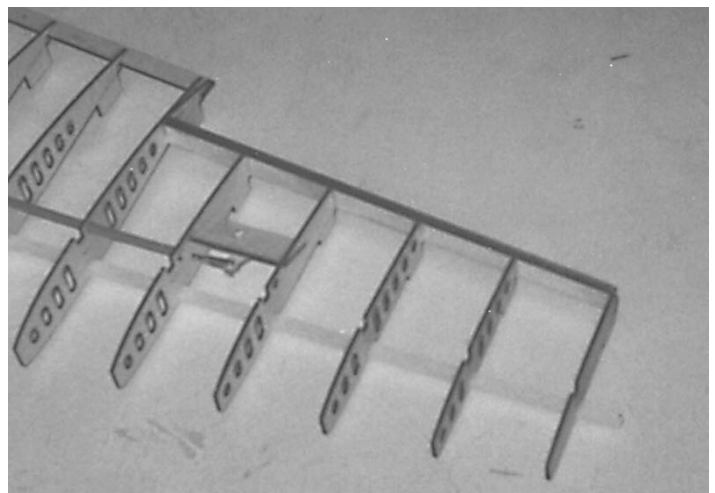


- 7. Glue W7, W8, and W9 in place. Use slight upward pressure on the balsa spar to fully seat it in the rib while gluing.
- 8. Bevel the side of W9A to fit and glue in place.
- 9. Glue W16 and W17 in place in the notches in the trailing edges of the ribs. Adjust notch in W10 as necessary to fit W19.



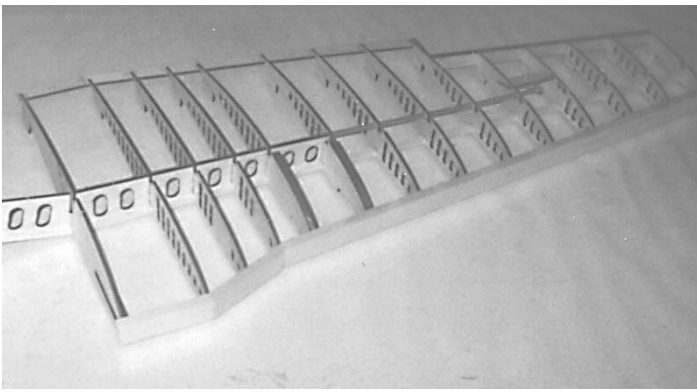
- 10. Glue W10 in place.

- 11. If using the single servo aileron setup, do the following: Locate and drill the hole for the bellcrank bolt in W19. Install the bellcrank on W19. Cut the plastic pushrod housing to 18 1/2" and slide the housing through the holes in the ribs to W10. Open up the holes at W10 and W2 slightly to allow for pushrod movement and glue the housing to all the ribs except W10 and W2. Install W19 with the bellcrank side down, and glue W11 in place. Cut two inner pushrods to 20", assemble them with the aileron connector, and slide the pushrod through the housing. Cut the pushrod at the bellcrank to allow for the clevis, install the clevis, and connect to the bellcrank. Adjust holes for pushrods as necessary.

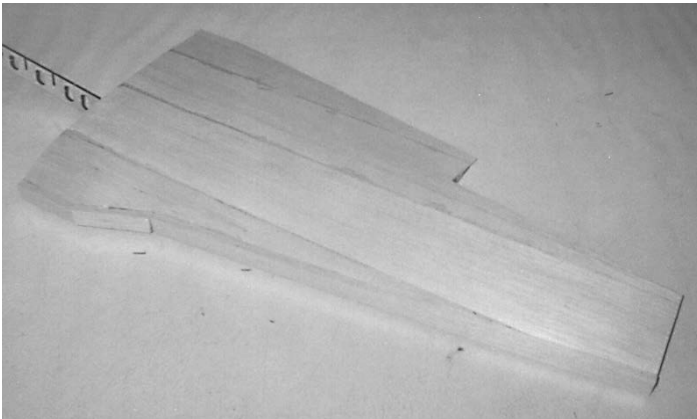


- 12. Glue W12, W13, and W14 in place.

- 13. Cut a piece of 1/4 x 3/4 balsa stock to length and glue to W9 thru W14 as the aileron spar.

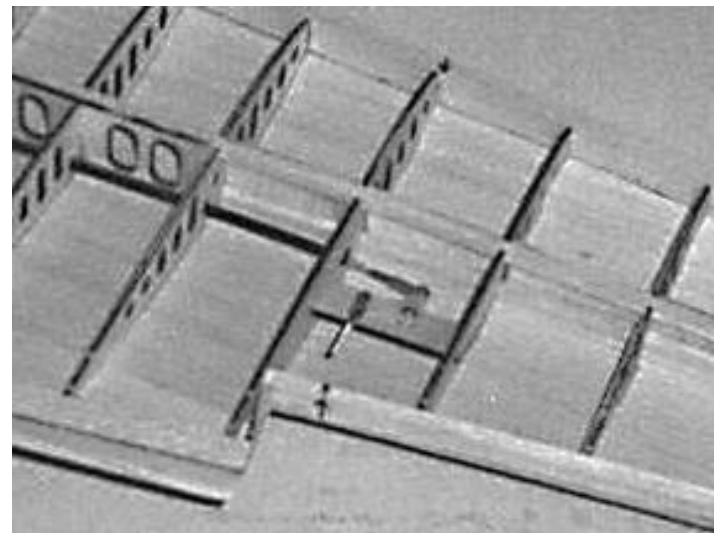


- 14. Cut a piece of 3/8 x 1 balsa stock to fit between W1 and W2 for the leading edge. Glue in place. Sand the leading edge flush with W2.
- 15. Cut another piece of 3/8 x 1 balsa to fit between the leading edge at W2 and W4. Sand to fit and glue in place.
- 16. Fit the remaining 3/8 x 1 balsa to the leading edge and glue in place.
- 17. Glue the top 1/4 x 1/4 balsa spar in place.
- 18. Cut shear webs to fit from W6 to W14 from scrap 3/32" balsa. Sand as needed for a tight fit between the ribs. Glue between the top and bottom 1/4" spars as indicated on the plans. The grain in the shear webs should run vertical.

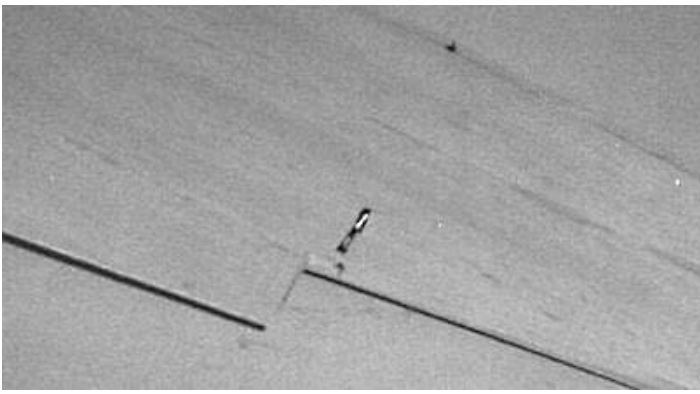


- 19. Sand the aileron spar flush with the ribs. Lightly sand the spar to remove any high spots.
- 20. Cut two 1/16 x 4 x 36 and two 1/16 x 3 x 36 balsa sheets to 29". Edge glue these sheets. Trim the sheet to match the leading edge.
- 21. Sheet the top of the wing. Start at the leading edge and glue except at W1, W2 and W3 - leave this free until you've glued to the spar, then glue.
- 22. Trim the trailing edge to 0.7 aft of W16 and W17. Trim and sand the sheeting at W14, W1, and the aileron.

- 23. Epoxy the Maple Gear Block to ribs W3, W4, W5, and W6.
- 24. Epoxy the Maple Gear Block Anchor to the Gear Block and W3A. Align so that the Gear Block Anchor is flush with W3A and perpendicular to the Gear Block.
- 25. Add balsa tri-stock to the sides of the Gear Block Anchor for added support.
- 26. Carefully drill the Gear Block using a 3/16" bit to open up the hole for the gear wire. Use caution to prevent drilling through the top sheeting!

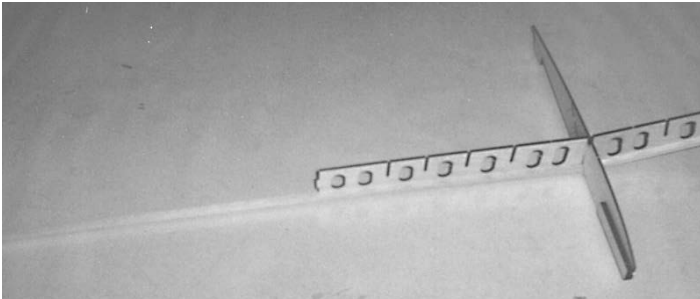


- 27. Remove the tabs from the bottom of the ribs. Remove the tab on the bottom aft of W1 and W2 and glue W20 Ply Holddown Plate in place.
- 28. Sand the aileron spar flush with the ribs. Bevel the trailing edge sheeting to match the rib contours. Sand off the tabs on the ply spar, and lightly sand any high spots on the bottom of the wing.
- 29. Bend and install the pushrod onto the bellcrank. Make alignment marks on the aileron spar and the leading edge for the opening in the bottom sheeting.

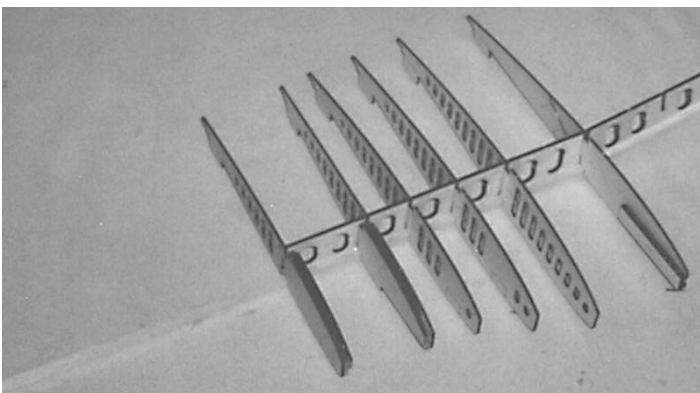


- 30. Cut two 1/16 x 4 x 36 and two 1/16 x 3 x 36 balsa sheets to 29". Edge glue these sheets. Using the same techniques as with the top of the wing, sheet the bottom of the left wing.
- 31. Trim and sand the sheeting at W1, W14, the trailing edge, and the aileron opening.
- 32. Open up the hole in the sheeting for the pushrod, using the marks made previously as a guide.

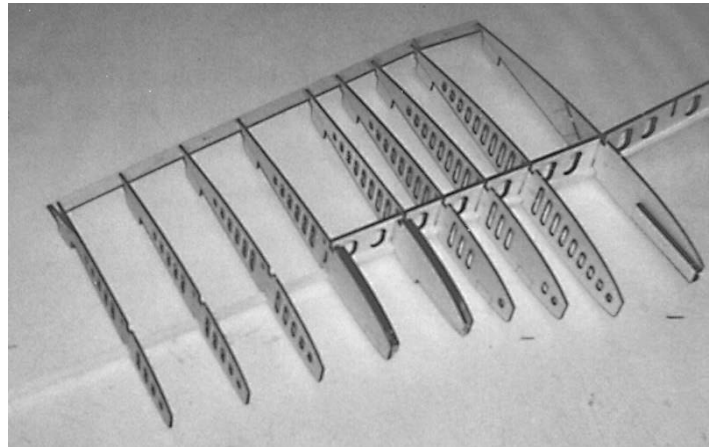
Right Wing Fixed Gear Assembly



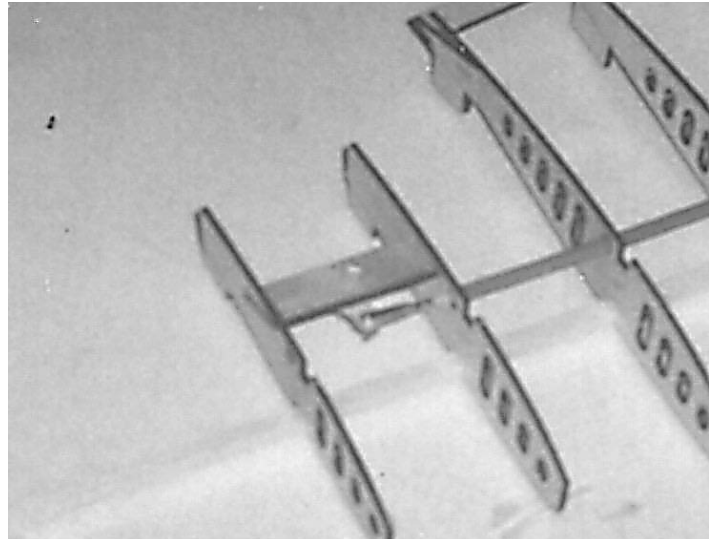
- 33. Glue a 1/4" x 1/4" x 28-1/4" balsa spar to W15 Ply spar, aligning with the bottom edge.
- 34. Slide W1 into the center slot in W15. Glue to the other W1. Make a mark on the leading edge for the dowel opening. Slide W18 servo tray in the slots in W1 and W2 and glue. Insure the hole in W18 is centered.



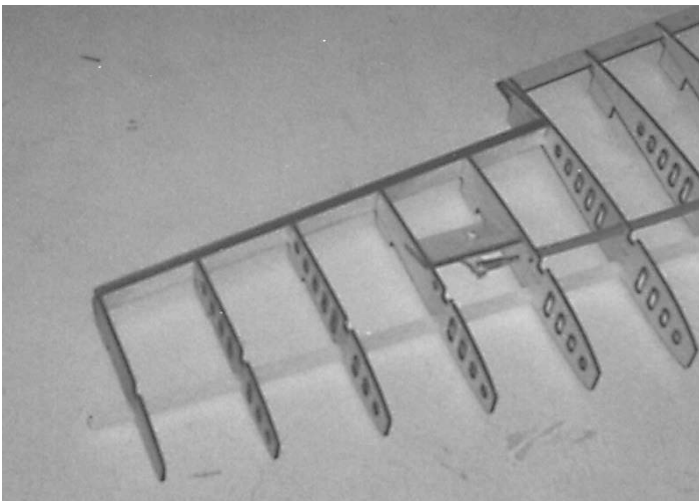
- 35. Align and glue W2, W3, W4, W5, and W6 in place.



- 36. Glue W7, W8, and W9 in place. Use slight upward pressure on the balsa spar to fully seat it in the rib while gluing.
- 37. Bevel the side of W9A to fit and glue in place.
- 38. Glue W16 and W17 in place in the notches in the trailing edges of the ribs. Adjust notch in W10 to fit W19.

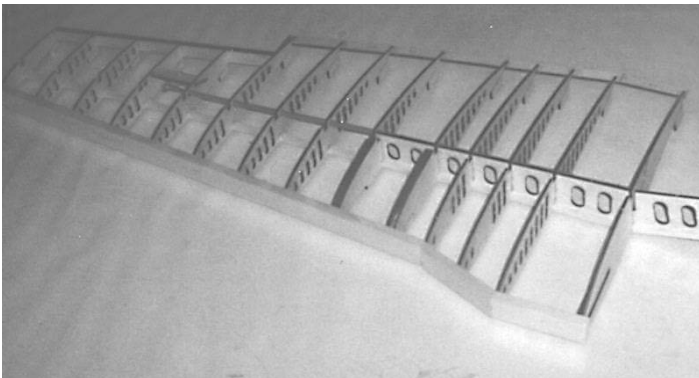


- 39. Glue W10 in place.
- 40. If using the single servo aileron setup, do the following: Locate and drill the hole for the bellcrank bolt in W19. Install the bellcrank on W19. Cut the plastic pushrod housing to 18 1/2" and slide the housing through the holes in the ribs to W10. Open up the holes at W10 and W2 slightly to allow for pushrod movement and glue the housing to all the ribs except W10 and W2. Install W19 with the bellcrank side down, and glue W11 in place. Cut the pushrod at the bellcrank to allow for the clevis, install the clevis, and connect to the bellcrank. Adjust holes for pushrods as necessary.



41. Glue W12, W13, and W14 in place.

42. Cut a piece of $\frac{1}{4} \times \frac{3}{4}$ balsa stock to length and glue to W9 thru W14 as the aileron spar.



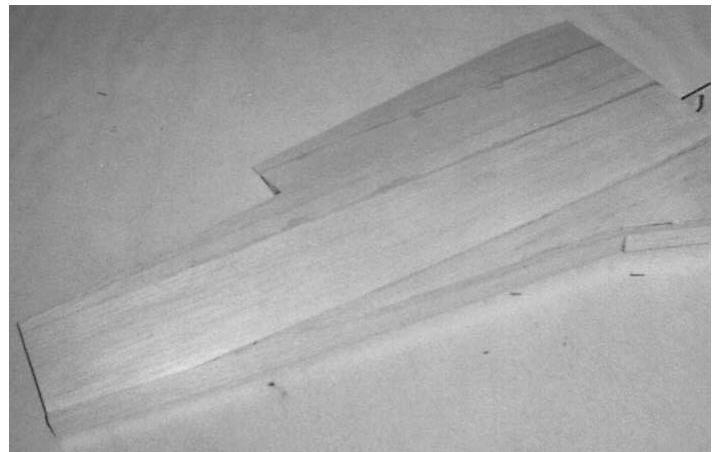
43. Cut a piece of $\frac{3}{8} \times 1$ balsa stock to fit between W1 and W2 for the leading edge. Glue in place. Sand the leading edge flush with W2.

44. Cut another piece of $\frac{3}{8} \times 1$ balsa to fit between the leading edge at W2 and W4. Sand to fit and glue in place.

45. Fit the remaining $\frac{3}{8} \times 1$ balsa to the leading edge and glue in place.

46. Glue the top $\frac{1}{4} \times \frac{1}{4}$ balsa spar in place.

47. Cut shear webs to fit from W6 to W14 from scrap $\frac{3}{32}$ " balsa. Sand as needed for a tight fit between the ribs. Glue between the top and bottom $\frac{1}{4}$ " spars as indicated on the plans. The grain in the shear webs should run vertical.



48. Sand the aileron spar flush with the ribs. Lightly sand the spar to remove any high spots.

49. Cut two $\frac{1}{16} \times 4 \times 36$ and two $\frac{1}{16} \times 3 \times 36$ balsa sheets to 29". Edge glue these sheets. Trim the sheet to match the leading edge and the left wing sheeting.

50. Sheet the top of the wing. Start at the leading edge and glue except at W1, W2 and W3 - leave this free until you've glued to the spar, then glue.

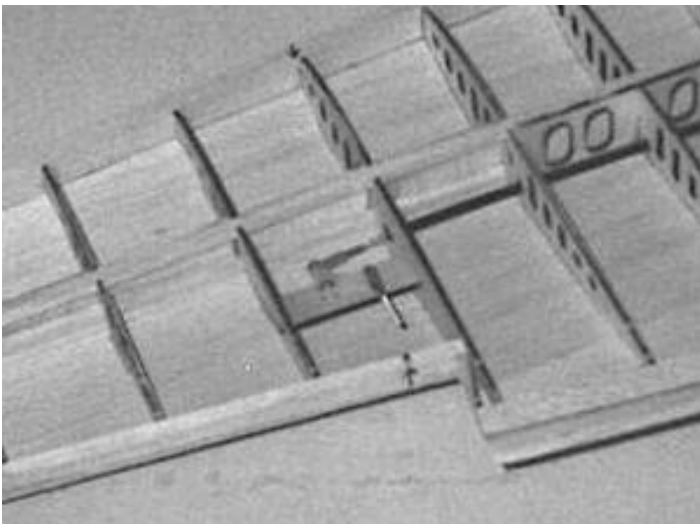
51. Trim the trailing edge to 0.7 aft of W16 and W17. Trim and sand the sheeting at W14, W1, and the

52. Epoxy the Maple Gear Block to ribs W3, W4, W5, and W6.

53. Epoxy the Maple Gear Block Anchor to the Gear Block and W3A. Align so that the Gear Block Anchor is flush with W3A and perpendicular to the Gear Block.

54. Add balsa tri-stock to the sides of the Gear Block Anchor for added support.

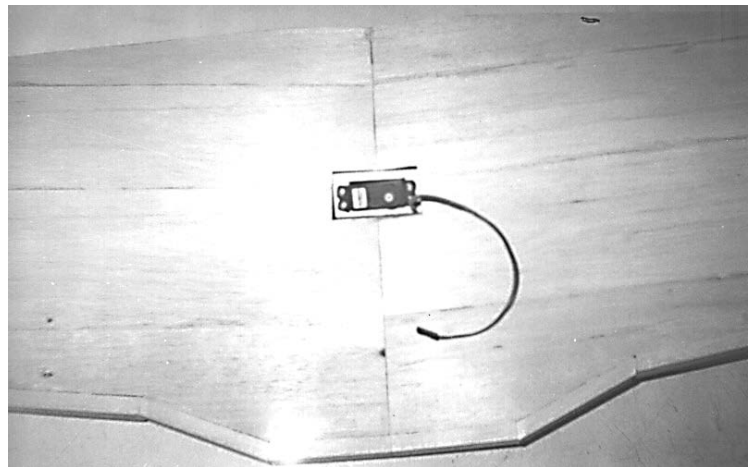
55. Carefully drill the Gear Block using a $\frac{3}{16}$ " bit to open up the hole for the gear wire. Use caution to prevent drilling through the top sheeting!



- 56. Remove the tabs from the bottom of the ribs. Remove the tab on the bottom aft of W1 and W2 and glue W20 Ply Holddown Plate in place.
- 57. Sand the aileron spar flush with the ribs. Bevel the trailing edge sheathing to match the rib contours. Sand off the tabs on the ply spar, and lightly sand any high spots on the bottom of the wing.
- 58. Bend and install the pushrod onto the bellcrank. Make alignment marks on the aileron spar and the leading edge for the opening in the bottom sheathing.

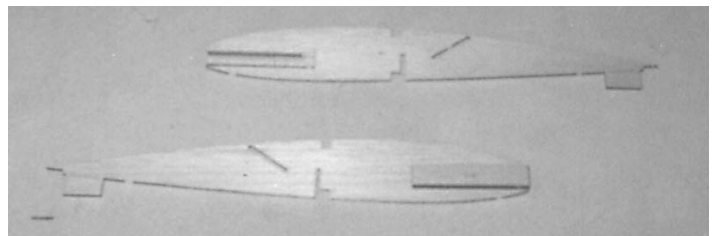


- 59. Cut two 1/16 x 4 x 36 and two 1/16 x 3 x 36 balsa sheets to 29". Edge glue these sheets. Using the same techniques as with the top of the wing, sheet the bottom of the left wing.
- 60. Trim and sand the sheathing at W1, W14, the trailing edge, and the aileron opening.
- 61. Open up the hole in the sheathing for the pushrod, using the marks made previously as a guide.

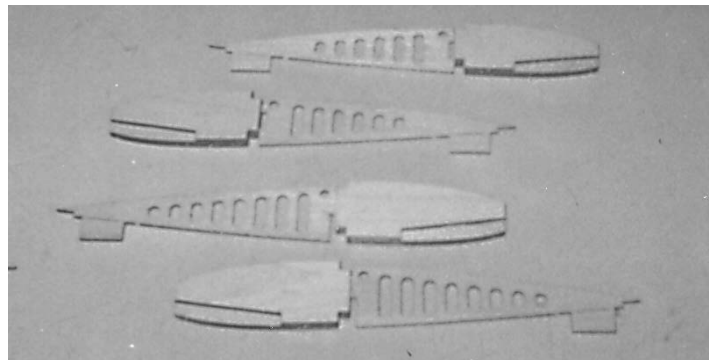


- 62. Cut the opening in the top sheathing for the servo. Cut away the excess material at W1 and install the servo.
- 63. Trim the sheathing away from the gear wire slots.
- 64. Using the mark made previously, open up the hole in the leading edge for the dowel and epoxy the dowel in place.
- 65. Glue the wingtips in place. Sand the wingtips to shape. Sand the leading edge to shape.

Left Wing Retract Assembly



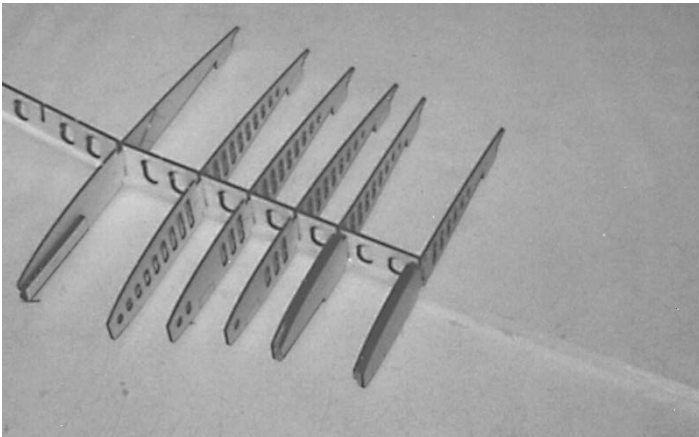
- 1. Glue W1A to W1, aligning the slot in both pieces. Glue W1B to W1A. Make a left and right side.



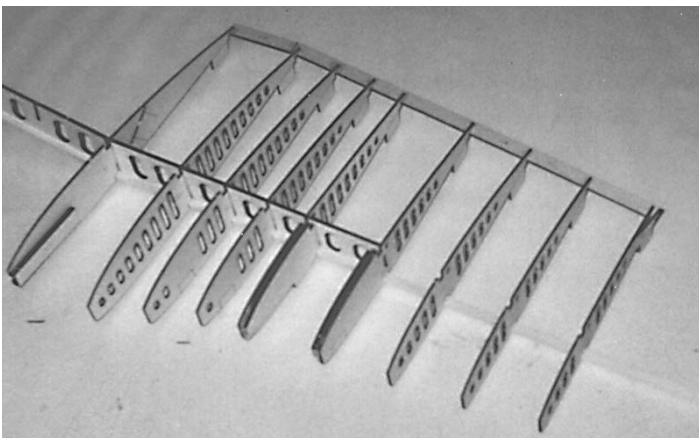
- 2. Epoxy W5R1 to W5. Epoxy W5R2 to W5R1, aligning along the upper edge. Make a right and left side. Double-check yourself here, it's easy to make two left sides!!
- 3. Epoxy W6R1 to W6. Epoxy W6R2 to W6R1, aligning along the upper edge. Make a right and left side. Repeat the double-check procedure!



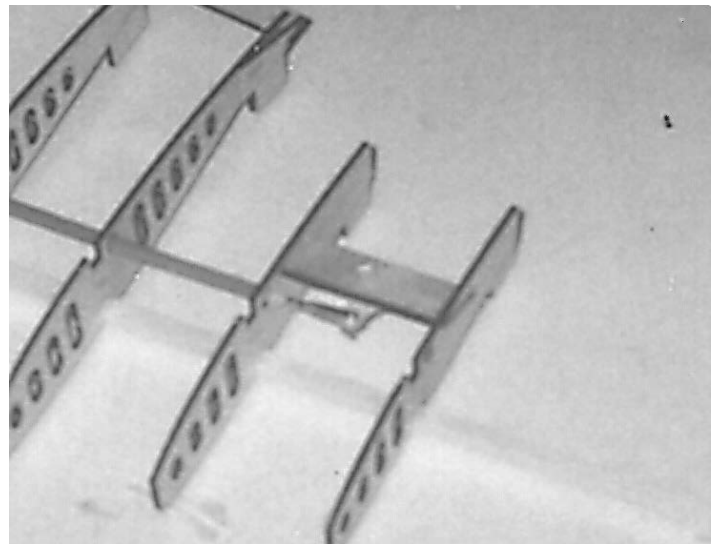
- 4. Glue a 1/4" x 1/4" x 28-1/4" balsa spar to W15 Ply spar, aligning with the bottom edge. For the left side, the balsa spar will glue to the front of W15.
- 5. Slide W1 into the center slot in W15. Temporarily slide the other W1 into the slot as well, but do not glue. Glue only the left side W1 in place.



- 6. Align and glue W2, W3, W4, W5, and W6 in place. Note that W5 and W6 will be installed so that the ply plates face each other.

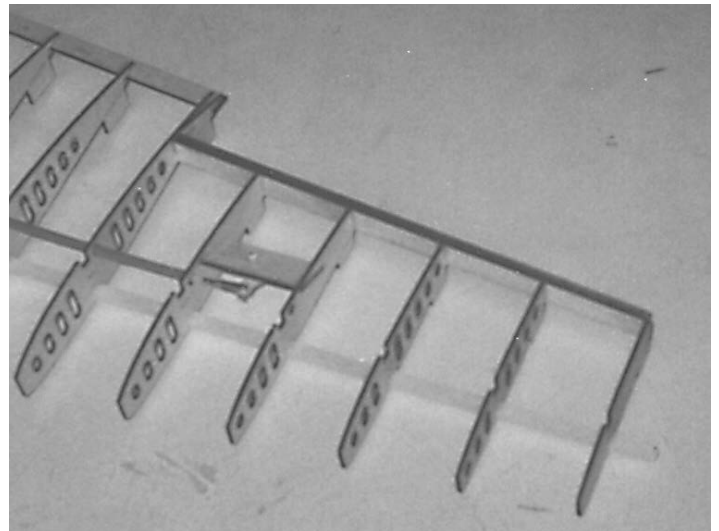


- 7. Glue W7, W8, and W9 in place. Use slight upward pressure on the balsa spar to fully seat it in the rib while gluing.
- 8. Bevel the side of W9A to fit and glue in place.
- 9. Glue W16 and W17 in place in the notches in the trailing edges of the ribs. Adjust notches in W10 to fit W19.



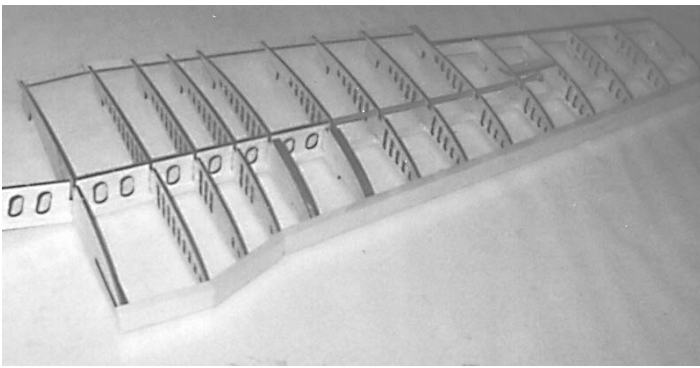
- 10. Glue W10 in place.

- 11. If using the single servo aileron setup, do the following: Locate and drill the hole for the bellcrank bolt in W19. Install the bellcrank on W19. Cut the plastic pushrod housing to 18 1/2" and slide the housing through the holes in the ribs to W10. Open up the holes at W10 and W2 slightly to allow for pushrod movement and glue the housing to all the ribs except W10 and W2. Install W19 with the bellcrank side down, and glue W11 in place. Cut two inner pushrods to 20", assemble them with the aileron connector, and slide the pushrod through the housing. Cut the pushrod at the bellcrank to allow for the clevis, install the clevis, and connect to the bellcrank. Adjust holes for pushrods as necessary.

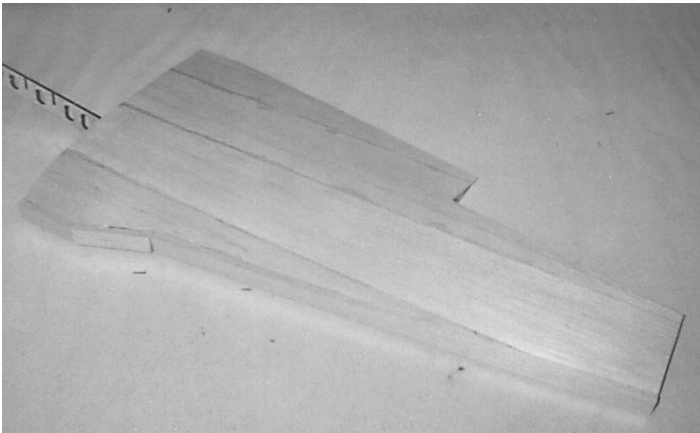


- 12. Glue W12, W13, and W14 in place.

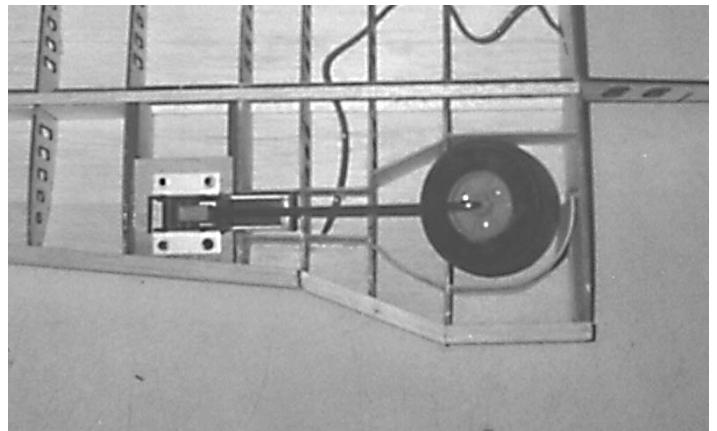
- 13. Cut a piece of 1/4 x 3/4 balsa stock to length and glue to W9 thru W14 as the aileron spar.



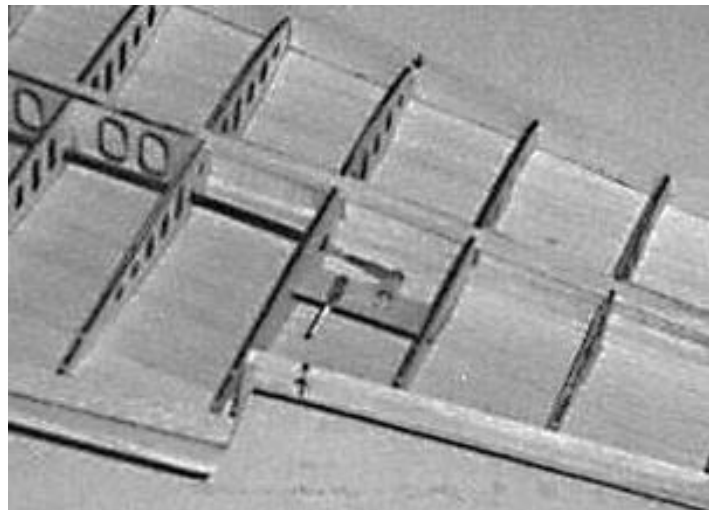
- 14. Cut a piece of 3/8 x 1 balsa stock to fit between W1 and W2 for the leading edge. Glue in place. Sand the leading edge flush with W2.
- 15. Cut another piece of 3/8 x 1 balsa to fit between the leading edge at W2 and W4. Sand to fit and glue in place.
- 16. Fit the remaining 3/8 x 1 balsa to the leading edge and glue in place. See Figure 40.
- 17. Glue the top 1/4 x 1/4 balsa spar in place.
- 18. Cut shear webs to fit from W6 to W14 from scrap 3/32" balsa. Sand as needed for a tight fit between the ribs. Glue between the top and bottom 1/4" spars as indicated on the plans. The grain in the shear webs should run vertical.



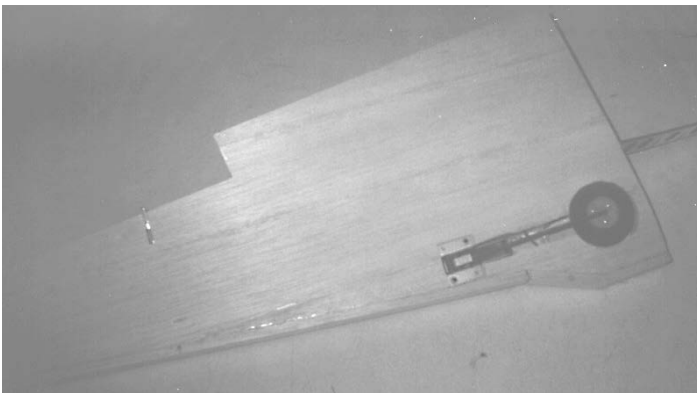
- 19. Sand the aileron spar flush with the ribs. Lightly sand the spar to remove any high spots.
- 20. Cut two 1/16 x 4 x 36 and two 1/16 x 3 x 36 balsa sheets to 29". Edge glue these sheets. Trim the sheet to match the leading edge.
- 21. Sheet the top of the wing. Start at the leading edge and glue except at W1, W2 and W3 - leave this free until you've glued to the spar, then glue.
- 22. Trim the trailing edge to 0.7 aft of W16 and W17. Trim and sand the sheeting at W14, W1, and the aileron.



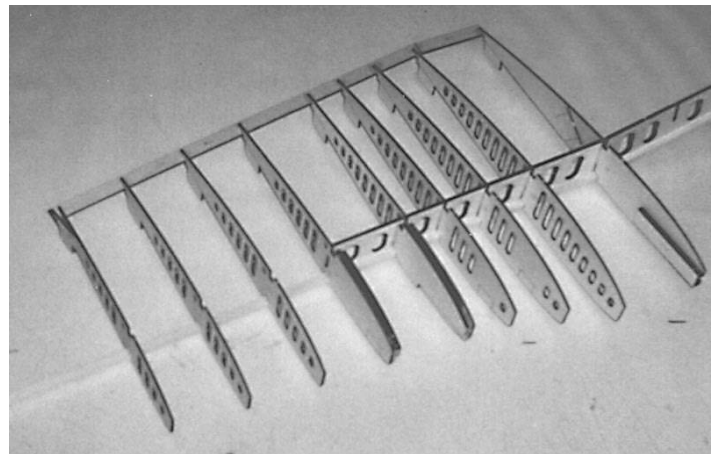
- 23. Epoxy W22 Ply Retract Plate in place in the slots between W5 and W6.
- 24. Wheel wells may be added by inserting scrap 1/16" balsa sheeting using the blue gear door outline as a guide. Place the wheel wells about 1/8" to 3/16" inside the outline.
- 25. Install the retract unit and run the air lines. Install the retract unit per the instructions with your specific retract.
- 26. Install the wheel and strut. Test for fit. Remove the retract and wheel.



- 27. Remove the tabs from the bottom of the ribs. Remove the tab on the bottom aft of W1 and W2 and glue W20 Ply Holddown Plate in place. Glue W18 Servo Tray in place in the slots in W1 and W2, centering the hole with W1.
- 28. Sand the aileron spar flush with the ribs. Bevel the trailing edge sheeting to match the rib contours. Sand off the tabs on the ply spar, and lightly sand any high spots on the bottom of the wing.
- 29. Bend and install the pushrod onto the bellcrank. Make alignment marks on the aileron spar and the leading edge for the opening in the bottom sheeting.

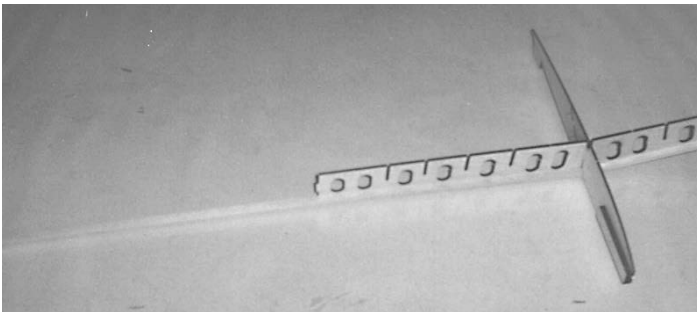


- 30. Cut two 1/16 x 4 x 36 and two 1/16 x 3 x 36 balsa sheets to 29". Edge glue these sheets. Using the same techniques as with the top of the wing, sheet the bottom of the left wing.
- 31. Trim and sand the sheeting at W1, W14, the trailing edge, and the aileron opening.
- 32. Open up the hole in the sheeting for the pushrod, using the marks made previously as a guide. cut out the opening for the retract and wheel.

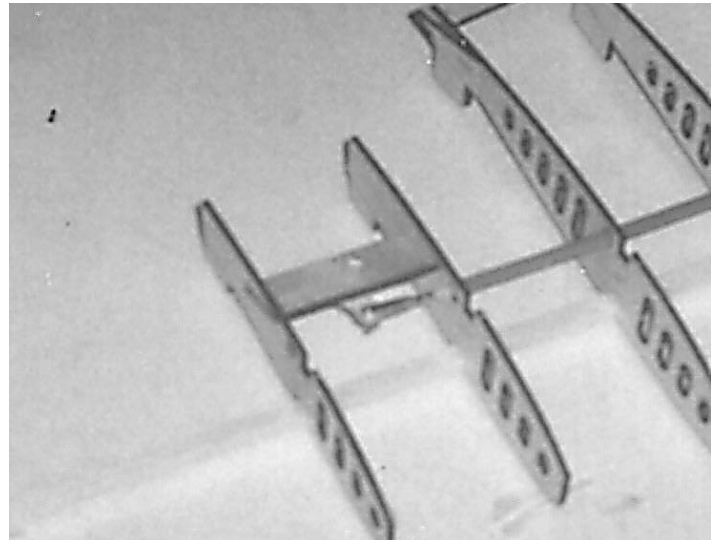


- 36. Glue W7, W8, and W9 in place. Use slight upward pressure on the balsa spar to fully seat it in the rib while gluing.
- 37. Bevel the side of W9A to fit and glue in place.
- 38. Glue W16 and W17 in place in the notches in the trailing edges of the ribs. Adjust notch in W10 to fit W19 as necessary.

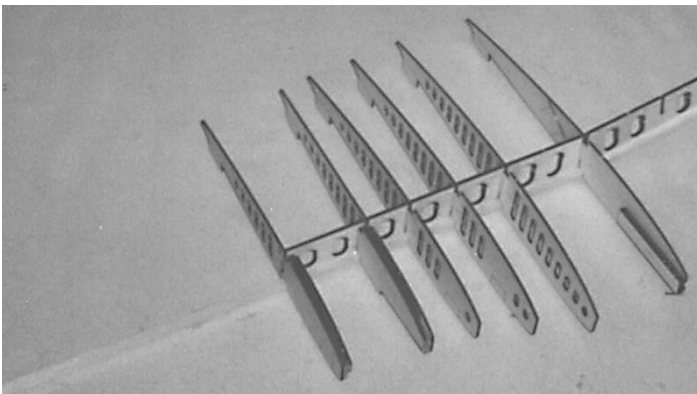
Right Wing Retract Assembly



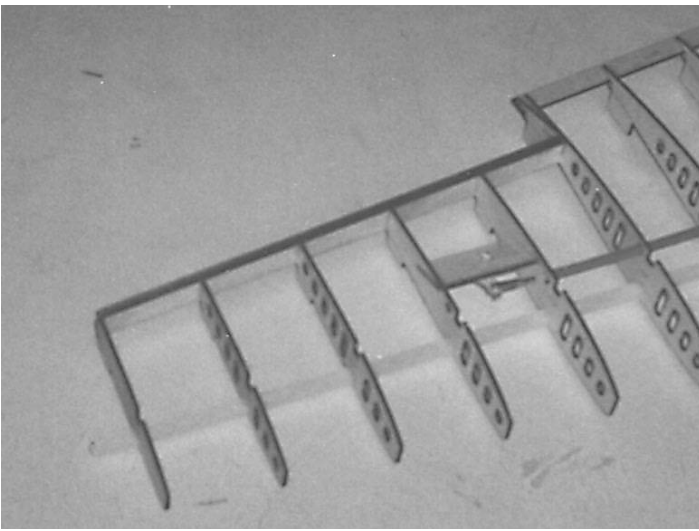
- 33. Glue a 1/4" x 1/4" x 28-1/4" balsa spar to W15 Ply spar, aligning with the bottom edge.
- 34. Slide W1 into the center slot in W15. Glue to the other W1. Make a mark on the leading edge for the dowel opening.



- 39. Glue W10 in place.
- 40. If using the single servo aileron setup, do the following: Locate and drill the hole for the bellcrank bolt in W19. Install the bellcrank on W19. Cut the plastic pushrod housing to 18 1/2" and slide the housing through the holes in the ribs to W10. Open up the holes at W10 and W2 slightly to allow for pushrod movement and glue the housing to all the ribs except W10 and W2. Install W19 with the bellcrank side down, and glue W11 in place. Cut the pushrod at the bellcrank to allow for the clevis, install the clevis, and connect to the bellcrank. Adjust holes for pushrods as necessary.

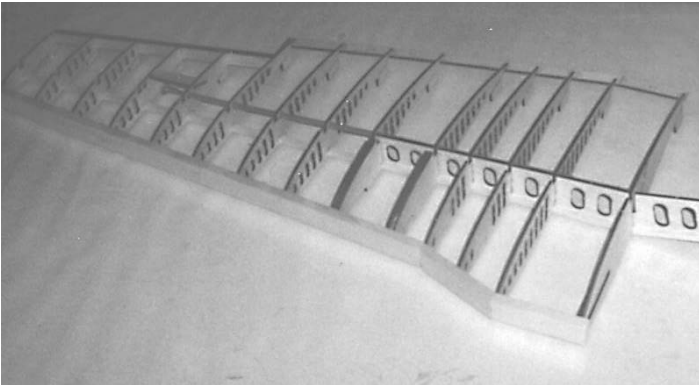


- 35. Align and glue W2, W3, W4, W5, and W6 in place. Note that the ply plates on W5 and W6 face each other.



41. Glue W12, W13, and W14 in place.

42. Cut a piece of $\frac{1}{4} \times \frac{3}{4}$ balsa stock to length and glue to W9 thru W14 as the aileron spar.



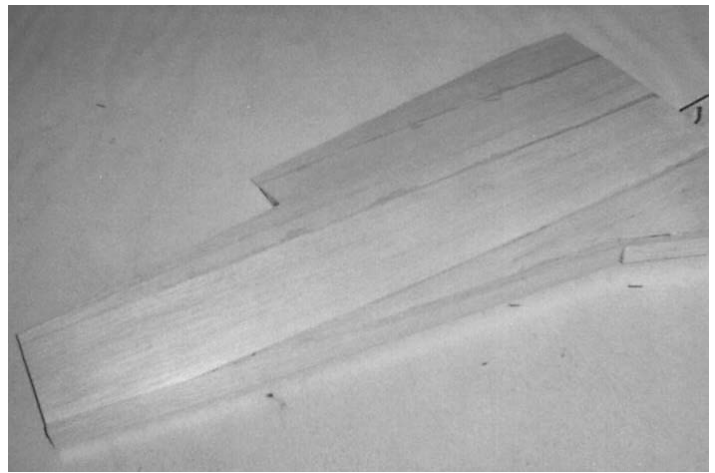
43. Cut a piece of $\frac{3}{8} \times 1$ balsa stock to fit between W1 and W2 for the leading edge. Glue in place. Sand the leading edge flush with W2.

44. Cut another piece of $\frac{3}{8} \times 1$ balsa to fit between the leading edge at W2 and W4. Sand to fit and glue in place.

45. Fit the remaining $\frac{3}{8} \times 1$ balsa to the leading edge and glue in place.

46. Glue the top $\frac{1}{4} \times \frac{1}{4}$ balsa spar in place.

47. Cut shear webs to fit from W6 to W14 from scrap $\frac{3}{32}$ " balsa. Sand as needed for a tight fit between the ribs. Glue between the top and bottom $\frac{1}{4}$ " spars as indicated on the plans. The grain in the shear webs should run vertical.

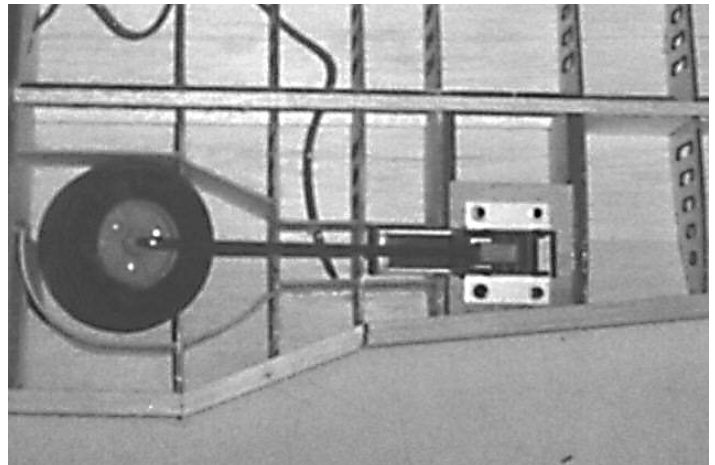


48. Sand the aileron spar flush with the ribs. Lightly sand the spar to remove any high spots.

49. Cut two $\frac{1}{16} \times 4 \times 36$ and two $\frac{1}{16} \times 3 \times 36$ balsa sheets to 29". Edge glue these sheets. Trim the sheet to match the leading edge and the left wing sheeting.

50. Sheet the top of the wing. Start at the leading edge and glue except at W1, W2 and W3 - leave this free until you've glued to the spar, then glue.

51. Trim the trailing edge to 0.7 aft of W16 and W17. Trim and sand the sheeting at W14, W1, and the aileron.

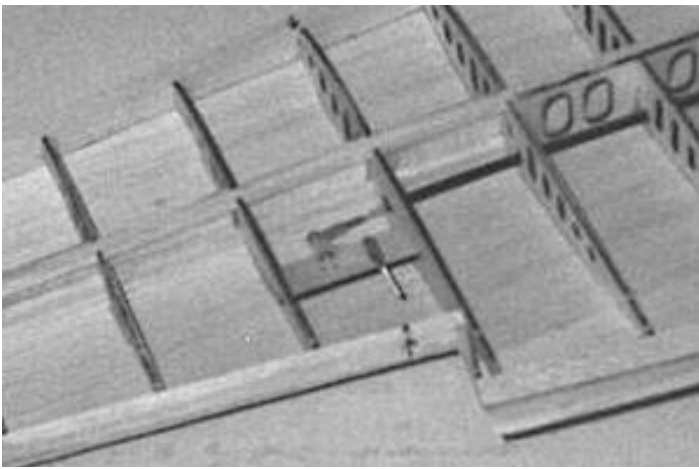


52. Epoxy W22 Ply Retract Plate in place in the slots between W5 and W6.

53. Wheel wells may be added by inserting scrap $\frac{1}{16}$ " balsa sheeting using the blue gear door outline as a guide. Place the wheel wells about $\frac{1}{8}$ " to $\frac{3}{16}$ " inside the outline.

54. Install the retract unit and run the air lines. Install the retract unit per the instructions with your specific retract.

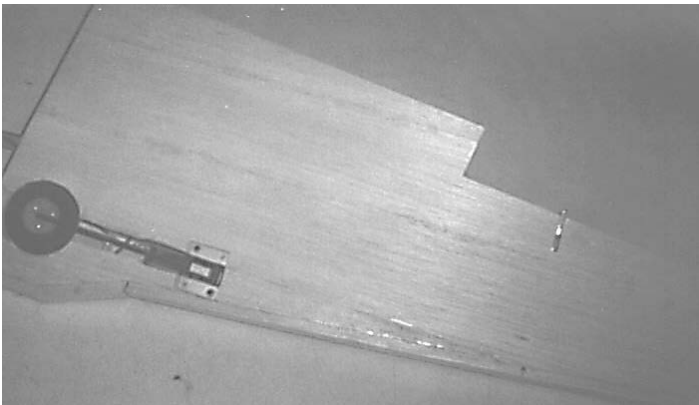
55. Install the wheel and strut. Test for fit. Remove the retract and wheel.



56. Remove the tabs from the bottom of the ribs. Remove the tab on the bottom aft of W1 and W2 and glue W20 Ply Holddown Plate in place.

57. Sand the aileron spar flush with the ribs. Bevel the trailing edge sheeting to match the rib contours. Sand off the tabs on the ply spar, and lightly sand any high spots on the bottom of the wing.

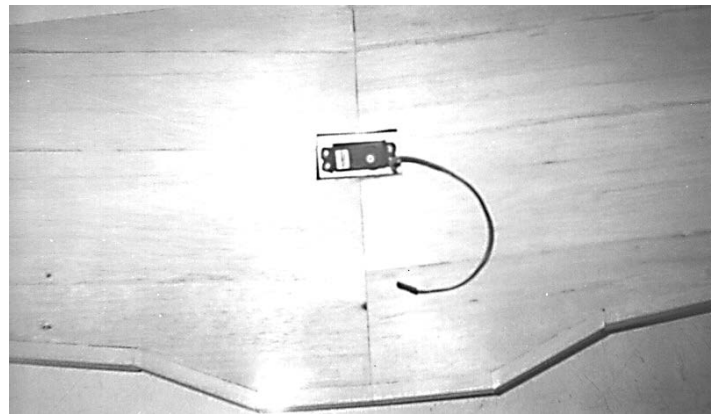
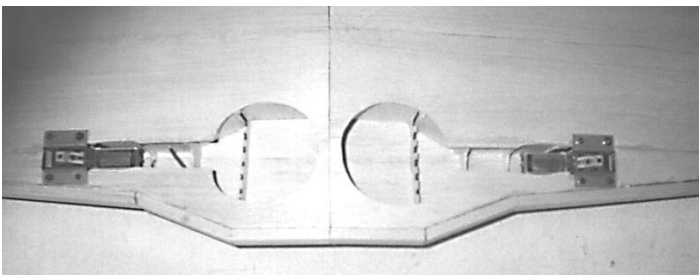
58. Bend and install the pushrod onto the bellcrank. Make alignment marks on the aileron spar and the leading edge for the opening in the bottom sheeting.



59. Cut two 1/16 x 4 x 36 and two 1/16 x 3 x 36 balsa sheets to 29". Edge glue these sheets. Using the same techniques as with the top of the wing, sheet the bottom of the left wing.

60. Trim and sand the sheeting at W1, W14, the trailing edge, and the aileron opening.

61. Open up the hole in the sheeting for the pushrod, using the marks made previously as a guide. cut out the opening for the retract and wheel.



62. Cut the opening in the top sheeting for the servo. Cut away the excess material at W1 and install the servo.

63. Trim the sheeting away from the gear wire slots.

64. Using the mark made previously, open up the hole in the leading edge for the dowel and epoxy the dowel in place.

65. Glue the wingtips in place. Sand the wingtips to shape. Sand the leading edge to shape.

Fuselage Assembly

See the Cockpit installation instructions at the end of this manual now for instructions on installing the optional cockpit that is included with this kit. If you do not wish to install the cockpit, continue with the standard instructions.

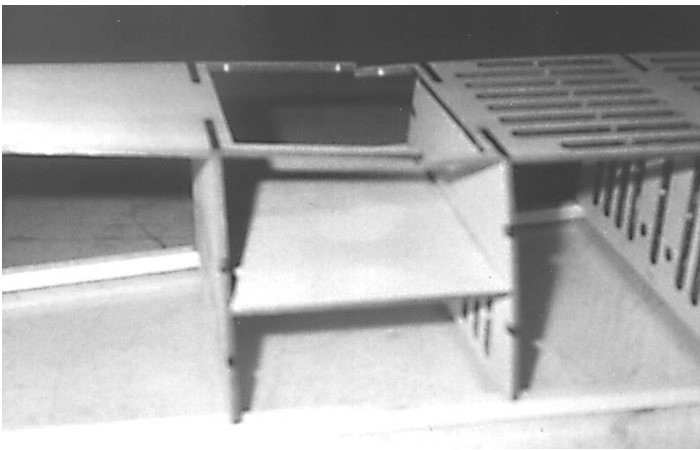
1. Make two 1/4 x 1/4 balsa crutches by splicing pieces of 36" balsa stock to length.

2. Pin the 1/4 x 1/4 crutches in place on the plans.

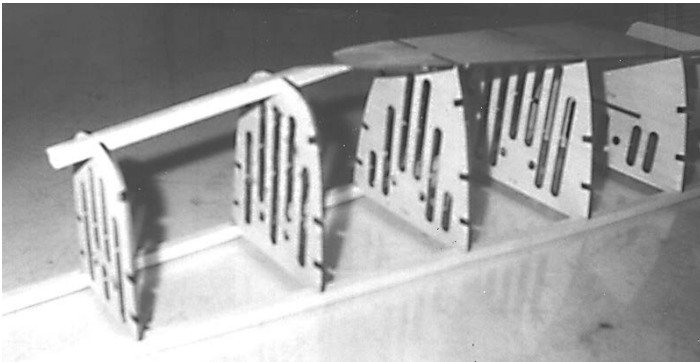
3. Cut 1/4 x 1/4 crutch doublers and glue to the aft sections of the crutch as shown on the plans

4. Glue F1A, in place. Glue F2A in place. Note that F2A is angled slightly to allow for engine right thrust.

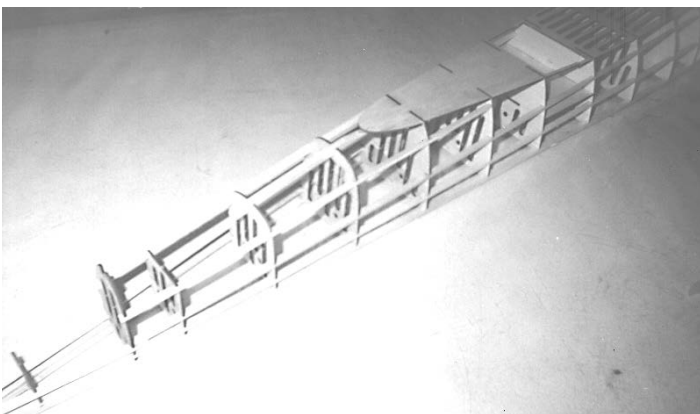
5. Glue F3A thru F18 in place.



- 6. Glue F27 cockpit floor in place.
- 7. Glue F20 in place.
- 8. Glue F21 in place. Remove the openings for the cockpit, match the ends of F27 and F21 together and glue.



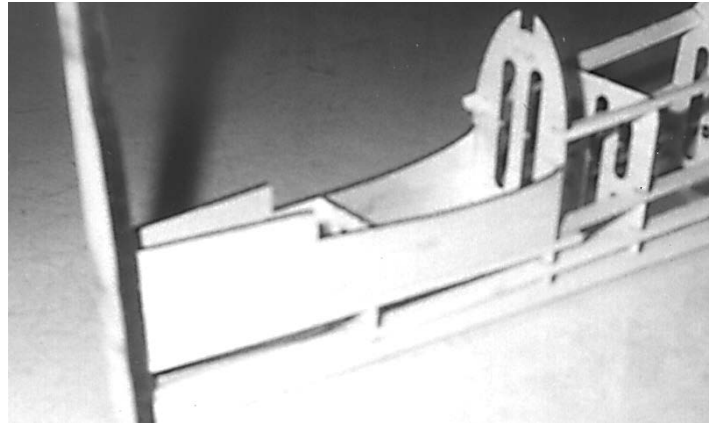
- 9. Glue pieces of $\frac{1}{4} \times \frac{1}{4}$ balsa stock into the slots in the bulkheads, starting at F13A. This piece will extend to F21, and will need to be beveled where it meets F21.
- 10. A short section of $\frac{1}{4} \times \frac{1}{4}$ will run between F5 and F1A. Glue in place.



- 11. Add $\frac{1}{8} \times \frac{1}{4}$ stringers to the fuselage assembly. Add the bottom stringer first - it runs from F18 to F1A. Insure that the stringer contours correctly at F14A and F15A.
- 12. A short stringer section will then run from F18 and butt against F14A.

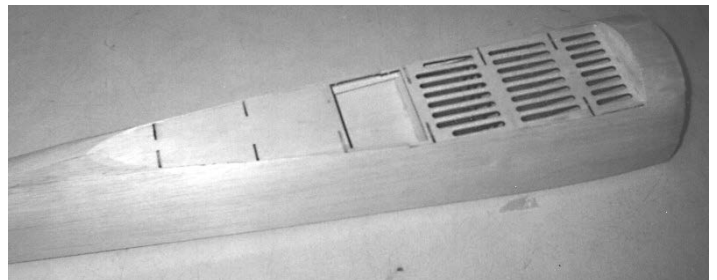
13. The second stringer will run from F15A to F1A.

14. The third stringer will run from F16A, and butt against F10A. The other section will run from F5 to F1A.



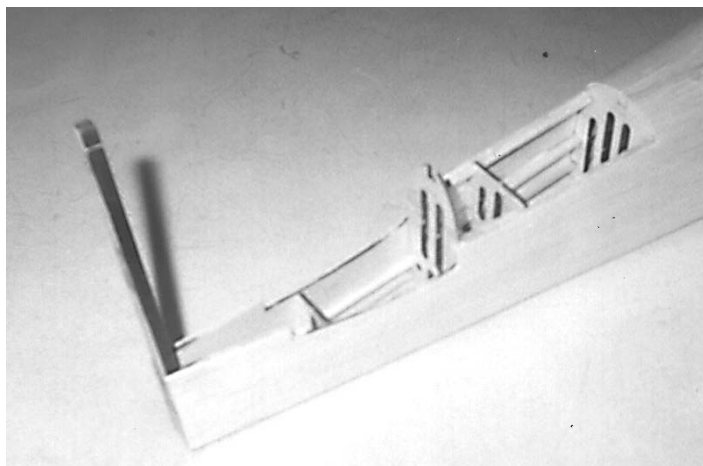
- 15. Glue F25 Stab Saddle in place between F16A and F18. Bevel the ends of F25 as necessary to fit.

16. Using scrap $\frac{1}{16}$ " balsa sheets, sheet the aft upper fuselage from F18 to F15A, aligning the sheeting edge with F15A. Add an additional piece of sheeting between F15A and F14A. Trim and sand the sheeting edges as necessary for a good fit at the sheeting joints. Trim and sand the sheeting at the stab saddle, F18 and the upper stringer.



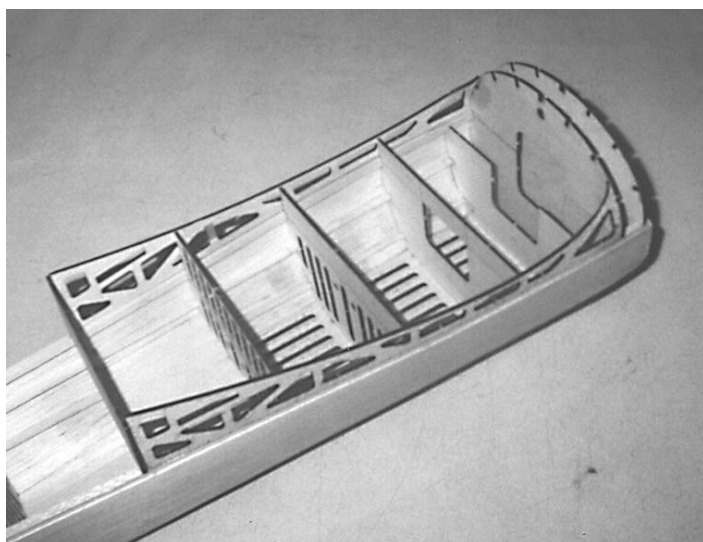
- 17. Sheet the upper fuselage by cutting and joining $\frac{1}{16}$ " x 4" x 36" balsa sheets to create a 48" long sheet wide enough to cover the fuselage. Pin small pieces of $\frac{1}{8}$ " x $\frac{1}{4}$ " scrap against the sides of the crutch. This will raise the sheeting up $\frac{1}{8}$ ", so the lower sheeting will attach to the crutch when it is added. The upper fuselage sheeting will butt against the previously sheeted aft fuse section at F14A. A small piece will need to be edge glued to the upper portion of the sheet between F9A and F12A. Add this section, and use the following as a guide: The best way to assure a straight fuse (that I've found) is to match the left and right sheets for density, then start the sheeting on both sides of the fuse at the same time. Slowly work the sheet up the fuselage sides, one stringer section at a time, starting in the middle and working alternately to both ends. Do one stringer row, then move to the opposite side and do that stringer row, and so forth. When you have difficulty making the sheet conform to the fuse sides, wet the sheet with an ammonia solution (Windex with Ammonia in the spray bottle works great and doesn't stain the wood!) And continue. As you get close to the top, pick one side and sheet to the $\frac{1}{4} \times \frac{1}{4}$ keel. Then work the other side to the same point.

18. Add sheeting to the upper forward fuse to complete that section. Trim and sand the sheeting at F5 to F21. Try to achieve a level surface across F21 - you may have 1/32" to 1/16" of sheeting not flush at the rear of F21 - this is OK.



19. Trim the sheeting to within 1/4" of F1A.

20. Trim and sand the sheeting between F10A and F12A, down to the stringer.

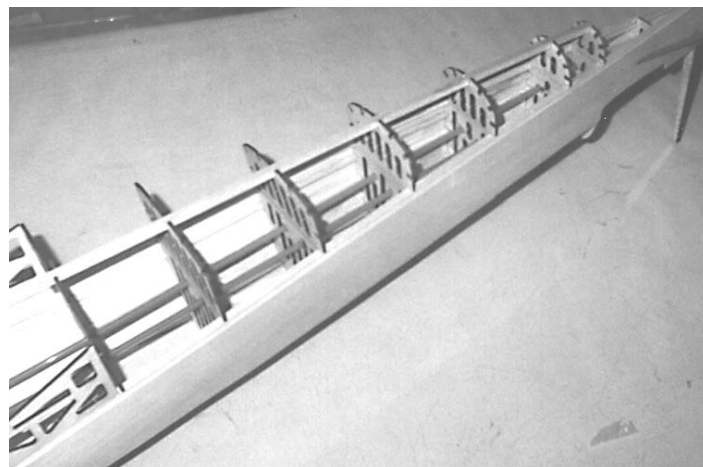


21. Remove the upper fuse from the board. Align and glue F2B to F2A. Test fit F19 ply firewall to the front of F2A/F2B. Epoxy in place.

22. Glue F1B, F3B, F4B, F6B, F7B, F8B and F9B in place.

23. Glue F22 Ply Wing Saddle in place. The forward portion has to make a radical curve, so the best way to achieve this is to break the outer plies where F22 meets F7B to make it conform. This area is not a structural load bearer, so it's OK to do this.

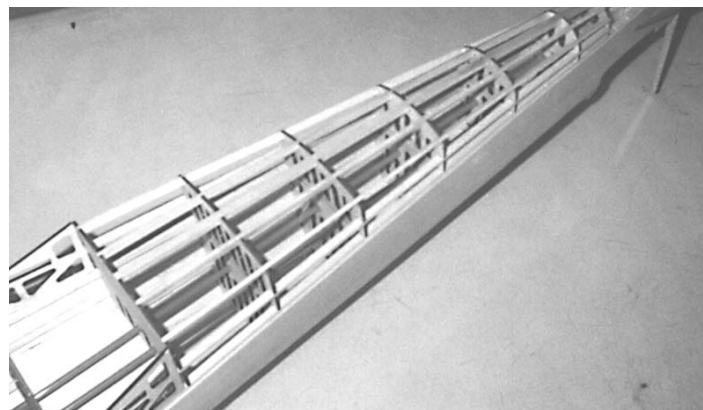
24. Epoxy F22 Ply Holddown Plate in place in the slots in F22.



25. Cut and glue the rudder and elevator pushrod housings in place. Cut the openings in the aft fuse between F16 and F17 for pushrod exits.

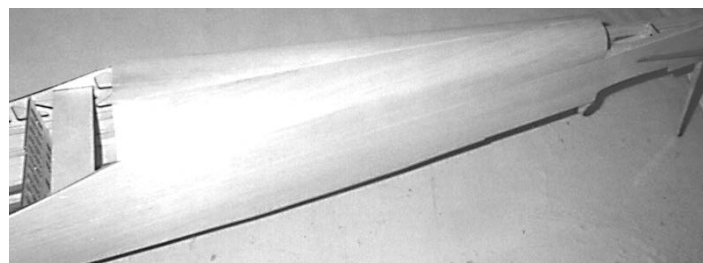
26. Glue F10B thru F16B in place.

27. Cut a 1/4 x 1/4 balsa keel to fit and glue in place.

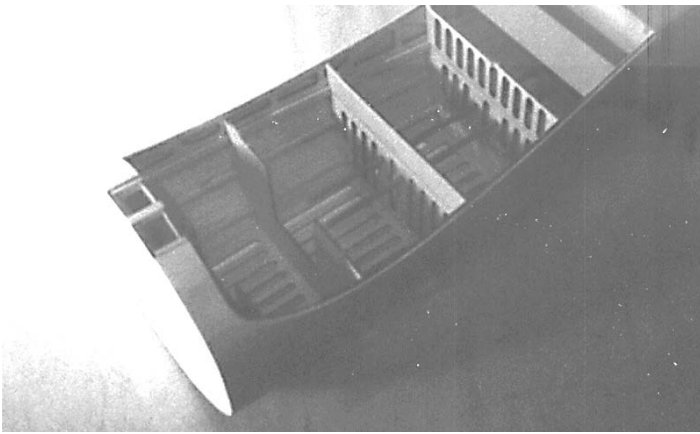


28. Add 1/8 x 1/4 balsa stringers to F1B and F4B, and to the aft lower fuselage between F9B and F16B. Insure the stringers conform to the bulkheads at F14B and F15B. Add an additional short stringer between F9B and F10B, right at the sharp corner.

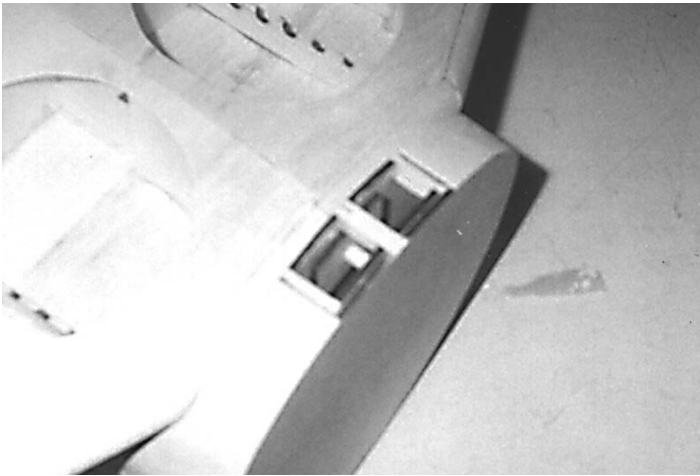
29. Using scrap 1/16" balsa sheeting sheet the area of the lower fuse from F14B to F16B, just like the upper fuse.



30. Sheet the lower fuselage from F14B to F1B. As you work up the fuse sides, cut the sheeting lengthwise between F9B and F10B. When making the corner, this area will lay flat. Wet the sheeting while working around the corner, and continue sheeting to F14B.



- 31. Continue the sheeting forward, but leave an opening as shown. You will need access to this area when mounting the wing.

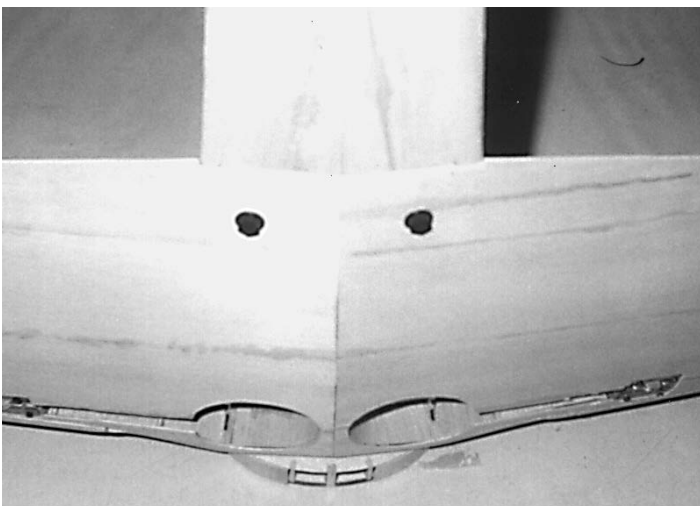


- 32. Trim and sand the sheeting at F16B, and the wing saddle.

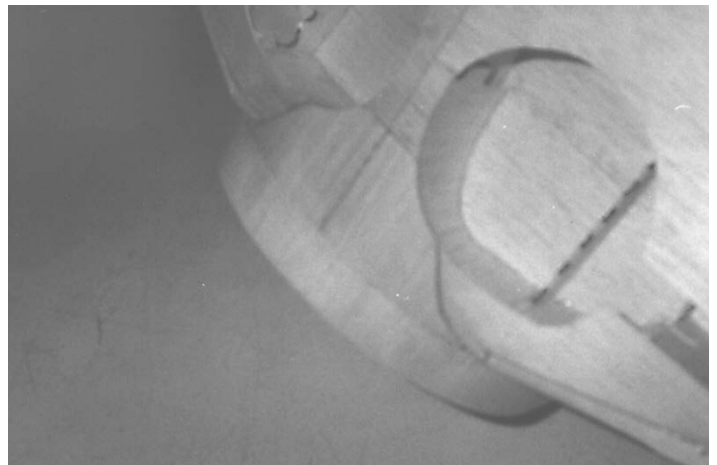
33. Lay the wing in the saddle and align. Trim the saddle as necessary for a good fit.

34. With the wing aligned, slide F26 over the wing dowel and epoxy to F4B.

35. Sheet the remainder of the forward fuselage.



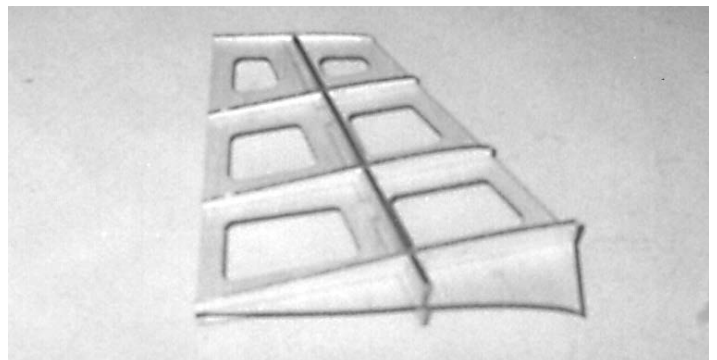
- 36. Align the wing and drill and install the wing hold-down bolts.



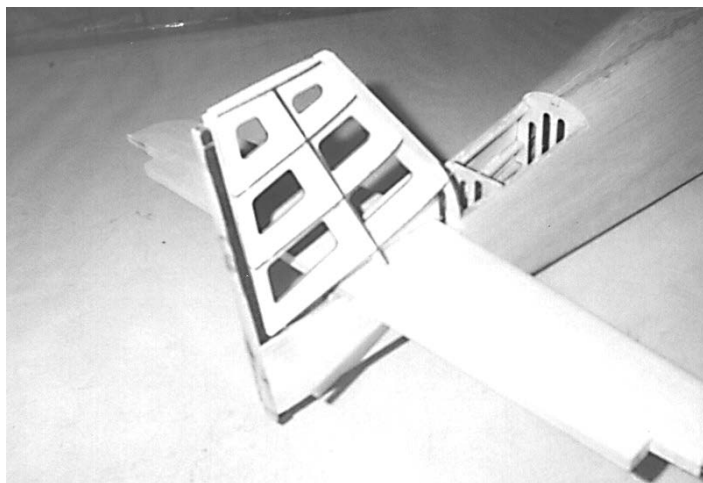
- 37. With the wing in place, fit and glue F2C to the leading edge of the wing.

38. Glue two W21s together. Fit and glue to F2C and the bottom of the wing. Trim and sand to match the fuselage.

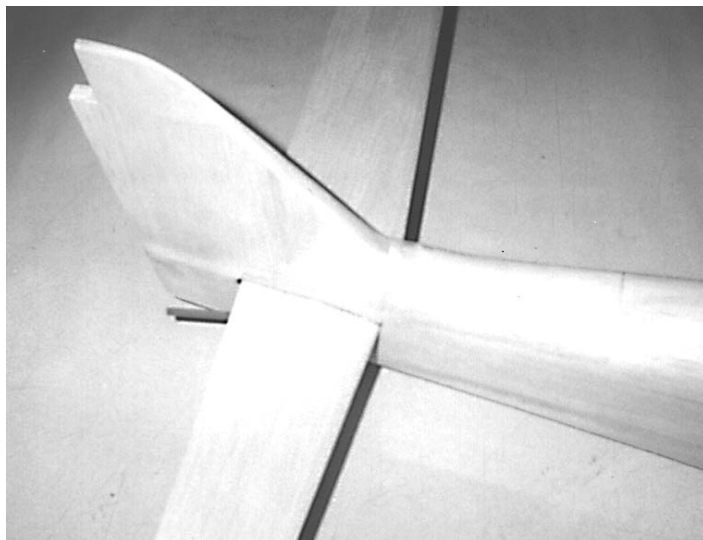
Vertical Stabilizer Assembly



- 1. Glue S1 and S2 together.
- 2. Trail fit this assembly to the tail section - trim as necessary.
- 3. With the S1/S2 assembly flat, glue the S3 spar, and S4, S5, and S6 ribs.
- 4. Align and glue S3 thru S6 to the opposite side of the vertical.
- 5. Glue S7 to the top of S1/S2.

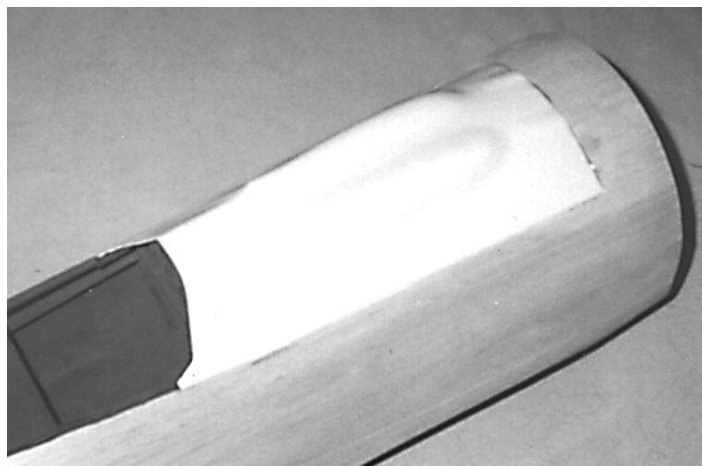


- 6. Glue short pieces of tri-stock to the inside of F25 for added horizontal stabilizer support.
- 7. Align and glue the horizontal stabilizer in place.
- 8. Align and glue the vertical stab assembly to F16A, F18 and the horizontal stab.
- 9. Cut the vertical stab leading edge from $\frac{1}{4} \times \frac{1}{4}$ balsa and glue in place.

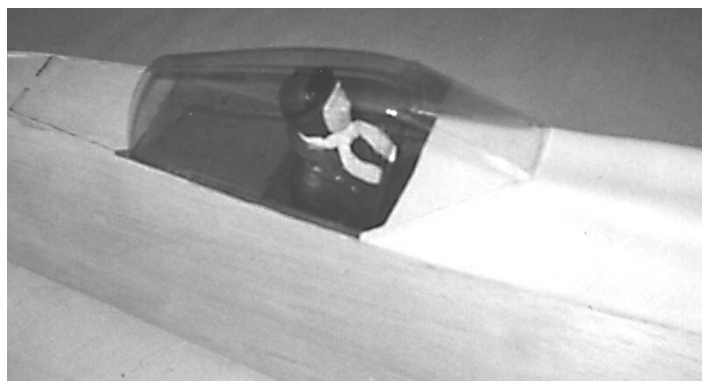


- 10. Fit the upper fuselage block in place, trim and glue. Sand to a rough shape to conform to the fuselage and F16A.
- 11. Glue F24 to the vertical and horizontal stabs. The front edge will wrap up F16A.
- 12. Cut and edge glue sheeting for the stab. The lower aft edge will follow F24, but the lower forward edge will have to be trimmed to fit along F24, F16, and the leading edge. Sheet the vertical stab.
- 13. Glue two S8s together and glue to the top of the vertical stabilizer. Sand to shape.
- 14. The area shown by the arrow should be filled with lightweight filler and sanded to shape. Sand the fuse block and tail area to shape.

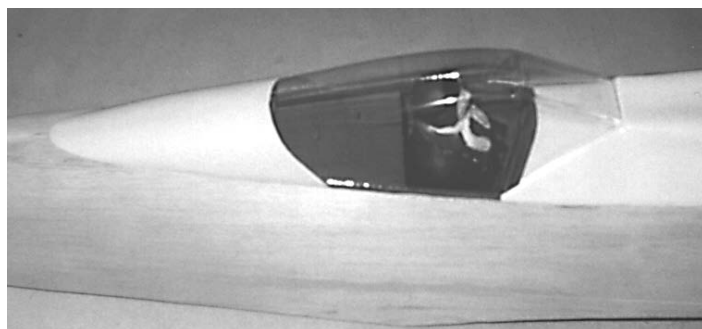
Fuselage Final Assembly



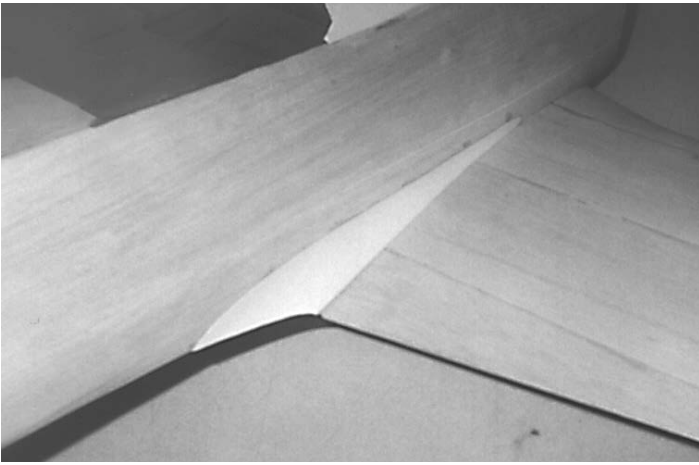
- 1. Cut the gun hood out and fit to the upper fuselage. Cut the cockpit glareshield to fit as shown on the plans and in the photo.
- 2. Cut the instrument panel from the 3-view drawing and glue to the back of the laser-cut instrument panel. Glue the instrument panel in place.
- 3. Epoxy the gun hood in place. Fill and sand the joint along the fuse as necessary.



- 4. Glue F28 Headrest in place.
- 5. Trim and fit the canopy in place. Finish the cockpit as desired, and glue the canopy in place.



- 6. Trim and fit the aft canopy shell. Glue to the canopy and the fuselage.



7. With the wing in place, glue F24 balsa fillets in place to the lower fuse, aligning with the trailing edge of the wing. Do not glue F24 to the wing.
8. Cut and trim the plastic wing fillets to shape, and glue in place.
9. Fit the cowl to the fuse. As an added strengthener, glue small (1") squares of sheet aluminum or carbon fiber to the inside of the cowl at the screw holes, then add the fiberglass over these. This will prevent the screw holes from cracking.

Final Assembly

The remainder of the construction consists of attaching the rest of the components to the airplane. Most of this is builder's choice, and individual tastes, styles, and component selection, so any detailed descriptions would be impossible. The remainder of assembly is described in general terms only.

Engine Installation:

The engine centerline is marked on F15. Locate and drill the holes for your motor mount. Install the motor mount and engine of your choice.

Fuel Tank and Throttle Cable:

After deciding which direction the engine will point (up, down, or sideways) drill holes for and install the throttle cable. Mount the fuel tank of your choice, and connect the lines.

Servo and receiver installation:

3/8" maple blocks are provided for servo rails.. Mount these as shown on the plans and mount the servos. Mount the receiver and connect the components. The battery pack may be located anywhere in the fuselage for balance purposes.

Covering:

Cover the airplane with the covering of your choice. The covering choices are too numerous to mention, but the airplane shown on the box was covered with film, painted, and clear-coated. It is recommended that the airplane and control surfaces be covered separately.

Control surfaces:

Locate the control horn positions. Final sand the control surfaces. Locate the hinge points (hinges and other hardware are not provided in the kit because everyone has his own preferences. Rather than put in stuff that most of you will throw away, we left it out to keep the kit price down) and install the hinges and control surfaces. Use at least three hinges per control surface for best results. Connect and adjust the pushrods.

Landing Gear (Fixed):

Insert the main gear wire legs into the slots in the wings, secure with straps, and mount the wheels of your choice. Landing gear (Retracts): Bend the gear wire to match the angle shown on the plans, and install the gear legs and wheels. Install the remainder of the retract components per the retract instructions.

Center of Gravity:

The CG is measured with the aircraft UPSIDE DOWN 4-7/8" back for the wing leading edge, where the wing meets the fuselage.

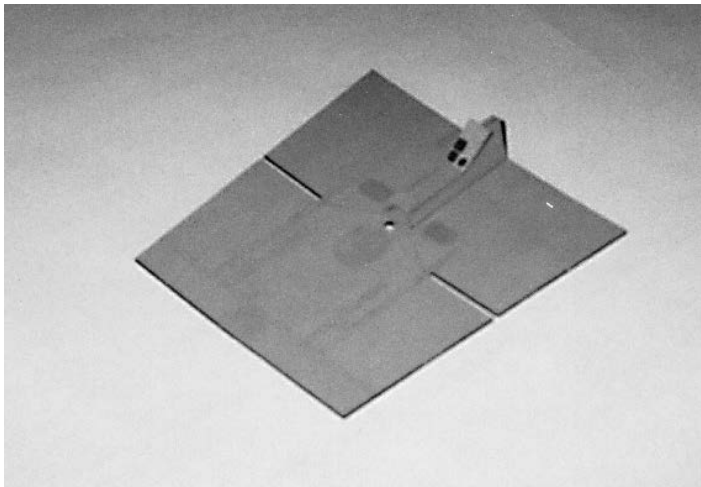
Control Throws:

Ailerons: 7/16" up & down
Elevator: 1/2" up & 3/8" down
Rudder: 1" left & right

The rest is up to you! Fly and enjoy!

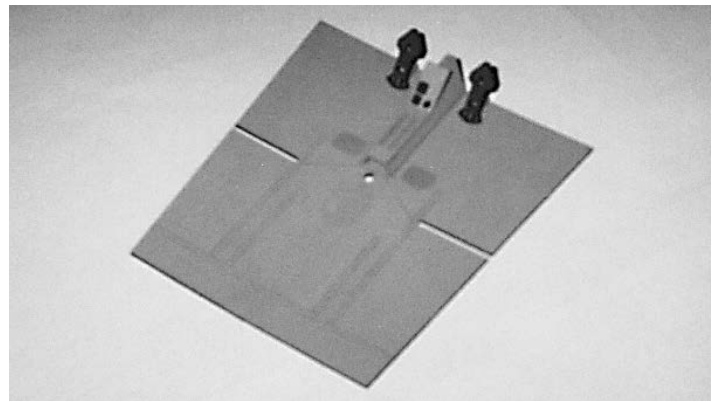
Cockpit Kit Assembly

1. Make two $\frac{1}{4}$ x $\frac{1}{4}$ balsa crutches by splicing pieces of 36" balsa stock to length.
2. Pin the $\frac{1}{4}$ x $\frac{1}{4}$ crutches in place on the plans.
3. Cut $\frac{1}{4}$ x $\frac{1}{4}$ crutch doublers and glue to the aft sections of the crutch as shown on the plans.
4. Glue F1A in place. Glue F2A in place (note that F2A is angled slightly for engine right thrust)
5. Glue F3A thru F7A in place. Do not remove the lightning holes from F7A. Discard F8A. Continue with F9A thru F18 and glue in place.



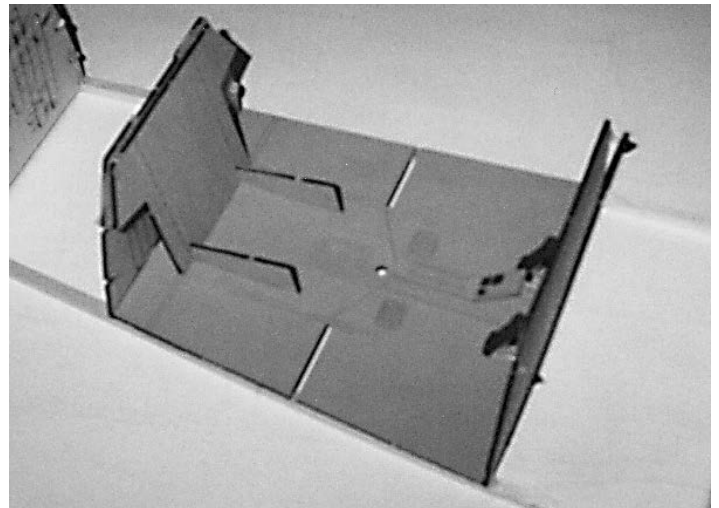
Note: Painting the cockpit pieces prior to installation in most cases will be much easier than trying to paint them after installing. Check color guide at the end of this supplement for painting tips.

6. Glue C1A and C1B together.
7. Glue both C6 Pedestal sides to the cockpit floor. Angle the sides inward so they touch at the top.
8. Glue C7 Aft Pedestal Cover and C8 Forward Pedestal Cover to the pedestal sides.



9. Glue C10 Rudder Pedals to C9 Rudder Pedal Supports.

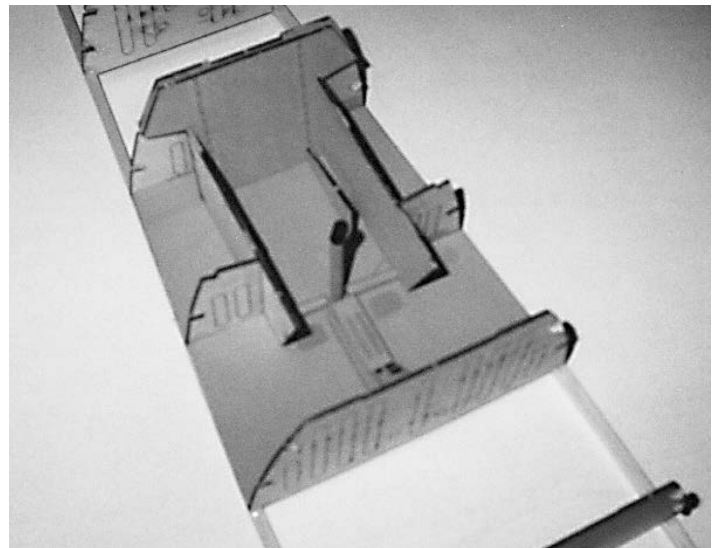
10. Glue rudder pedal assemblies to the cockpit floor.



11. Glue the cockpit floor assembly to the fuselage assembly between F7A and F9A.

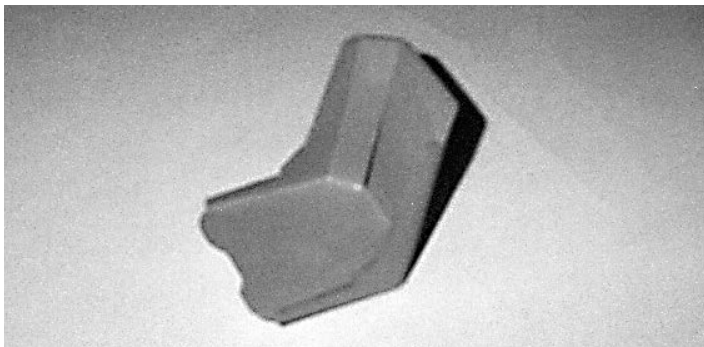
12. Glue C2 Aft Bulkhead to the cockpit floor and F9A.

13. Glue C3 Seat Supports to the cockpit floor and the aft bulkhead.

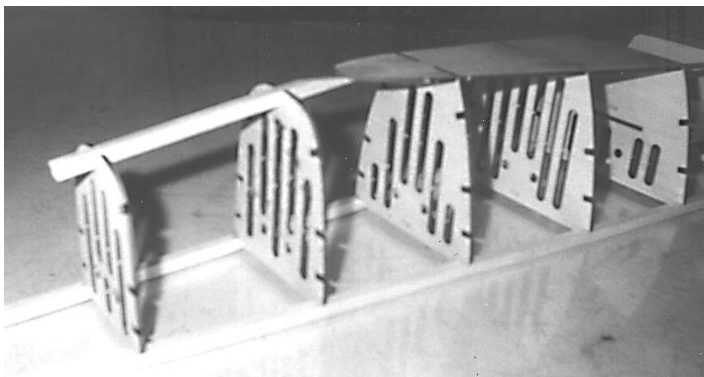


14. Glue C4 Left Console Side Panel to the cockpit floor and the aft bulkhead.

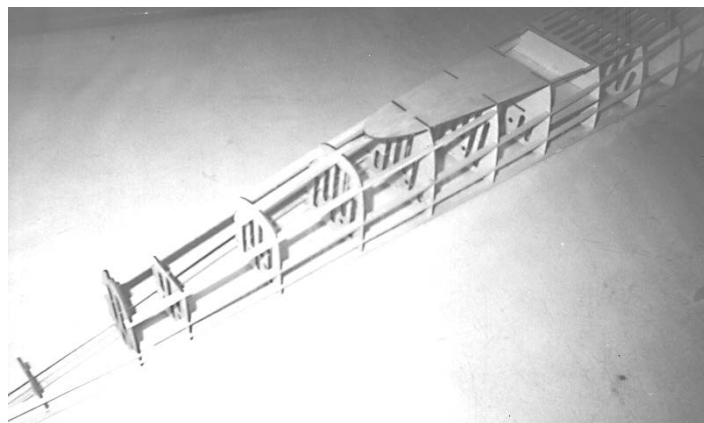
15. Glue C12 Map Holder to C5 Right Console Side Panel at the forward scribe mark.
16. Glue C5 to the cockpit floor and the aft bulkhead.
17. Glue C11 Bulkheads into the slots in the cockpit floor and against the side console panels. See Figure 6.
18. Cut a 2.3 inch piece of 1/4" dowel (supplied) as the stick. Cut an additional piece 0.6" as the hand grip. Sand to an angle, glue together, and glue the stick in place.
19. Cut two additional 1 inch pieces of dowel as control pushrods, and glue to the cockpit floor as shown.



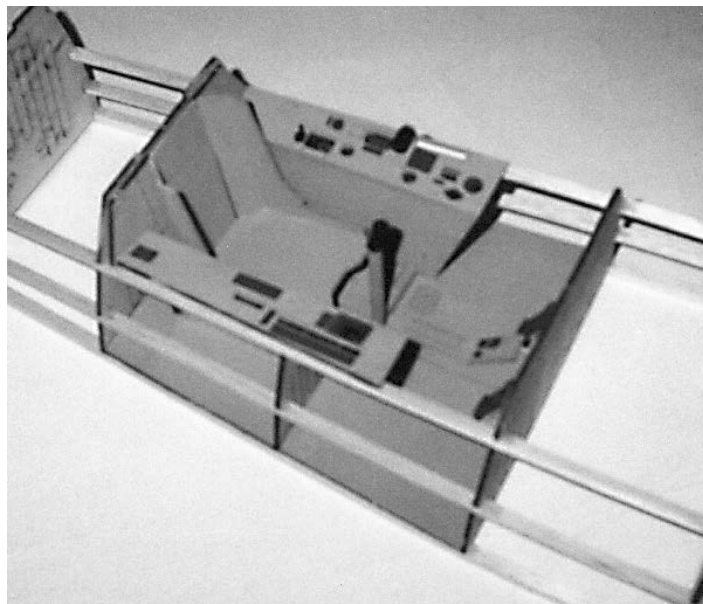
20. Glue C14 Seatback to C13 Seat Bottom.
21. Glue C15 Seat Side Panels to C13 Seat Bottom.
22. Glue C16 Seat Back Chamfers to C14 and C15s.
23. Glue the seat assembly to the seat supports and the aft bulkhead.



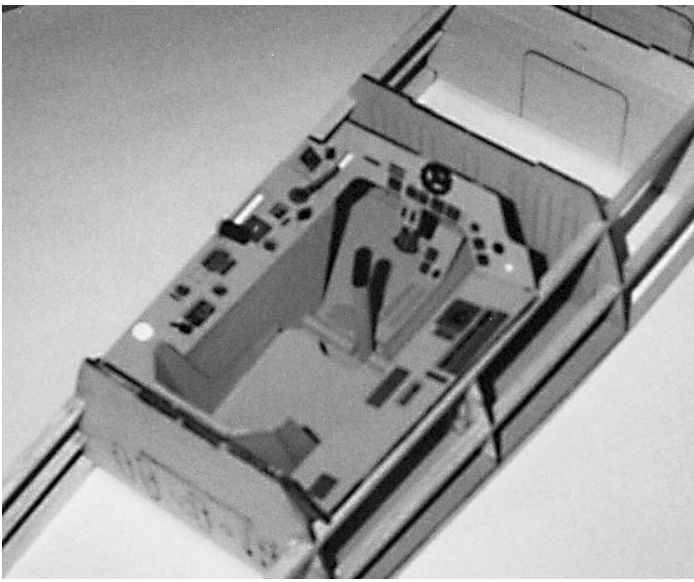
24. Trim F21 at the aft edge of the cockpit to fit behind the seat. Glue F21 in place.
25. Glue pieces of 1/4 x 1/4 balsa stock into the slots in the bulkheads, starting at F13A. This piece will extend to F21, and will need to be beveled where it meets F21.
26. A section of 1/4 x 1/4 balsa will run between F5 and F1A. Glue in place.



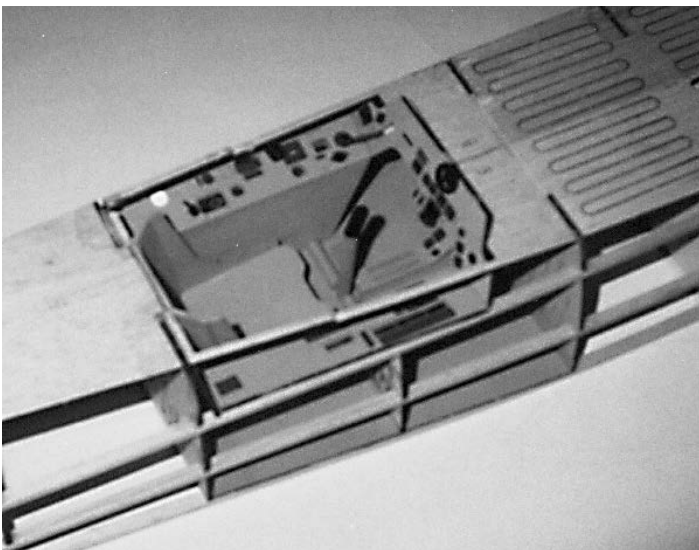
27. Add 1/8 x 1/4 stringers to the fuselage assembly. Add the bottom stringer first - it runs from F18 to F1A. Make sure that the stringer contours correctly at F14A and F15A.
28. A short stringer section will then run from F18 and butt against F14A.
29. The second stringer will run from F15A to F1A.
30. The third stringer will run from F16A, and butt against F10A. The other section will run from F5 to F1A.



31. Cut the left and right console instrument backing from the sheet provided. Glue to the appropriate consoles.
32. Glue the C17 Left Side Console to the console side panel, the aft bulkhead and the stringer. Note that the console will only contact the stringer at the forward edge.
33. Similarly, glue the C18 Right Side Console in place.
34. Cut a 1/4" piece of dowel as the throttle handle, and glue to C19. Glue the throttle assembly into the slot in the left console.



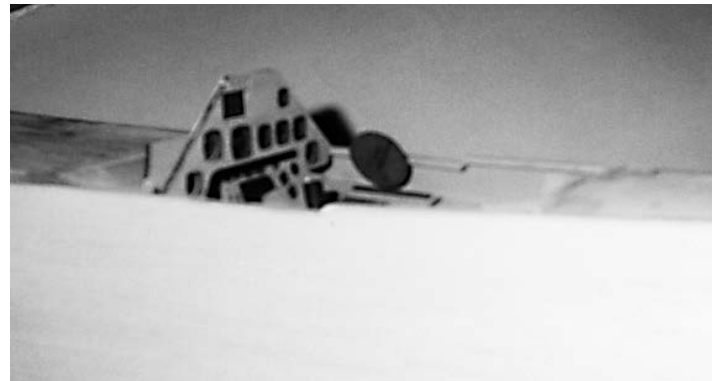
- 35. Cut the lower instrument panel backing from the sheet provided. Glue to the C20 Lower Instrument Panel.
- 36. Glue C22 Cowl Flap Crank to the C20 Lower Instrument Panel. A spot is provided for its location in the slightly right of center upper portion of the instrument panel.
- 37. Glue the C21 Landing Gear Lever into the slot on the left side of the instrument panel. Place it in the Gear Down position.
- 38. Glue the lower instrument panel to the side consoles and the stringers at an angle matching the console sides.



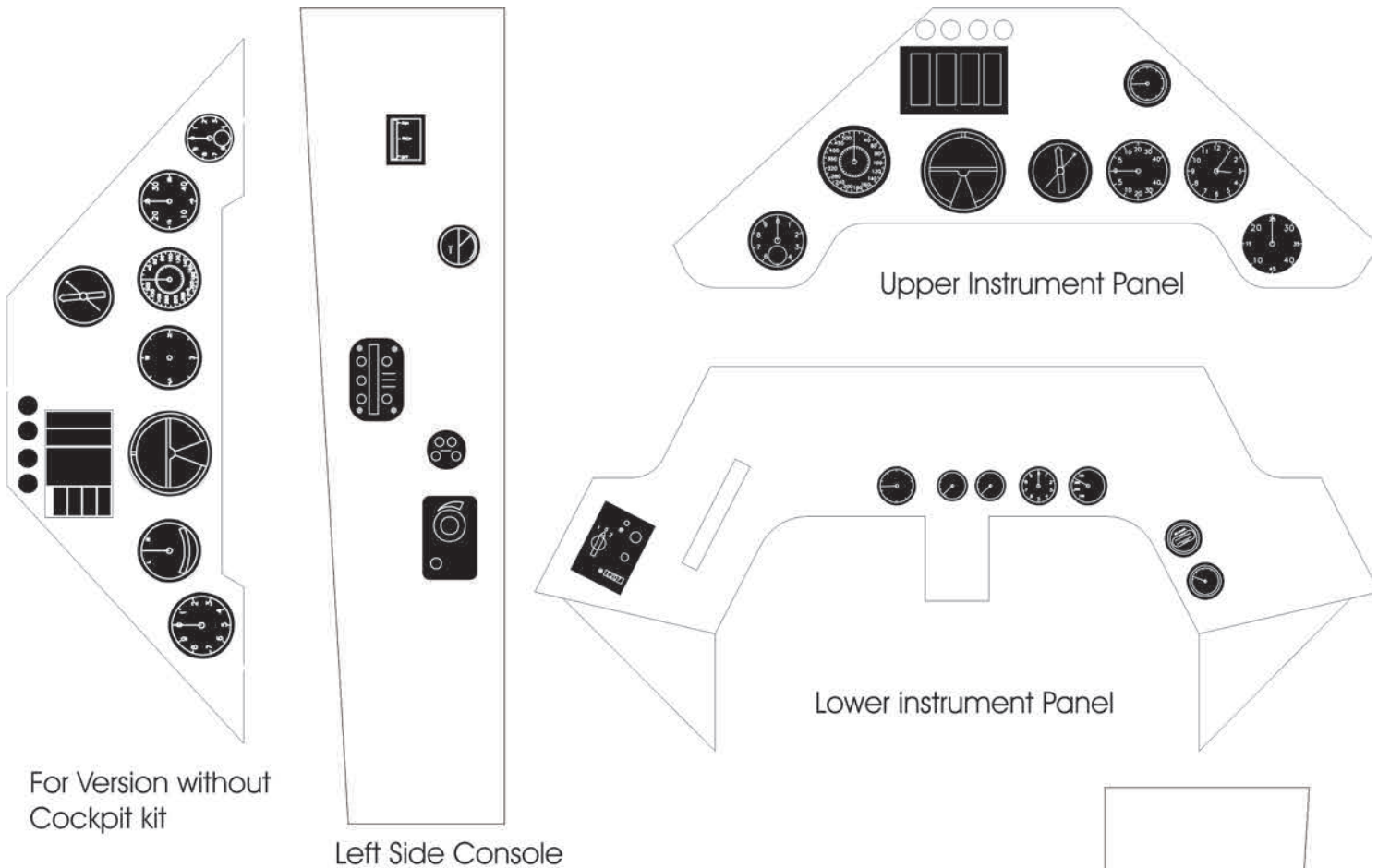
- 39. Cut F20 flush with F7A. Glue F20 to F5A, F6A, and F7A.
- 40. Glue C24 and C25 together. Trim as necessary to fit flush between F20 and the lower instrument panel.
- 41. Glue the arm extensions of F21 and C24/C25 together, preserving the notch. This notch will be

42. At this point, return to the main instruction manual and resume construction of the fuselage from Step 15 on page 15. The only additional point the note is that since the fuse sheeting makes up a portion of the upper cockpit sidewall, it will be easier to paint the inside portion of the sheeting around the cockpit prior to gluing the sheeting in place.

Return to this supplement when you've reached Step 1 of the Final Fuselage Assembly, Page 26.



- 43. Cut the gun hood out and fit to the upper fuselage. Cut the cockpit glareshield to fit as shown on the plans.
- 44. Trim the upper instrument panel to fit with the gun hood in place. Cut the instrument backing out and glue to the panel.
- 45. Glue the upper instrument panel in place 1/2" aft of the lower panel
- 46. Glue C27 Trim Handle to C26 Trim wheel and glue wheel at an angle to cockpit sidewall.



Cockpit Painting

In my research on the Fw190 cockpits, I never found any consistency in the colors used. This may be due to the relatively few 190s left, whims and tastes of the restorers, or the hurried atmosphere toward the end of the war. I found some cockpits all black, but that's pretty dull, and may not be actually authentic. Some were various shades of gray, and some had portions painted in blue! (OK, blue-ish gray)

The following will give you a good contrast to your cockpit:

Light Gray (RLM 63): Cockpit floor, side panels, pedestal, instrument panels, seat, and stick.

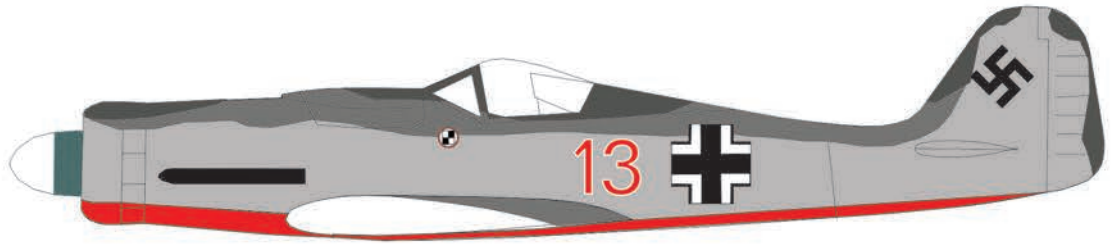
Dark Gray (RLM 66): Instrument bezels, individual instruments on all panels, rudder pedals, and trim wheel.

Black: Throttle, stick grip, Cowl flap wheel.

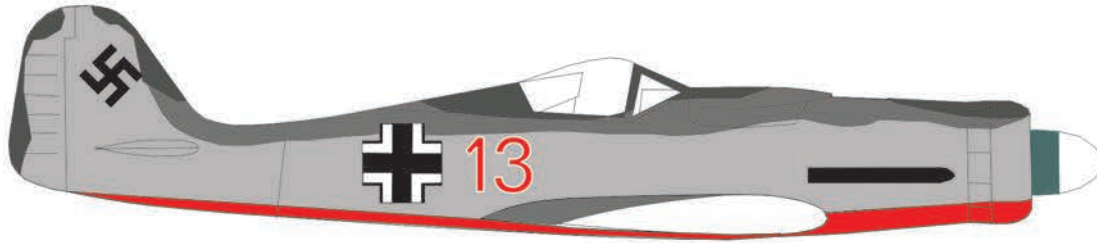
Red: Gear handle knob, emergency jettison handles (the three small rectangles on the lower instrument panel)

Right Side Console

Spinner is half white, half dark green



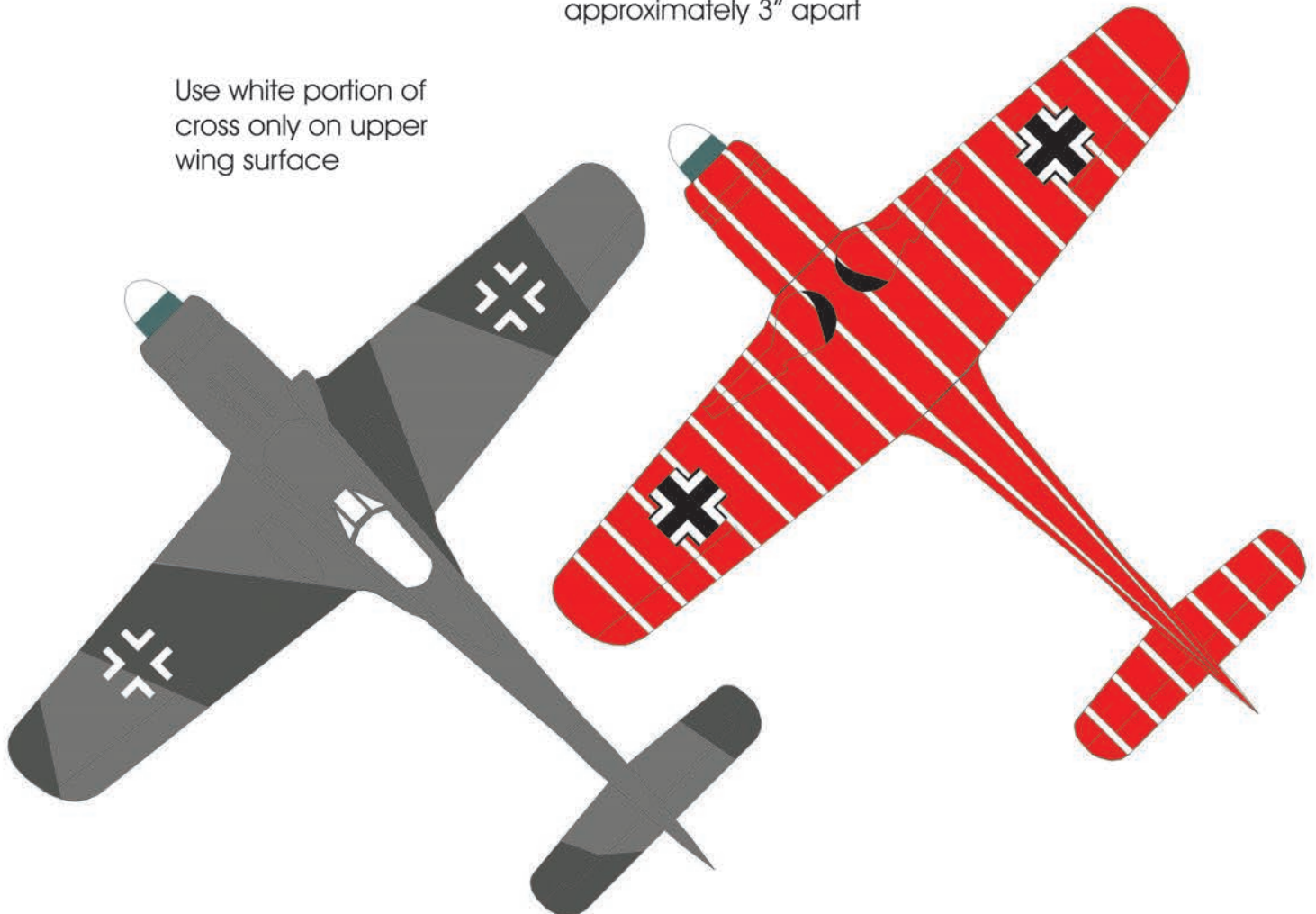
Use black portion of swastika only



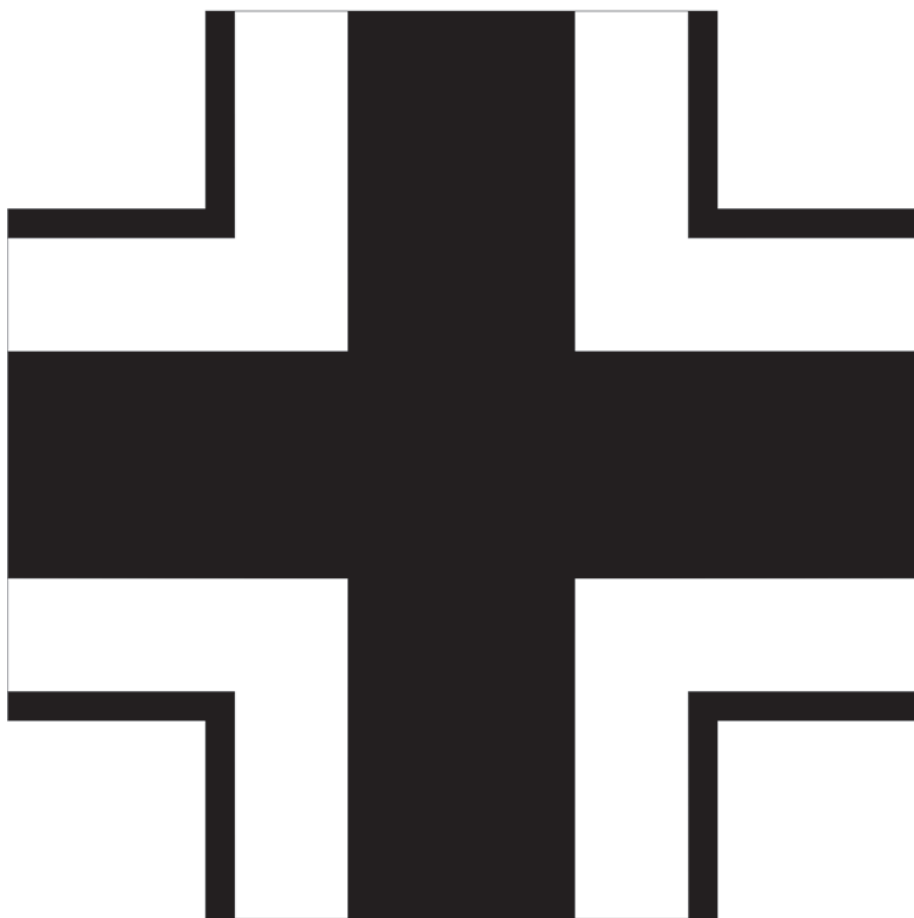
Use only the "1" for Rote 1 - "13" for Rote 13. Checkerboard insignia only on left side

White stripes are 1/2" wide, spaced approximately 3" apart

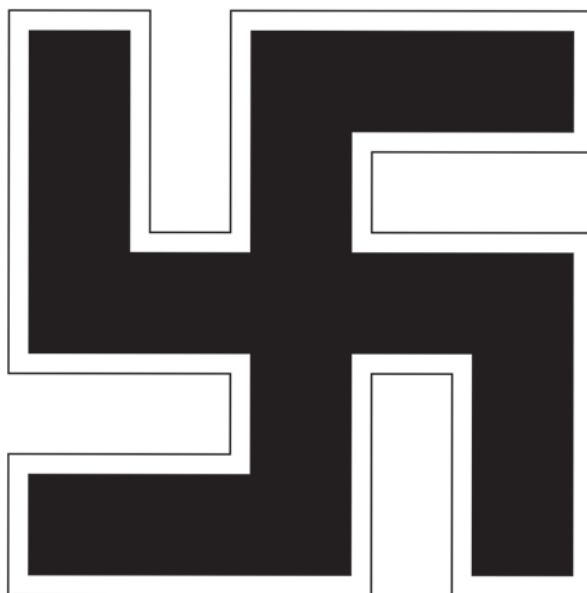
Use white portion of cross only on upper wing surface



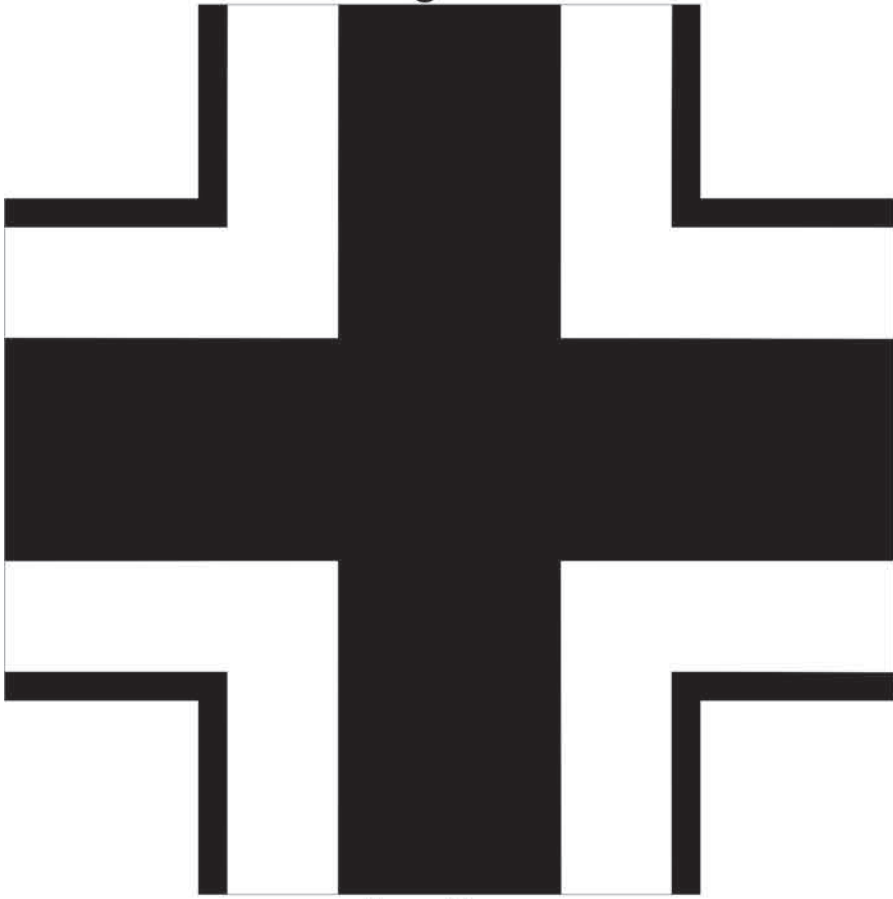
Print these markings on adhesive backed or water slide paper



Lower Wing



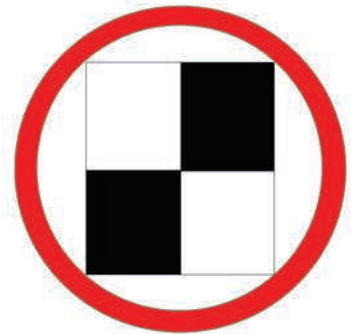
Print these markings on adhesive backed or water slide paper



Upper Wing



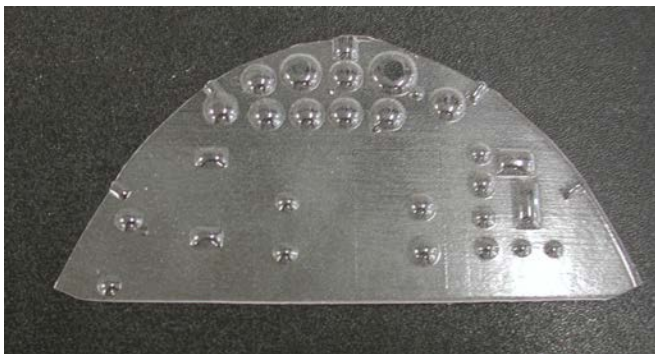
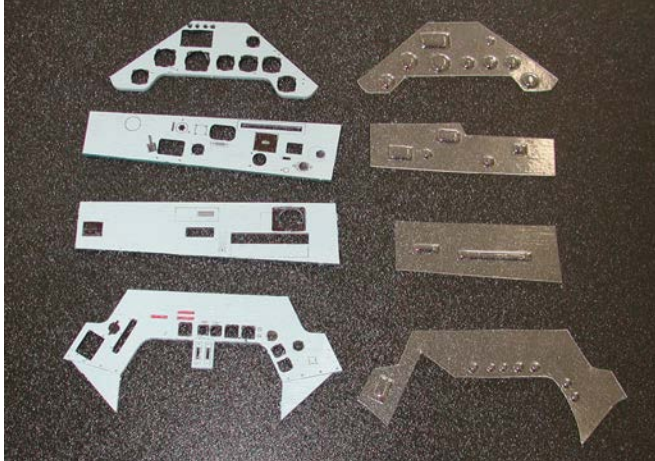
Fuselage



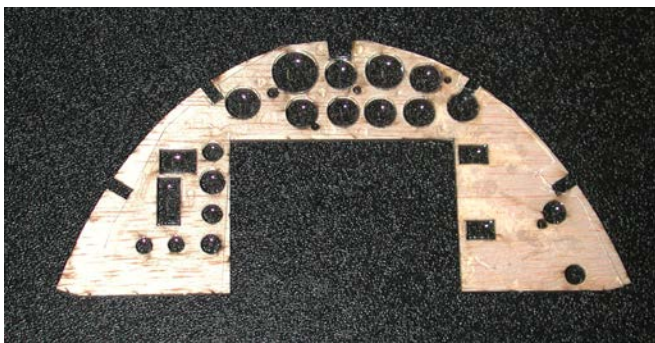
Skyshark R/C

Gauge Face Assembly Instructions

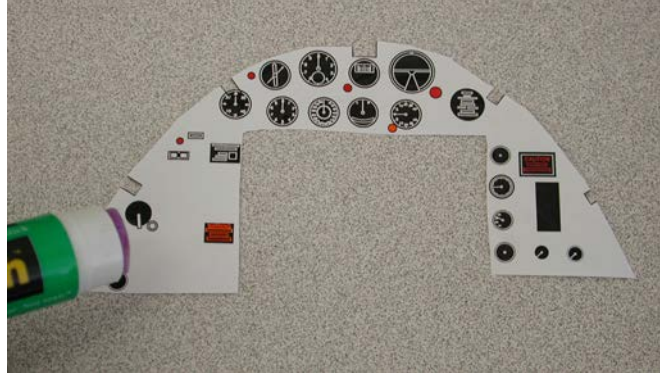
Paper gauge faces are located on the 3-view drawing that are included with the instruction manual.



1. After painting the laser-cut cockpit parts, cut the clear plastic gauge inserts to size. Be sure to cut away any areas where stringers will attach or notches where levers will be inserted.



2. Using a small amount of medium CA, attach the clear gauge insert to the back of the panel so the protruding lenses fit into the laser cut holes.



3. Color any necessary parts of the paper gauge panel and apply glue to the front of the paper. **DO NOT USE CA** for this step (the fumes from the CA will cloud the gauges). We use a Scotch glue stick for our prototypes.



4. Apply the paper to the back of the panel so the gauges line up with the laser-cut holes and allow to dry.